WHITE PAPER: THE ENVIRONMENTAL IMPACTS OF THE MARIHUANA INDUSTRY

September 17, 2018

Michigan Department of Environmental Quality
Marihuana Workgroup

DEQ

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Marihuana cultivation and processing are expanding, as both recreational and medical marihuana products are being legalized across the United States of America (U.S.). In Michigan, medical marihuana is currently legal, and an initiative to legalize recreational marihuana will appear on the ballot in November 2018. Due to the potential full legalization of marihuana in Michigan, a Michigan Department of Environmental Quality (MDEQ) workgroup was formed to assess the environmental risks posed by the marihuana industry.

Air

- Odor from marihuana cultivation and processing is a major concern. Many people are familiar with the pungent odor from burning marihuana. Foul odors are also generated from the cultivation and processing of marihuana.
- Processors often use solvents to extract essential oils that contain medicinal and psychoactive compounds. These solvents pose potential public health impacts and may be subject to existing air pollution control rules.
- Marihuana plants have the potential to emit significant quantities of volatile organic compounds (VOC), which may pose a threat to attainment of the National Ambient Air Quality Standard (NAAQS) for ozone.
- Depending on the nature, size, and scale of the operation, cultivation and processing facilities may be required to obtain a *Permit to Install* (PTI), per Rule 201 of Part 2, Air Use Approval (Part 2 Rules), promulgated pursuant to Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).
- Open burning is another potential concern. The growth and processing of marihuana results in plant wastes, which could pose air quality threats if they were burned as a means of disposal.

Waste

- Any marihuana plant waste should be made unusable and unrecognizable prior to disposal. This can be accomplished by grinding the marihuana waste and incorporating ground, non-consumable materials, such as inedible food waste, kitty litter, municipal solid waste, or other inedible wastes. The mixture should be at least 50 percent non-marihuana waste and should be secured in a locked container until transported off-site.
- Unprocessed marihuana is currently not listed as a hazardous waste. Characterization determinations could change if the unprocessed marihuana comes into contact with certain listed hazardous wastes during the essential-oil extraction processes.
- Marihuana byproducts resulting from chemical treatment have the potential to become characteristically hazardous waste. The MDEQ recommends that any treated marihuana or waste byproduct be fully characterized, on a case-by-case basis, before disposal.
- Inorganic solid wastes can be disposed at a licensed municipal solid waste incinerator or a licensed municipal solid waste landfill.
- Under current regulations, marihuana plant wastes may be disposed at the following: a licensed municipal solid waste incinerator, municipal solid waste landfill, anaerobic digester, or registered composting facility; or the wastes may be composed on-site.

Water

- The cultivation of marihuana plants requires significant quantities of water. The use of the *State of Michigan Water Withdrawal Assessment Tool* (WWAT) will be required prior to beginning any new or increased large quantity withdrawal from groundwater or surface water.
- A Soil Erosion and Sedimentation Control (SESC) permit will be required for any earth change activity that disturbs one or more acres of land or is within 500 feet of a lake or stream.
- Construction activities that disturb one or more acres of land and have a point source discharge of storm water to waters of Michigan (streams, rivers, lakes, and wetlands) are required to obtain a National Pollutant Discharge Elimination System (NPDES) Permit.
- The State of Michigan (State) has assumed authority to administer Section 404 of the federal Clean Water Act (CWA) permitting program, which is the program that regulates the discharge of dredged or fill material into wetlands. The Michigan Department of Attorney General (MDAG) is reviewing if the MDEQ can issue wetland permits for marihuana activities.
- The State has been delegated authority to administer Section 402 of the CWA, which is the NPDES Program. If facilities have a direct discharge of pollutants to surface waters, they must apply to obtain an NPDES permit. Further research and/or discussion with the MDAG is needed to determine if the Water Resources Division (WRD), of the MDEQ, needs to add special language in NPDES permits for marihuana operations.
- The MDEQ does not recommend groundwater (land application) discharges of wastewater from growing or processing facilities.
- Discharge of wastewater from growing or processing to a septic system is not allowed, as only sanitary wastewater can be discharged to a septic system.
- The MDEQ has some concerns with contaminated runoff from these sites. Current storm water regulations would not directly apply to marihuana operations.

Key Recommendations

- Create fact sheets and educational documents for distribution to owners and operators of marihuana cultivation and processing facilities.
- Develop sample city ordinances or guidance for local governments on how to manage odors, as well as other environmental impacts from the marihuana industry.
- Review topics where administrative rulemaking may be necessary to properly manage environmental impacts from the marihuana industry and determine if rulemaking is the appropriate avenue for managing these impacts.
- Continue inter-departmental coordination with the Department of Licensing and Regulatory Affairs (DLARA) and Michigan Department of Agriculture and Rural Development (MDARD); consider developing a task force or formal workgroup to encourage greater coordination across the different agencies impacted by the marihuana industry.
- Develop internal guidance and policies for how MDEQ staff should handle marihuana facilities moving forward. There is a need for consistency across divisions in how communication, complaints, enforcement, and inspections will be handled.
- Assist the Bureau of Medical Marihuana Regulation (BMMR) staff in development of a permanent rule set to replace the emergency rules that regulate the marihuana industry.

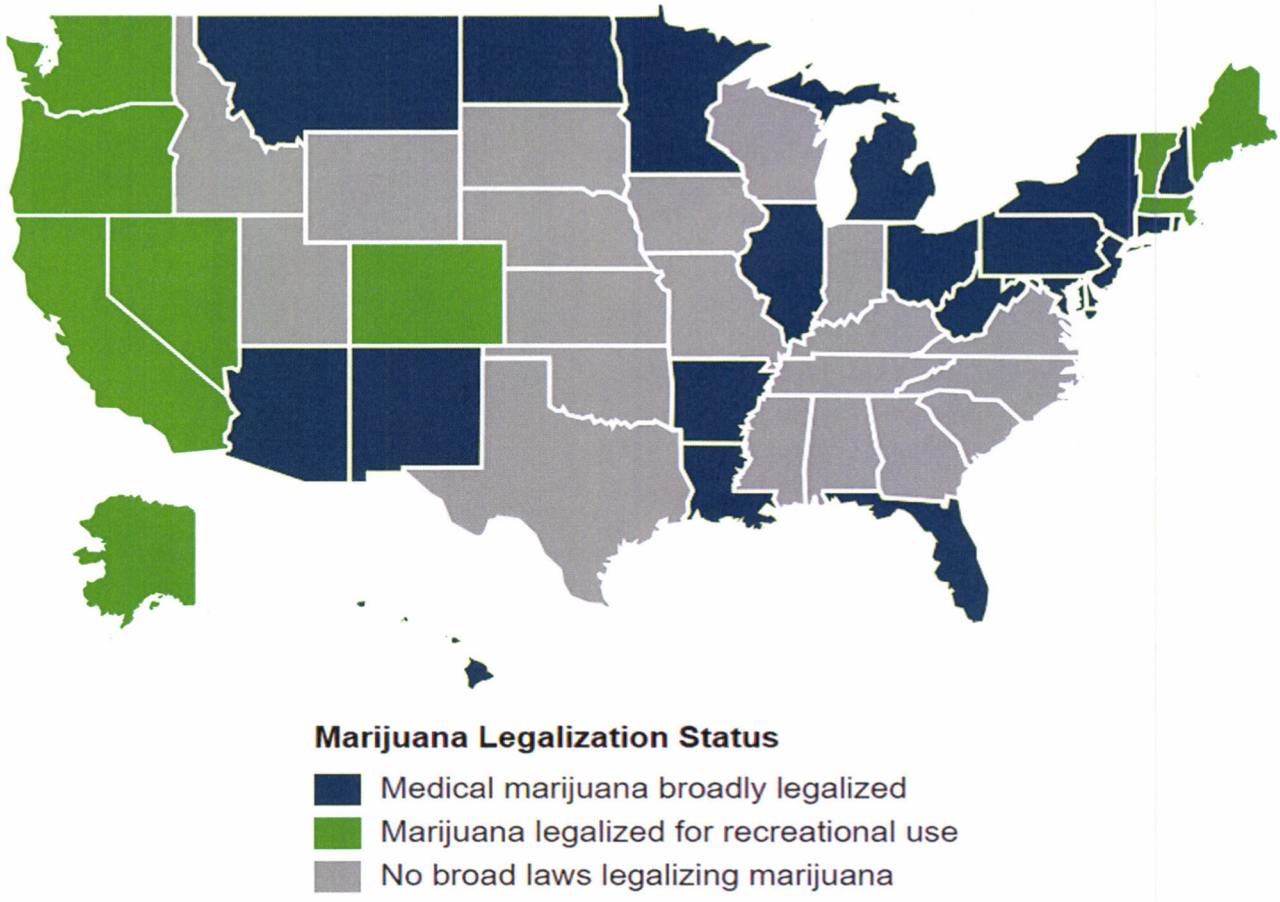
INTRODUCTION

States that have legalized recreational marihuana are beginning to realize the full extent of environmental impacts associated with the marihuana industry. As marihuana operations continue to expand (*Figure 1*),[1,2] state environmental agencies have been working to determine the appropriate method of regulating this industry.

In Michigan, medical marihuana is currently legal and a proposal[3] to legalize recreational marihuana will appear on the November 2018 ballot. Legalization of recreational marihuana could result in a significant increase in production and processing of cannabis. The State must be prepared to address the adverse environmental impacts posed by the marihuana industry. To achieve this goal, the MDEQ formed a marihuana workgroup tasked with assessing the negative environmental impacts that the marihuana industry will have within Michigan.

This white paper examines the environmental impacts posed by the marihuana industry, identifies gaps in the existing regulatory framework, and recommends potential actions the MDEQ may need to take to address the environmental impacts of the marihuana industry.

Figure 1: Legal Status of Marihuana by State



[1] https://en.wikipedia.org/wiki/Timeline_of_cannabis_laws_in_the_United_States#States
[2] http://www.governing.com/gov-data/state-marijuana-laws-map-medical-recreational.html
[3] https://www.regulatemi.org/initiative/

Definition of marihuana

Cannabis is a tall plant that is cultivated to produce drugs and fiber. Marihuana is the dried leaves and flowers of the cannabis plant that has THC (Tetrahydrocannabinol) in a concentration sufficient to produce a psychoactive effect after ingestion. Marihuana is also a natural source of CBD (Cannabidiol), which is not psychoactive and has medical applications. Hemp is a variety of cannabis that has very little THC and is cultivated for its tough fiber, which is used to make rope, cloth, and other products. Throughout this paper, cannabis will be used when referring to the plant and cultivation, while marihuana refers to the drug and its industry.

MICHIGAN'S EXISTING REGULATORY FRAMEWORK

Medical Marihuana

Medical marihuana was legalized with the passing of the Medical Marihuana Act of 2008 (MCL 333.26530). The Medical Marihuana Act created a system of registering patients and caregivers, imposed registration, application, and renewal fees, and provided for the promulgation of administrative rules. To supplement the Medical Marihuana Act, the Michigan Legislature adopted the Medical Marihuana Facilities Licensing Act (MMFLA) in 2016, which spells out the licensing requirements for marihuana cultivation, processing, and provisioning operations.

Through the MMFLA, BMMR, which is housed within the DLARA, was given the responsibility of licensing facilities that grow, process, transport, and sell medical marihuana in Michigan. In December of 2017, the DLARA issued emergency administrative rules to implement the MMFLA. These emergency administrative rules specify how facilities can obtain a medical marihuana license, the criteria by which license approval will be assessed, requirements for tracking and monitoring systems, along with several other requirements surrounding the licensing and operation of medical marihuana facilities in Michigan. The emergency administrative rules remain in effect until November 2018. BMMR staff are currently working to develop a permanent rule set that will replace the emergency rules.

Ballot Petition

A proposal to legalize recreational marihuana will appear on the ballot November 2018. This was a result of successful campaign efforts by the advocacy group, Coalition to Regulate Marijuana Like Alcohol. If passed, the ballot initiative would modify State law to allow legal marihuana possession, use, cultivation, and sale of marihuana for persons 21 years or older. This petition would also allow for taxation of revenue earned from marihuana facilities and would allow for the promulgation of additional administrative rules regarding marihuana possession, use, cultivation, and sale. However, the ballot proposal does not contain language regarding environmental impacts resulting from the legalization of recreational marihuana.

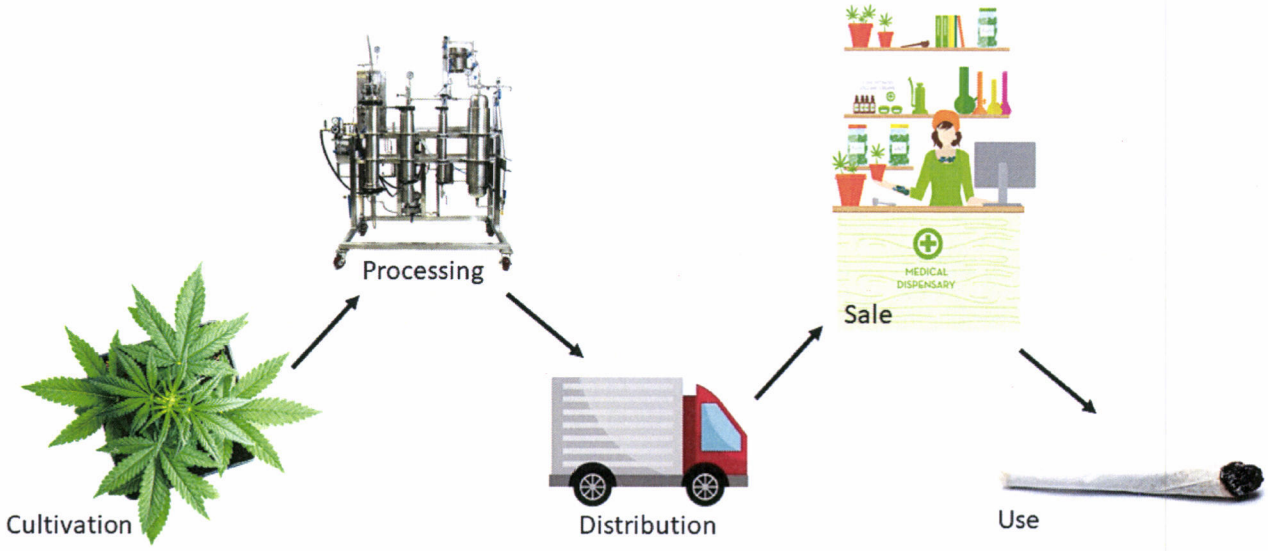
ENVIRONMENTAL IMPACTS OF THE MARIHUANA INDUSTRY

The marihuana industry consists of five stages: cultivation, processing, distribution, sale, and use. An overview of the process is provided in

Figure 2. Cultivation is the stage at which the cannabis plant is grown, either indoors or outdoors. Processing is when the cannabis plant is converted into the final marihuana product that typically involves the use of solvents to extract active ingredients. Distribution involves the transportation of

marihuana products to the dispensaries. Marihuana products are sold through dispensaries and used by the consumer.

Figure 2: Marihuana Industry Overview



Environmental impacts from the marihuana industry are most common during the cultivation and processing stages. These stages are the primary focus of the remainder of this whitepaper. Cultivation and processing operations pose several threats to air, water, and land resources in Michigan. Cultivation and processing may be performed at a single facility or at separate operations. The remainder of this section discusses the environmental risks posed by marihuana cultivation and processing operations.

Cultivation

Cannabis cultivation may occur at indoor or outdoor facilities. Both indoor and outdoor cultivation require similar inputs to the system, such as water, nutrients, soil, and light to successfully grow cannabis. However, differences in conditions between indoor and outdoor cultivation result in unique environmental risks.

For both indoor and outdoor grow operations, the location of these facilities is important in preventing future environmental impacts. Clear-cutting, soil erosion, river diversions, and wetland impacts are among the impacts that marihuana cultivation operations can have on the land and water resources. For example, the state of California has faced issues with grow operations illegally located on federal and state protected lands. There are cases where individuals have clear-cut state protected forestland to establish cannabis cultivation operations. As a result of these illicit marihuana grow operations, Northern California has seen significant land use changes (*Figure 3*).[4] To prevent these impacts, outdoor grow operations should not be located on or near ecologically sensitive areas, and all land changes and water withdrawals should be carefully controlled. In addition, indoor cultivation operations should not be located close to residential areas or in proximity to ecologically sensitive land.

[4] Carah, Jennifer K. et al. High Time for Conservation: Adding the Environment to the Debate on Marijuana Legalization. *Bioscience* 65.8 (2015): 822-829. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4776720/

Cannabis plants require large amounts of water throughout the growth process. Researchers have estimated that growing marijuana requires up to six gallons per plant, per day, resulting in an estimated 412,500 gallons of water used per acre over the growing season.[5] Best management practices such as closed loop and water reuse systems can help reduce the quantity of water required by these facilities.

Due to the high water demand of cannabis cultivation, facilities may utilize illegal surface water withdrawals to irrigate cultivation operations. The state of California has had difficulty dealing with the large scale impacts resulting from illegal operations that intentionally divert streams or drain wetlands to irrigate cannabis plants.

In Michigan, impacts from outdoor marihuana grow operations have already been documented in Arenac County, where outdoor medical marihuana cultivation is allowed. The WRD has been dealing with issues of improper management of wetlands at medical marihuana facilities. A site of approximately 9.5 acres of a high quality, regulated, forested wetland was impacted by illegal tree and stump removal, excavation of a ditch/stream to drain the property, and placement of fill. Another site of approximately one to two acres, high quality, regulated floodplain was damaged by mechanical land clearing, the excavation of ditches to drain the property, placement of fill, and the construction of a grow building. Additionally, the colonization of invasive species occurred at both sites (*Figure 4*).

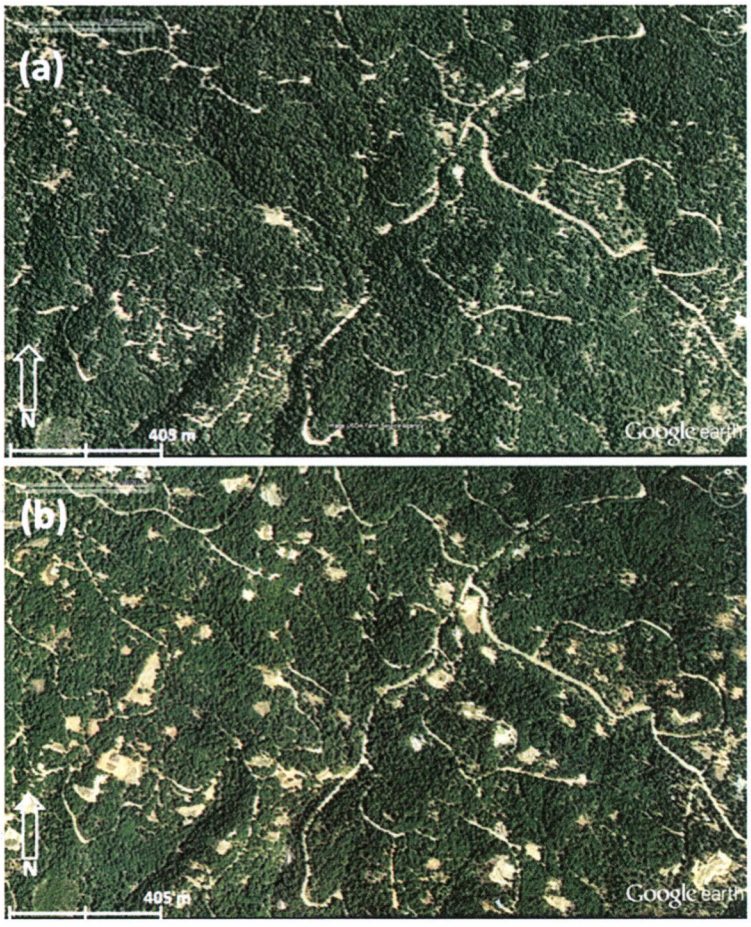


Figure 3: Land clearing and habitat conversion associated with marihuana cultivation in the Trinity River watershed (a) before conversion, 2004, and (b) after conversion, 2012. Source: Carah et al, 2015.

[5] Bauer, Scott et al. Impacts of Surface Water Diversions for Marijuana Cultivation on Aquatic Habitat in Four Northwestern California Watersheds. *PLoS ONE* 10(3).

(a) 9.5 acre site of what was previously high quality forested wetland.

(b) 1-2 acre site of previous high quality flood plain wetland.

Figure 4: Damage due to unlawful activities at outdoor marihuana grow operations in Arenac County.

Nutrient and chemical inputs to the system present another set of environmental challenges. Fertilizers, pesticides, fungicides, and rodenticides are commonly used in marihuana cultivation operations. These nutrient and chemical inputs can be toxic to wildlife, adversely impact drinking water aquifers, result in eutrophication of water resources, and damage septic systems. Nutrient and chemical inputs have a higher likelihood of resulting in adverse environmental impacts in outdoor operations, which are less likely to control and prevent the direct runoff of toxic compounds. WRD staff recommend following best management practices,[6] such as pesticide management, to reduce the impacts of storm water runoff. In addition, the WRD does not recommend discharges to groundwater via a septic system, or discharges of untreated wastewater to the ground or groundwater.

Cannabis plants emit VOCs throughout their growth cycle. These VOC emissions are similar to the biogenic emissions that originate from pine trees. Outdoor grow operations typically have higher emissions to the ambient air than indoor grow operations, due to the lack of physical barriers or control technologies between the plants and the ambient air. Work is ongoing to determine more accurate emissions estimates for both indoor and outdoor grow operations. Preliminary estimates indicate that an average outdoor grow operation emits around 43 tons of VOC per year.[7] There is a potential for hundreds of these operations to emerge across Michigan in a relatively short period of time, resulting in significant increases in VOC emissions in Michigan. These increases in VOC emissions would impact the ability of Michigan to meet the health-based national air quality standards for ozone.

VOCs emitted by cannabis plants are known to have a strong, pungent odor. The odors from growing cannabis plants can pose a nuisance to the surrounding communities in which these cultivation

[6] http://www.michigan.gov/deq/0,4561,7-135-3313_71618_3682_3714-118554--,00.html

[7] Ashworth, Kristi and Wiedinmyer, Christine. Impacts of the Legalization of Marijuana on Emissions and Air Quality in US. http://www.research.lancs.ac.uk/portal/files/145113071/GRC_Poster.pdf

operations are located. Odors from the plants can be mitigated through the use of control technologies, such as activated carbon filtration, negative ion generation, ozone generators, and misting systems. Activated carbon filtration is the most common and widely accepted method of controlling foul odors. Some odor control technologies may also reduce VOC emissions. Odor control plans are an effective way of reducing nuisance odors, beyond just installing control technologies. These plans typically document the nature of odors at the facility, as well as the control technologies and work practices the facility will utilize to minimize the impact of the odors on the surrounding communities.

Indoor cannabis cultivation operations may also use carbon dioxide (CO_2) generators to accelerate plant growth. Two common methods used to generate CO_2 are fermentation and combustion. Fermentation creates CO_2, hydrogen, methane, and other air contaminants. Combustion generates carbon monoxide (CO), nitrogen oxides, particulate matter (PM), sulfur dioxide, and VOCs. In significant quantities, the emissions of these air contaminants may pose public health risks and require a PTI.

The cultivation of marihuana produces solid wastes including stems, seeds, roots, stalks, soils, and other materials. Any marihuana plant waste should be made unusable and unrecognizable prior to leaving the licensed premises. This can be accomplished by grinding the marihuana waste and incorporating with ground, non-consumable, materials that result in a mixture of at least 50 percent non-marihuana waste. Example materials include, but are not limited to, inedible food waste or other organic material, kitty litter, municipal solid waste, or other inedible wastes. Mixture should be secured in a locked container until it is transported off site (*Figure 5*).

Once the marihuana plant waste is made unusable and unrecognizable, the waste may be disposed of at a licensed municipal solid waste landfill, deposited at a registered compost facility, taken to an anaerobic digestor or a licensed municipal solid waste incinerator, or composted in a secure on-site location, to create soil that will be used on-site for further marihuana cultivation.

Figure 5: Grinding of marihuana plant waste. Photo courtesy of www.marijuanaventure.com

Composting[8] may be a desired practice at grow facilities, but it does present some additional concerns. Composting plant material and other organic wastes from growing and processing operations may include fertilizers and toxic pollutants. These pollutants have the capacity to leach into groundwater impacting drinking water sources. Storm water runoff from compost piles can include fertilizers and toxic pollutants, oxygen depleting constituents, extreme pHs, and solids.

Incineration of marihuana wastes may be a safe disposal method in some cases, but it is important to ensure that ambient air quality is not adversely impacted. Open burning of plant wastes results in uncontrolled emissions of pollutants into the air, which can lead to nuisances and odors in surrounding communities. Open burning of cannabis plants specifically poses additional public health concerns, due to the potential psychoactive effects when the smoke is inhaled. If cannabis wastes are to be burned as a means of disposal, it must be at licensed municipal solid waste or hazardous waste incinerator where emissions from the incineration can be controlled.

In addition to plant wastes, waste streams from indoor cannabis cultivation operations may include light bulbs, fertilizers, carbon dioxide canisters, solvents, and pesticides, which all pose potential disposal hazards. These materials should be disposed of according to existing guidance and recommendations.

Processing

Marihuana processing operations convert the cannabis plant into usable marihuana products. These are indoor operations that typically use solvents to extract essential oils from the plant. The extracted essential oils contain THC and CBD and are used to make a variety of marihuana products, such as food items, skin care products, and vapor pen cartridges. Chemicals such as CO, propane, butane, and supercritical CO_2 can be used to enhance oil recovery from marihuana. The use of these solvents and their fate in the environment is the primary environmental concern during the processing stage.

If not properly managed, the solvents and chemicals used in essential oil extraction will end up in wastewater streams or storm water runoff. The pollutants in the wastewater have the potential to impact drinking water sources and damage septic systems. Processing facilities should follow best management practices[9] to reduce the impacts of storm water runoff, and untreated wastewater from processing facilities should not be discharged directly to groundwater or surface water.

Solvents may evaporate during the extraction processes, resulting in potential emissions of hazardous air pollutants and VOCs. Air emissions due to solvent evaporation can be controlled through the use of low-VOC solvents, proper workplace practices, or control technologies. Emissions from processing cannabis may pose additional threats to attaining the NAAQS.

[8] http://www.michigan.gov/deq/0,4561,7-135-3312_4123-185537--,00.html
[9] http://www.michigan.gov/deq/0,4561,7-135-3313_71618_3682_3714-118554--,00.html

While most odor issues associated with marihuana facilities occur during the growth of the marihuana plant, odors are emitted from processing facilities as well. The handling of marihuana plants, along with the chemicals used throughout the processing stage may result in strong or pungent odors. Foul odors from processing facilities can become nuisances and may pose public health and safety threats to neighboring communities. Odors can be mitigated with proper odor controls or an odor control plan.

Solid and hazardous wastes generated at processing facilities must be properly managed to prevent adverse environmental impacts. Processing facilities handle marihuana plant wastes, which should be handled following the same guidelines provided for cultivation facilities. However, processing facilities have additional waste streams generated from the use of solvents during the extraction processes. Waste byproducts resulting from chemical treatment have the potential to become characteristically hazardous in accordance with 40 CFR, Part 261, and R 299.9212, of Part 111, of the NREPA. The MDEQ recommends that any treated marihuana or waste byproduct be fully characterized on a case-by-case basis before disposal.

APPLICABILITY OF EXISTING REGULATIONS

The MDEQ currently administers several programs that will help prevent adverse environmental impacts from the marihuana industry. The following section discusses, by media, the existing regulatory programs that may apply to the marihuana industry.

Air

Prior to operation of a cannabis cultivation or processing facility, the facility may be required to obtain an air quality permit. A PTI is required for any source of air contaminants unless the source is exempt from the permitting requirements. Furthermore, a source of air contaminants may be subject to the requirement to obtain a Renewable Operating Permit (ROP) if the potential to emit one or more criteria air pollutants[10] exceeds applicability thresholds. It remains to be determined whether the character and quantity of air emissions from cannabis cultivation or processing operations are exempt, or if the emissions are great enough to require the owner to obtain a PTI or ROP.

The acceleration of plant growth via CO_2 generation may not be exempt from air pollution control rules if the CO_2 generating equipment produces other air contaminants such as CO, VOCs, and hazardous air pollutants. The Air Quality Division (AQD) may require marihuana growers to calculate the potential to emit from CO_2 generators. Marihuana growers may demonstrate that their CO_2 generators are exempt from the requirement to obtain a PTI, per the exemptions described in Rule 278 - 291 of the Part 2 Rules.

Rule 901 of Part 9, Emission Limitations and Prohibitions—Miscellaneous, promulgated under Part 55, Air Pollution Control, of the NREPA, prohibits the emissions of air contaminants or water vapors that cause or contribute to: "injurious effects to human health or safety, animal life, plant life of significant value, or property" or that result in "unreasonable interference with the comfortable enjoyment of life and property."[11] Rule 901 could apply to odors generated from marihuana cultivation and processing

[10] Criteria pollutants are those for which a national air quality standard has been set. There are six criteria pollutants: carbon monoxide, sulfur dioxide, nitrogen dioxide, particulate matter, ozone, and lead.
[11] http://dmbinternet.state.mi.us/DMB/ORRDocs/AdminCode/1760_2017-006EQ_AdminCode.pdf

facilities. At this time, the AQD is not inspecting odor complaints from medical marihuana facilities, due to the uncertain legal status and potential dangers posed to field staff. Currently, the AQD refers cannabis related odor complaints to local government agencies. However, if recreational marihuana were to be legalized and a more robust regulatory framework were to be developed, the AQD may use its authority under Rule 901 to enforce against odors from marihuana cultivation and processing facilities.

Michigan has laws restricting the open burning of waste and plant debris. Open burning is regulated by the NREPA and fines may be imposed if the law is violated. According to the open burning regulations, businesses are prohibited from burning trash, which would prohibit marihuana cultivation or processing facilities from the open burning of their wastes. Michigan laws also restrict open burning of household wastes, including brush, logs, stems, trees, brush, and clippings. These restrictions would likely apply to marihuana wastes that are disposed of at private households. In addition, local governments often have city or county ordinances regarding open burning. Local ordinances take precedence when they are more restrictive than the State regulations.

Waste

Existing waste regulations are currently used to regulate medical marihuana wastes. These regulations would also apply to recreational marihuana wastes in the event that marihuana is fully legalized. Unprocessed marihuana is currently not listed as a hazardous waste or as a prohibited material consistent with the regulations of either the Resource Conservation and Recovery Act of 1976, as amended (RCRA), or Part 111 of the NREPA. Characterization determinations could change if the unprocessed marihuana were to come into contact with certain listed hazardous wastes, which could have the potential to impact the way marihuana is characterized for disposal. Waste byproducts resulting from chemical treatment have the potential to become characteristically hazardous waste in accordance with Title 40 Code of Federal Regulation, Part 261, Identification and Listing of Hazardous Waste, and R 299.9212 of Part 111, of the NREPA. The MDEQ recommends that any treated marihuana or waste byproduct be fully characterized on a case-by-case basis before disposal.

Solid wastes generated in the cultivation and processing of cannabis can be a concern to public health and the environment if improperly handled. Marihuana waste does not meet the definition of "Yard Clippings" as defined in Part 115, Solid Waste, of the NREPA. Therefore, organic and inorganic solid wastes produced in the growth, production, and processing of medical marihuana may be disposed of in a municipal solid waste landfill or taken to a licensed municipal solid waste or hazardous waste incinerator.

Organic marihuana wastes may be deposited at a registered composting facility that has notified the MDEQ that it will accept medical marihuana waste as a feedstock. The generating facility must maintain records of the amount of medical marihuana waste (by weight or volume) that is sent to compost facilities, and to which compost facilities the material is sent. Composting Best Management

Practices are available to help reduce the impacts of composting on groundwater and surface water.[12,13] The MDEQ plans to use enforcement discretion to allow the transportation of medical marihuana waste to any municipal solid waste landfill or registered composting facility.

In addition to existing MDEQ regulations, the DLARA proposed administrative rule set contains rules related to waste management. The rules require marihuana wastes to be made unusable and unrecognizable through the grinding and mixing of marihuana waste with specific non-consumable solid waste products, such as paper, plastic, cardboard, food, grease, fermented organic matter, soil, or other wastes, as approved by the DLARA. Also, the rules say that marihuana facilities must adhere to applicable State and local laws and regulations related to waste disposal.

Water

Michigan currently has laws that help protect against the significant water usage or withdrawals that large-scale cannabis cultivation operations may require. In 2008 the Michigan Legislature enacted new laws to manage large quantity water withdrawals (more than 100,000 gallons of water per day [gpd]). Prior to beginning any new or increased large quantity withdrawal from groundwater or surface water, Michigan requires the use of the WWAT.[14] The WWAT is used to determine if the withdrawal is likely to cause an adverse resource impact on any aquatic system. If the WWAT determines the withdrawal is not likely to cause an adverse resource impact, the user may register the withdrawal through the WWAT and execute the withdrawal if it is under 2,000,000 gpd. If the proposed withdrawal is in a sensitive area, or the WWAT evaluation indicates there is a potential adverse resource impact, the user is referred to the MDEQ for further review. MDEQ staff complete a site-specific review utilizing additional information and determine the likelihood of an adverse resource impact occurring due to the withdrawal.

All withdrawals above 100,000 gpd are required to report their annual water use to either the MDARD (for farms) or the MDEQ (other withdrawals including municipal water supplies). Fees apply to these annual reports; however, for farms and withdrawals less than 1,500,000 gpd, the annual reporting fee is waived. Withdrawals greater than 2,000,000 gpd require a permit under Part 327, Great Lakes Preservation, of the NREPA. Application fees apply to Part 327 permits, which are subject to public notice and have administrative appeal rights that are not required or available for withdraws between 100,000 and 2,000,000 gpd. If a grower wishes to use municipal water rather than undergoing a water withdrawal, they should consider contacting the municipality to determine if the local system can supply the quantity of water required.

[12] http://www.michigan.gov/documents/deq/deq-wb-nps-odd_250887_7.pdf
[13] http://www.michigan.gov/documents/deq/wrd-storm-industrial-Composting-CompAssistance_483542_7.pdf
[14] http://www.michigan.gov/deq/0,4561,7-135-3313_3684_45331---,00.html

Part 91, SESC, of the NREPA, provides for the control of soil erosion and protects adjacent properties and the waters of Michigan from sedimentation. A permit is generally required for any earth change activity that disturbs one or more acres of land or is within 500 feet of a lake or stream. Part 91, of the NREPA, is administered and enforced by various State, county, and local governmental agencies with oversight from the WRD. Fees are determined locally.

Construction activities that disturb one or more acres of land and have a point source discharge of storm water to waters of Michigan (streams, rivers, lakes, and wetlands) are required to obtain an NPDES permit from the WRD. For sites disturbing one to five acres, the applicant/permittee receives automatic storm water coverage upon the applicant obtaining a Part 91 permit or undertaking the project as an Authorized Public Agency (APA). Although the coverage is automatic, the permittee must comply with the requirements of Permit by Rule (Rule 2190, promulgated under Part 31, Water Resources Protection, of the NREPA). For sites disturbing five or more acres, the applicant/permittee must obtain a permit under Part 91, of the NREPA, (or undertake the project as an APA) and apply for a Notice of Coverage (NOC) with the WRD. Along with the NOC application, the applicant/permittee must submit a copy of the SESC permit, approved SESC plan, site location map, and the permit fee.

Any occupation, filling, or grading below the 100-year floodplain elevation requires a permit from the MDEQ under Michigan's Floodplain Regulatory Authority found in Part 31, of the NREPA.[15] A river, stream, lake, or drain may, on occasion, overflow their banks and inundate adjacent land areas. The land that is inundated by water is defined as a floodplain. In Michigan and nationally, the term floodplain has come to mean the land area that will be inundated by the overflow of water resulting from a 100-year flood (a flood that has a 1 percent chance of occurring any given year).

In 1984 Michigan received authorization from the federal government to administer Section 404, of the CWA, in most areas of Michigan.[16] A State-administered program of Section 404 must be consistent with the requirements of the CWA and associated regulations set forth in the Section 404(b)(1) guidelines.

Part 303, Wetlands Protection, of the NREPA, requires a wetland permit to deposit or allow the placing of fill material; dredge, remove, or permit the removal of soil or minerals; construct, operate, or maintain any use or development; or drain surface water in wetlands that are:

- Connected to one of the Great Lakes or Lake St. Clair.
- Located within 1,000 feet of one of the Great Lakes or Lake St. Clair.
- Connected to an inland lake, pond, river, or stream.
- Located within 500 feet of an inland lake, pond, river, or stream.
- Not connected to one of the Great Lakes or Lake St. Clair, or an inland lake, pond, stream, or river, but are more than five acres in size.
- Not connected to one of the Great Lakes or Lake St. Clair, or an inland lake, pond, stream, or river, and less than five acres in size, but the MDEQ has determined that these wetlands are essential to the preservation of Michigan's natural resources and has notified the property owner.

Prior to issuing a permit, the MDEQ determines that: the permit would be in the public interest; the permit would be otherwise lawful; the permit is necessary to realize the benefits from the activity; no unacceptable disruption to aquatic resources would occur; the proposed activity is wetland dependent; and no feasible and prudent alternatives exist.

---

[15] https://www.michigan.gov/deq/0,4561,7-135-3313_3684_3725---,00.html

[16] https://www.michigan.gov/deq/0,4561,7-135-3313_3687---,00.html

The U.S. Army Corps of Engineers (U.S. ACE) retains federal jurisdiction over traditionally navigable waters including the Great Lakes, connecting channels, other waters connected to the Great Lakes where navigational conditions are maintained, and wetlands directly adjacent to these waters. A joint State and federal permit application is available under these situations.

Federal oversight of State-administered Section 404 of the CWA programs is primarily the responsibility of the U.S. Environmental Protection Agency (USEPA). The MDEQ's 1983 Memorandum of Agreement with the USEPA, Region 5, outlines the procedures to be followed in program administration. Federal agencies must review projects that impact critical environmental areas or involve large quantities of fill. The USEPA reviews about one percent of all applications received. If the MDEQ determines that an application to Michigan's program pursuant to Section 404 of the CWA is subject to federal review, copies of the public notice are sent to the USEPA, Region 5; U.S. ACE Detroit District; and the U.S. Fish and Wildlife Service. The USEPA is responsible for compiling all federal comments and submitting comments on the federal position to the MDEQ.

The MDEQ may not issue a permit that carries Section 404 of the CWA authority if the USEPA objects to the project. This is true even if the applicant successfully appeals the MDEQ's denial of a permit at the administrative level or through a court. People are encouraged to set up a voluntary pre-application meeting with MDEQ staff to minimize project planning costs and delays. Fees apply for the pre-application meeting. The MDEQ offers a Wetland Identification Program (WIP) to assist landowners in identifying wetland and upland areas. Fees apply to the WIP.

In addition to State and federal wetland regulations, local units of government can regulate wetlands by ordinance. In areas where a local wetland permit is required, a permit must also be received from the State before beginning the activity.

Wastewater discharges are carefully regulated and monitored by the WRD. The existing regulations apply to marihuana facilities. A discharge of point source pollutants to surface waters of Michigan is subject to the NPDES program.[17] Discharges to the ground or into groundwater are also regulated by the State.[18]

The NPDES permit process was initiated by the Federal Water Pollution Control Act amendments of 1972. The purpose of the program is to control the discharge of pollutants into surface waters by imposing effluent limitations to protect the environment. Authority to administer this program was delegated to Michigan by the USEPA in October 1973. Under this program, producers and processors could discharge waste to a municipal wastewater treatment plant (WWTP) with an NPDES or groundwater discharge permit or obtain an NPDES permit for a direct discharge to surface water.

If facilities choose to utilize a municipal WWTP to treat and discharge the waste from their operations, they may be subject to the Industrial Pretreatment Program (IPP).[19] The IPP regulates the disposal of industrial wastewater into the sanitary wastewater collection system and is designed to: protect the physical structures and the safety of operation and maintenance personnel of the wastewater system (collection and treatment); protect the health and safety of the public and the environment; and comply with pretreatment regulations as required under 40 CFR, Part 403, General Pretreatment Regulations and Categorical Standards, and local source control ordinances. Fees for this program are determined by the municipality.

[17] http://www.michigan.gov/deq/0,4561,7-135-3313_71618_3682_3713---,00.html
[18] https://www.michigan.gov/deq/0,4561,7-135-3313_4117---,00.html
[19] http://www.michigan.gov/deq/0,4561,7-135-3313_71618_3682_3683_3721---,00.html

If facilities choose to have a direct discharge to surface waters, they must apply to obtain an NPDES permit. If issued, a permittee is responsible for meeting site specific permit limitations. The NPDES Program has application and annual fees.[20] A facility proposing to discharge wastewater into the ground or into the groundwater must apply for a State groundwater discharge permit. Depending on the volume and environmental risk of the discharge, a hydrogeologic investigation of the proposed discharge site may be required. A State groundwater discharge permit may include permit limitations and requirements for a detailed discharge management plan and groundwater monitoring.[21]

DISCUSSION

Regulatory Gaps

The MDEQ's existing regulatory framework is relatively robust and should prevent many of the potential adverse environmental impacts from the marihuana industry. However, the MDEQ may still need to develop additional educational tools, guidance, sample local ordinances, or administrative rules in order to more fully regulate the marihuana industry.

Education is one key aspect of preventing adverse environmental impacts. Marihuana cultivation and processing facilities are subject to a variety of existing rules and regulations of that they may be unaware. Providing guidance documents or educational materials that identify these regulations and inform owners and operators of their required actions helps in preventing environmental impacts prior to operation.

Administrative rulemaking may be needed to add new rules or revise existing ones to apply specifically to environmental impacts of marihuana industries. This may be done through internal MDEQ rulemaking or through coordination with the DLARA.

As was previously mentioned, the DLARA is currently undergoing administrative rulemaking to replace their emergency rules and to ensure more robust regulation of the medical marihuana industry. The rules primarily apply to medical marihuana facilities licensing and tracking, but some do have applicability to environmental regulation, such as the waste regulations contained in their current proposed rules. The MDEQ Marihuana Workgroup has met with BMMR staff involved in rule development and they expressed interest in coordinating with MDEQ in this or future rulemakings, especially as they relate to environmental topics. This rulemaking is too far along to make major changes or additions to at this point. However, there should be opportunities in the future to coordinate with BMMR in administrative rulemaking.

The MDEQ may want to develop guidance or sample ordinances that can be used by local governments to help fill any additional regulatory gaps. One area where sample city ordinances may be needed is odor prevention and control. While the State has rules to enforce against nuisance odors, city ordinances and the requiring odor control plans is likely to be more effective at limiting nuisance odors from cannabis facilities. Cities can adopt ordinances that require marihuana facilities to develop and submit odor control plans prior to operation. These odor control plans would then identify the control techniques or work practices that facilities will use to minimize odors from their facilities.

[20] http://www.michigan.gov/deq/0,4561,7-135-3313_71618_3682_3713-90130--,00.html
[21] https://www.michigan.gov/deq/0,4561,7-135-3313_4117-9782--,00.html

Complicating Factors

The ability of the MDEQ to regulate marihuana may depend on the regulatory approach taken by other State agencies. MDARD has the authority to choose whether or not to classify cannabis as an agricultural product. If it were classified as an agricultural product, marihuana cultivation operations would be required to follow Generally Accepted Agricultural and Management Practices (GAAMPS), established as part of the Right to Farm Act, 1981 PA 93, and these operations may then not be subject to MDEQ rules and regulations. The workgroup has had discussions with MDARD staff, who have said that marihuana is not classified as an agricultural product. However, MDARD staff have also indicated that the classification of marihuana as an agricultural product will be reconsidered if the ballot measure passes. Additional coordination with MDARD staff will be needed regarding the regulation of marihuana cultivation operations.

The illegal status of marihuana at the federal level may complicate the ability of the MDEQ to implement and enforce federally delegated programs. For instance, water permits are handled through federally delegated programs. The WRD is currently working with the MDAG to determine if the statement of the rule that the permit must otherwise be lawful will hinder the DLARA from issuing permits to marihuana facilities. The AQD and the Waste Management and Radiological Protection Division also have federally delegated programs that may face complications in implementation. It remains to be determined whether permitting and enforcement actions would be legitimate under USEPA-approved and federally delegated programs.

CONCLUSION

With the possible legalization of recreational marihuana in Michigan, the State could see a large increase in marihuana operations across Michigan. The MDEQ is already seeing adverse impacts from the cultivation and processing of medical marihuana. Therefore, it is important that the MDEQ be prepared to address these impacts, particularly in the event that recreational marihuana is also legalized in Michigan. The MDEQ must work to ensure that this emerging industry does not threaten the quality of Michigan's air, water, or land resources.

APPENDICES

Appendix A: About this Workgroup and Contact Information

Appendix B: Summary of Regulations in Other States Related to Environmental Impacts from the Marihuana Industry

Appendix C: Additional Resources

APPENDIX A:
THE MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
MARIHUANA WORKGROUP

The Michigan Department of Environmental Quality (MDEQ) Marihuana Workgroup was formed in fall of 2017 and had their first meeting on November 15, 2017. The group is primarily concerned with the environmental impacts faced by the marihuana industry and how the MDEQ can best work to address and prevent these impacts. The whitepaper was created and compiled by members of this workgroup and represents a summary of the information collected thus far on this industry.

MEMBERS

Jack Schinderle (Group Lead), Waste Management and Radiological Protection Division

Christine Alexander, Water Resources Division

Amanda Bosak, Water Resources Division

Jenifer Dixon, Environmental Support Office

Aaron Hiday, Waste Management and Radiological Protection Division

Robert Elmouchi, Air Quality Division

James Ferritto, Waste Management and Radiological Protection Division

Craig Fitzner, Air Quality Division

Kaitlyn Leffert, Air Quality Division

Duane Roskoskey, Waste Management and Radiological Protection Division

Brian Rudolph, Water Resources Division

Justin Tinker, Water Resources Division

Rhonda Oyer, Waste Management and Radiological Protection Division

Aashika Sulabelle, Intern

APPENDIX B:
MARIHUANA ENVIRONMENTAL LAWS BY STATE

ALASKA

The state requires owners of cultivating and processing facilities to have proper licensing to operate.[1] Facilities may also be subject to specific taxes and fees associated with marihuana production.

To obtain and keep licenses, owners must adhere to regulations that outline proper solid and liquid waste disposal,[2] approved pesticides and sanitizers, water irrigation methods, odor control measures, and facility ventilation. Facilities must also be mindful of approved solvents/gases for extraction processes and diligent in maintaining records and including labels which cite pesticides and chemicals used in cultivation. Inspections may be unannounced, and the state reserves the right to retract licenses should facilities pose public health risks.[3] At this time, there are no wastewater permits required for cultivators. However, cultivators who wish to discharge wastewater directly into surface waters can only do so after receiving an Alaska Pollutant Discharge Elimination System permit. This permit also requires routine monitoring which is to be paid for by the permittee.

Additionally, local governments may soon be allowed to address odor control if they go through a local approval process; a processing fee would be added.[4] Home growers may possess up to six plants, with three or fewer being mature. Personal use in public is not allowed and must be done on privately owned property. In addition to the Clean Air Act's implementation, Alaska has recently made it illegal[5] to smoke any substance in most public spaces across the state; marihuana cafes and lounges are still legal, so long as the establishment has the correct authorizations.

CALIFORNIA

Proper licensing is required by the state to process and produce marihuana.[6] Random inspections and compliance checks will be conducted to ensure that facilities are up to code.

Standards to be upheld are inclusive of proper water catchment systems, solid and liquid waste disposal, pesticide and herbicide usage, and irrigation methods. Plants must also be tracked and traced throughout the entire process of cultivation. Cultivation sites and/or licensees may lose their right to marihuana processing and license renewals should there be repeat compliance offenses or adverse watershed and wildlife impacts. Certain cultivation sites may face higher fees if their

---

[1] *Alaska Administrative Code, Chapter 306 Regulation of Marijuana Industry, Article 1 Licensing; Fees, Section 420 Marijuana cultivation facility license required*

[2] *Alaska Administrative Code, Chapter 306 Regulation of Marijuana Industry, Article 7 Operating Requirements for All Marijuana Establishments, Section 740* Waste disposal

[3] *Alaska Administrative Code, Chapter 306 Regulation of Marijuana Industry, Article 4 Marijuana Cultivation Facilities, Section 465 Random sampling*

[4] *Alaska Administrative Code, Chapter 306 Regulation of Marijuana Industry, Article 2 Local Options, Sections 200 - 260*

[5] *Alaska Administrative Code, Chapter 306 Regulation of Marijuana Industry, Article 8 Enforcement, Civil Penalties, Sections 800 - 850*

[6] *California Code of Regulations, Title 3 Food and Agriculture, Division 8 Cannabis Cultivation, Chapter 1 Cannabis Cultivation Program, Article 3. Cultivation License Fees and Requirements, Section 8200 Annual License Fees*

operation poses potential increased threats to environment and health, and sites that require remediation may also incur additional fees.

During the establishment of a marihuana business or grow operation, most jurisdictions in California require an odor control plan, approved by a licensed engineer, when owners apply for Use Permits or Building Permits. For any cannabis cultivation licensing, documentation of water source is required during the application process. Cannabis cultivators who intend to divert surface water require a water right to irrigate their plants.[7] Water rights have also recently been made available for small domestic use; however, owners are prohibited from doing so during the dry season. Those with contained springs may be exempt from flow requirements under specific conditions.

By July 1, 2019, all cannabis cultivators will be required to transition to the Cannabis General Order (in adherence with NPDES) which requires compliance in areas related to waste water discharge, storm water, water quality, irrigation, pesticide regulation, environment and wildlife, industrial water usage, and pollution.[8]

Home growers can have up to six plants and personal usage is prohibited in public. Some counties have begun issuing permits for marihuana smoking lounges after health officials were able to update regulations earlier in 2018.

COLORADO

Facilities and cultivation sites are required to abide by strict compliance regulations.[9] Depending on the medium, waste must be properly disposed of and made unrecognizable. During cultivation and during waste disposal, the plants themselves must be tracked in inventory and records. Pesticides and agricultural chemicals must be approved, and water must also be responsibly sourced from regulated water systems, as defined by the state.[10] Marihuana cultivators are required to apply for well permitting and water rights, should they intend to utilize such water sources. Additionally, some local jurisdictions (e.g., Denver) have implemented procedures to mitigate and control odor at marihuana facilities. In such instances, cultivators are required to have approved odor control plans, keep records, specify odor emitting activities, have authorized engineering controls, and undergo inspections.

Retailers may also be subject to an additional marihuana tax for wet whole plants, which reflects an allowance for water and waste. Marihuana plants are classified as noxious weeds. Also, bills are awaiting signature concerning allowable uses of reclaimed wastewater, allowable recyclable uses of marihuana waste, and research funding towards industrial hemp development and utilization.

---

[7] *California Code of Regulations, Title 14 Natural Resources, Division 1 Fish and Game Commission-Department of Fish and Game, Subdivision 3 General Regulations, Chapter 3. Miscellaneous (Refs & Annos), Section 699.56 Fees for Lake and Streambed Alteration Agreements:*

[8] *California Code of Regulations, Title 23, Waters, Division 3 Safe Water Resources Control Board and Regional Water Quality Control Boards, Chapter 9 Waste Discharge Reports and Requirements, Article 1 Fees, Section 2200.7 Annual Fee Schedule for Marihuana Cultivation*

[9] *Code of Colorado Regulations, Industrial Hemp Regulatory Program Act, Title 35, Article 61, Section 1203 Administration and Enforcement of the Industrial Hemp Regulatory Program Act*

[10] *Code of Colorado Regulations, Industrial Hemp Regulatory Program Act, Title 35, Article 61, Section 1203-2 Pesticide Applicators' Act*

Home growers are allowed up to six plants, with as many as three plants flowering at once. Public consumption of marihuana that endangers others is prohibited. Marihuana smoke is subject to the Colorado Clean Indoor Air Act, the same as tobacco smoke; however, cannabis lounges and cafes are on the rise, as the state recently issued its first licenses which allow the use of marihuana on a business premise.

MAINE

Maine Department of Health and Welfare is entitled to take action to ensure compliance. This can mean collecting samples and/or performing lab testing on soil and marihuana plant specimens from facilities and dispensaries. Mandatory testing,[11] notification requirements, sampling test results, and contamination testing for residual solvents, poisons, pesticides, insecticides, and bacteria are required. Contaminated marihuana must also be destroyed and disposed of responsibly. Proper regulation and control of cultivation, manufacturing, and retail may be adopted and amended by the Commissioner of Agriculture to ensure public safety. [12]

Licenses to grow marihuana for commercial purposes will be doled out in lottery fashion with state caps on the number of licenses given out to prospective marihuana cultivators. [13]

Home growers may cultivate up to six flowering plants at their primary residence, on property owned by them, and plants must be tagged and tracked.[14] Public usage is prohibited.

MASSACHUSETTS

Cultivation processes are to follow regulations which limit contamination, such as mold, fungus, bacterial disease, rot, and pests, and should also use approved pesticides.

During all processing: solid waste containing cannabis must be ground up and made unusable for its original purposes; liquid waste containing by-products are to be disposed of in a manner that does not pollute surface or ground water; storing waste must be done so in accordance with local statutes; waste and litter are to be disposed of in a manner that minimizes odor and pest attraction.

Marihuana may only be labeled "organic" if cultivation abides by U.S. Department of Agriculture's organic requirements. Home growers may not have more than six flowering plants growing in their primary, private residence and marihuana usage is prohibited in public spaces, such as parks, public transportation, schools, sidewalks, etc.

---

[11] *Maine Revised Statutes, Title 7 Agriculture and Animals, Part 5 Plant Industry, Chapter 417 Marijuana Legalization Act, Section 2445 Independent testing and certification program*

[12] *Main Revised Statutes, Title 17-A Main Criminal Code, Part 2 Substantive Offenses, Chapter 45 Drugs, Section 1117 Cultivating Marihuana*

[13] *Maine Revised Statutes, Title 7 Agriculture and Animals, Part 5 Plant Industry, Chapter 417 Marijuana Legalization Act, Section 2447 License application and issuance*

[14] *Maine Revised Statutes, Title 7 Agriculture and Animals, Part 5 Plant Industry, Chapter 417 Marijuana Legalization Act, Section 2452 Personal use of marihuana*

NEVADA

Growers and handlers must keep inventory of the cultivating property. Facilities are to abide by compliance regulations, inclusive of safe ventilation systems,[15] which control the enclosed space, proper disposal of all solid or liquid waste and wastewater, and responsible use of any agricultural chemicals.[16]

Marihuana facilities may also be subject to unannounced compliance checks and must complete random sampling tests for contamination and safety risks. Any costs of remediation or mitigation of environmental damages due to marihuana cultivation, manufacturing, distribution, or disposal fall upon the facility to cover.[17]

Some local departments have implemented odor control and nuisance measures (e.g., Clark county) which oversee facilities' odor emissions, odor mitigation practices, engineering controls, complaints, and records.

Additionally, the cultivation of industrial hemp is permitted only if hemp research is being conducted under designated pilot programs or other academic research. Public consumption of marihuana is prohibited, no exceptions. A public place is defined as anywhere the public is invited, and violators will be charged with a misdemeanor.

Home growers are limited to possession of six plants per person, or 12 plants per private household, but only if there is no licensed marihuana retail store within 25 miles of residence. Up to six plants may be "growing" or "flowering" at any one given time.

OREGON

The Oregon Department of Environmental Quality (ODEQ) does not regulate growing/processing of marihuana, but businesses are required to abide by pre-existing regulations intended to safeguard air, water, and land. If a cultivator is in risk of violating the ODEQ's regulations, permits for air contaminant discharge, volatile organic compounds, odor nuisances, and/or burning are required.

To renew licenses, cultivators and processors are required to use only approved pesticides, submit a report of water and electrical usage, use approved extraction methods and chemicals, and abide by all waste disposal requirements. Cannabis waste must be disposed of responsibly in a manner that makes the original plant unrecognizable and unfit for human/animal consumption.

Additionally, all solid and liquid waste must be disposed of in accordance with regulations set by the ODEQ's air emissions, waste water, and hazardous waste. Regulated water irrigation methods must also be applied, and facilities are to have proper ventilation. Only licensed and accredited laboratories may test industrial hemp; the selling of industrial hemp products is prohibited unless the product has been laboratory tested and approved for safe consumption.

---

[15] *Nevada Administrative Code, Chapter 453A – Medical Use of Marijuana, Production and Distribution of Medical Marijuana, Requirements for the Extraction of Concentrated Cannabis and the Production of Edible Marijuana Products and Marijuana-Infused Products, Section 574 Ventilation and Hood Systems*

[16] *Nevada Administrative Code, Chapter 586 Nevada Pesticides Act, Section 550 Pesticides used on Marijuana and Medical Marihuana*

[17] *Nevada Administrative Code, Chapter 557, Industrial Hemp Growers, Handlers and Producers of Industrial Hemp not for Agricultural or Academic Research, Grower to Provide Description of Cultivation Property:*

Home growers are allowed to possess up to four plants on their private property and public usage of marihuana is prohibited. Any utilization of marihuana inhalant delivery systems in all public spaces and businesses are prohibited, as per Oregon's Clean Air Act.[18] Oregon has specific permits for air quality contaminants in compliance with Title V of the Clean Air Act, but there is no specific mention of marihuana.

The state also requires reports of greenhouse gas emission levels. Businesses which emit more than 25,000 metric tons are required to report to the U.S. EPA, which may be the case with larger commercial indoor grow operations associated with greater energy usage.

VERMONT

The use of marihuana in public is not permitted; public spaces may be defined as streets, alleys, parks, or public buildings other than individual dwellings.[19]

Home cultivators are limited to 2 mature plants or 4 immature plants per household.

The manufacturing of concentrated marihuana by chemical extraction is not allowed unless authorized by a dispensary.

WASHINGTON

When applying for marihuana licensing, applicants are required to submit a plan which outlines security, safe transport, and responsible waste testing and disposal methods [20, 21] Outdoor growing operations may be denied development permits if water is not physically or legally available at the site.

If the cultivating land does not have water rights already attached to it, owners may have to obtain water through a water right from a public utility district or irrigation district, go through the process of obtaining a water right permit, or apply for a water right permit exemption intended for industrial uses of water.

Water right exemptions may also be available for small uses of water. Commercial growers are prohibited from using irrigation from their respective irrigation districts if the water is sourced from a U.S. Bureau of Reclamation water facility (i.e., reservoirs, canals, pumps, etc.), as stated under the Controlled Substance of 1970. However, rain water may be collected and/or stored, and does not require a water right. Also, groundwater from exempt wells can be pumped to storage tanks as

---

[18] *Oregon Revised Statutes, Volume 11, Chapter 468A Air Quality, Section 020 Application of Air Pollution Laws*

[19] *Vermont Statutes Online, Title 18 Health, Chapter 084 Possession and Control of Regulated Drugs, Subchapter 001 Regulated Drugs, Section 4230 Marihuana Usage in Public Spaces, (a) Possession and Cultivation*

[20] *Washington Administrative Code, Title 314 Liquor and Cannabis Board, Chapter 55 What is a marijuana producer license and what are the requirements and fees related to a marijuana producer license, Section 075* (1.ii.b.) *Requirements and Fees for Marihuana Producer License:*

[21] *Washington Administrative Code, Title 314 Liquor and Cannabis Board, Chapter 55 What is a marijuana producer license and what are the requirements and fees related to a marijuana producer license, Section 097 Marihuana Waste Disposal – Liquids and Solids*

part of rainwater collection systems, that is, if the 5,000 gallons per day limit is not exceeded. Marihuana licensees are not eligible for license renewals if their property is within 1,000 feet of public property grounds, or if licensees are in serious breach of regulations.

Processors and facilities are subject to regular compliance checks, which will check for proper ventilation, safe use of solvents in extraction,[22] proper disposal of solid and liquid waste, and approved application of crop aids. Any revenue collected from fees are to be deposited into an account that resides within the agricultural local fund. In terms of air quality, marihuana facilities are subject to odor and air pollutant regulations.

Additionally, because marihuana processors are volatile organic compounds and sources of odor, air permits, fees, and certain registrations are required by the state. Some counties in the state are even required to obtain an Order of Approval from the Puget Sound Clean Air Agency. The processing of industrial hemp (except seed) as food, extract, oil, cake, concentrate, resin, or other preparations for topical use, oral consumption, or inhalation is prohibited.

Washington may adopt rules as needed to monitor licensing and permitting of hemp research, as well as adopt any standards for marihuana production which are consistent with the Director of Agriculture and Marketing's program. Home growers are limited to four plants per household and it is illegal to use marihuana in view of the public.

WASHINGTON D.C.

Home cultivators may grow up to six marihuana plants, of which no more than three can be mature, on private residence. Marihuana smoking, eating, or drinking in public spaces, such as streets, parks, alleys, vehicles on streets, etc., is prohibited.[23]

Prepared by: DEQ Interns led by Aashika Sulabelle

[22] *Washington Administrative Code, Title 314 Liquor and Cannabis Board, Chapter 55 What is a marijuana producer license and what are the requirements and fees related to a marijuana producer license, Section 104 Marihuana Processor License Extraction Requirements*

[23] *Washington D.C. Law 20-153 Legalization of Possession of Minimal Amounts of Marijuana for Personal Use Initiative of 2014*

APPENDIX C:
USEFUL RESOURCES

For more information regarding other states' cannabis and marijuana programs, see the links below.

ALASKA
Marijuana Industry Info Webpage
Marijuana Growing and Processing Wastewater FAQ

CALIFORNIA
State Board – Cannabis Cultivation Water Quality

OREGON
Business Readiness Guidebook
Recreational Marijuana FAQ Webpage

WASHINGTON STATE
Regulatory Guidance for Indoor Marijuana Producers
Regulatory Guidance for Cannabis Operations
Puget Sound Clean Air Agency: Marijuana Producer/Grower/Processor Permit Application

CITY OF DENVER
Cannabis Sustainability Webpage
Best Management Practices: Commercial Medical Marijuana Cultivation
Cannabis Environmental Best Management Practices Guide
Executive Summary: Cannabis Environmental Best Management Practices Guide
Odor Control Plan Review Checklists: Marijuana Cultivation, Marijuana Infused Products

NATIONAL
Domestic Cannabis Cultivation Assessment (2009)