



Forensic Analytical

# Health and Safety in the Cannabis Industry

**Presented by:**

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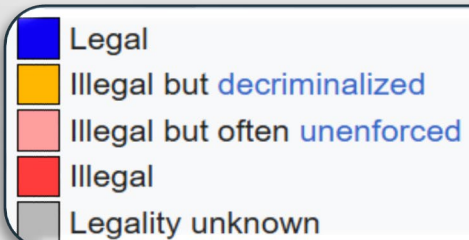
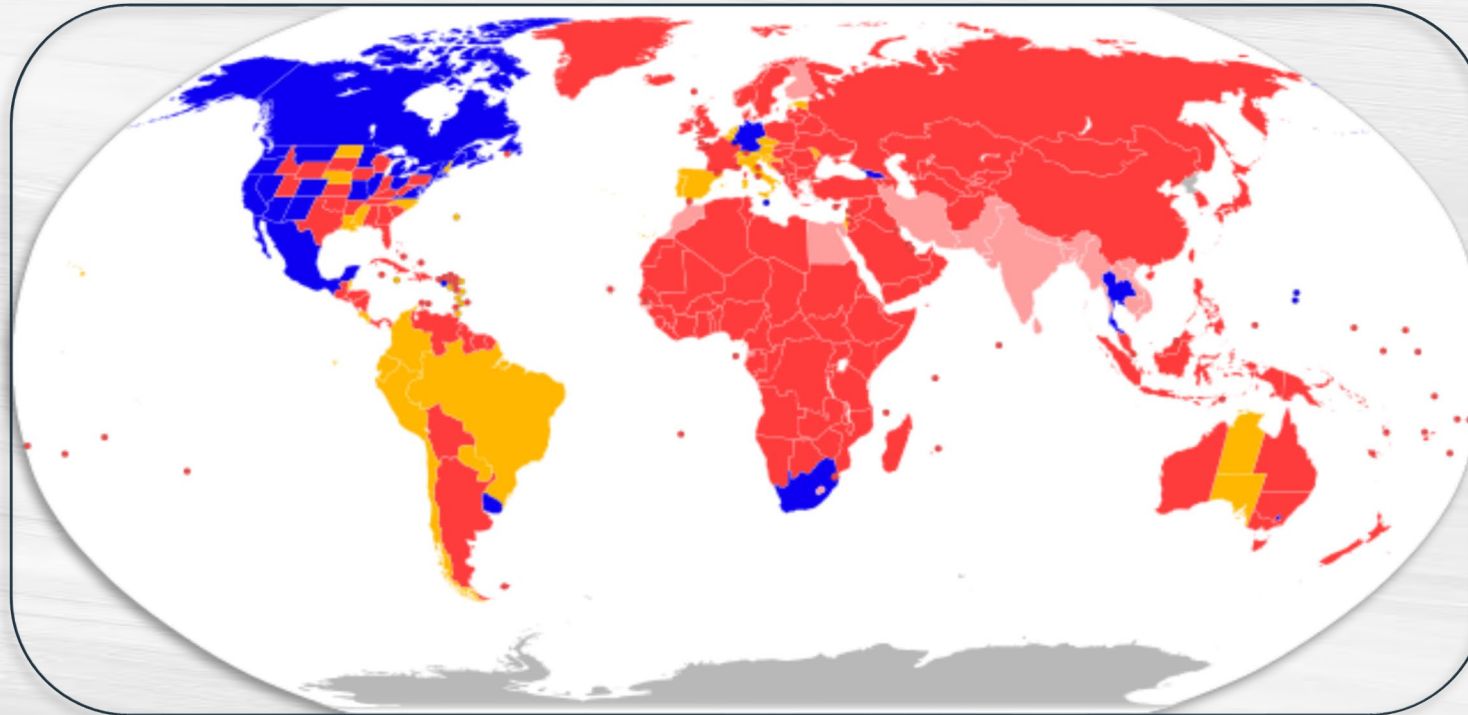


# Discussion Topics

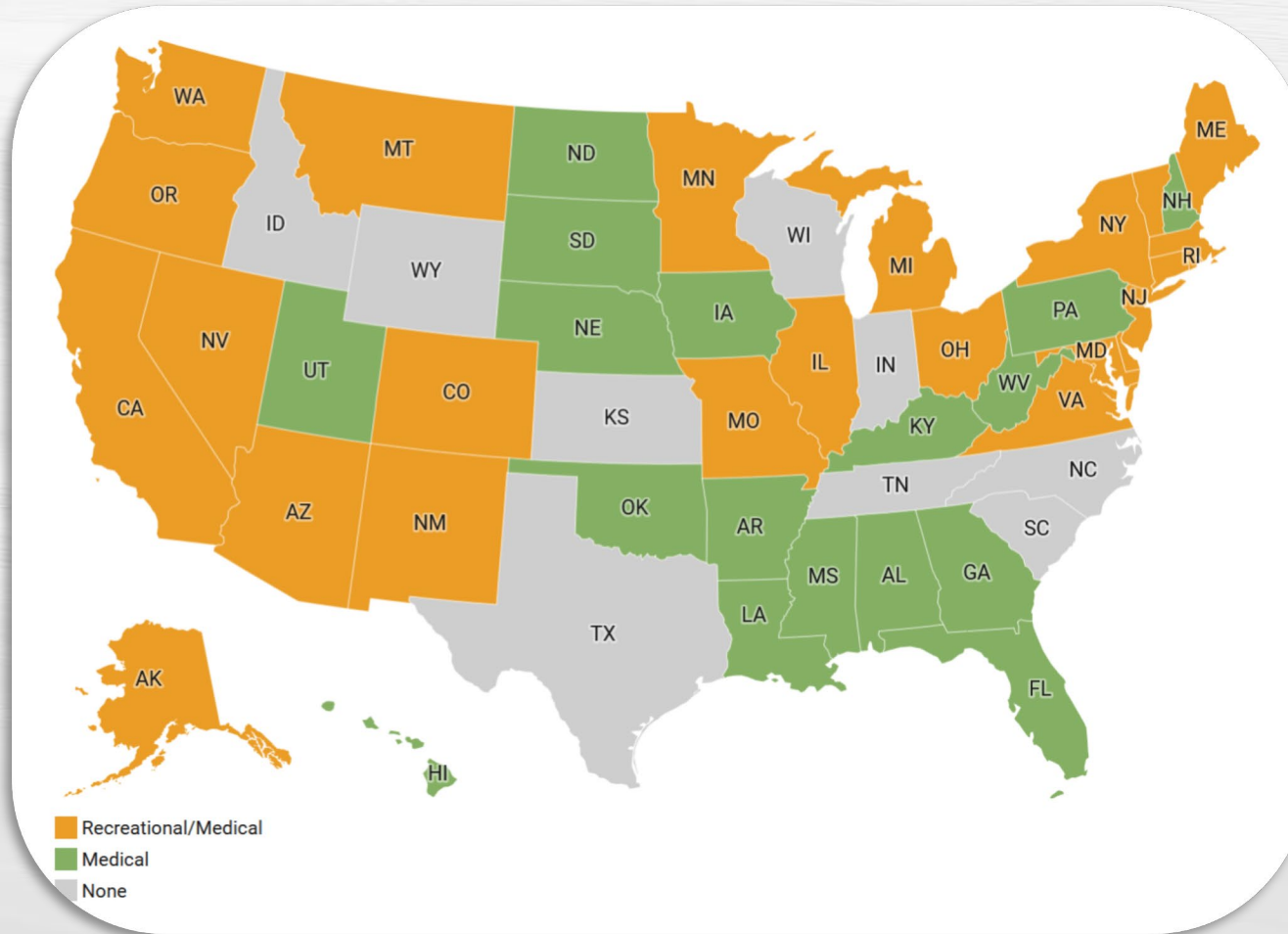


- ✿ The Cannabis Landscape
- ✿ Cultivation/Manufacturing
- ✿ Hazards
- ✿ The Endocannabinoid System and Cannabis Pharmacology
- ✿ Defining Impairment
- ✿ Creating a Workplace Policy for Cannabis that Employers can do now

# Legal Status of Cannabis



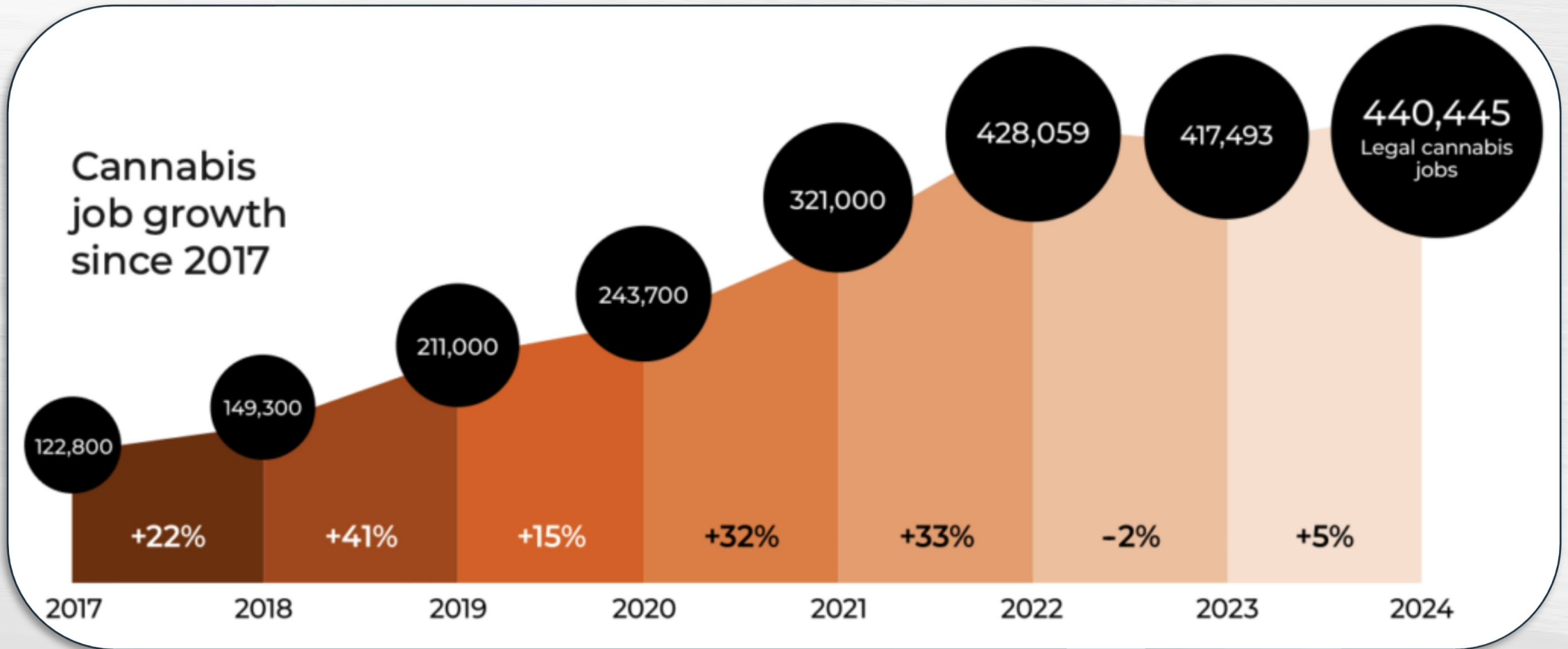
# Brief History of Cannabis Regulation



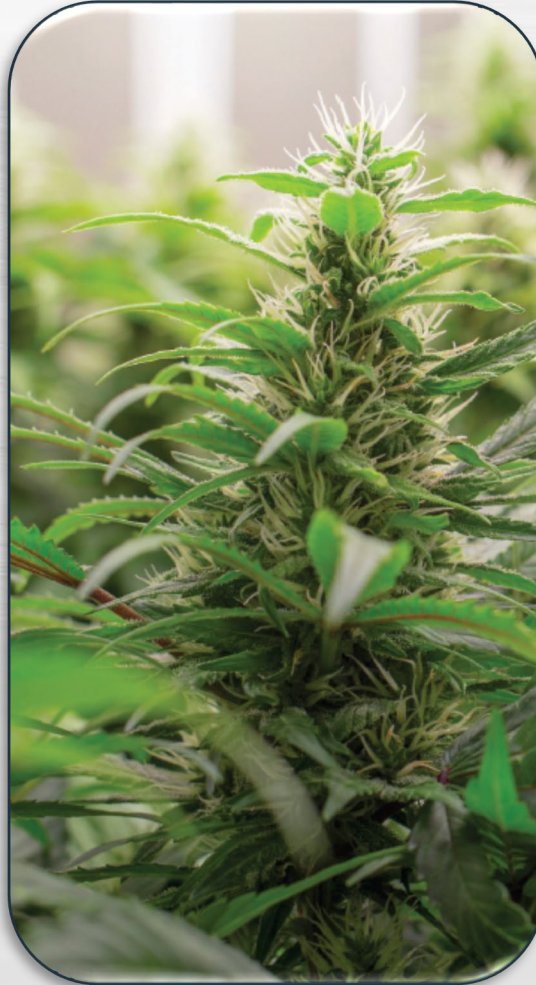
- ✿ Medical Cannabis Legal in 41 States and DC
- ✿ Adult use Cannabis Legal in 24 States and DC



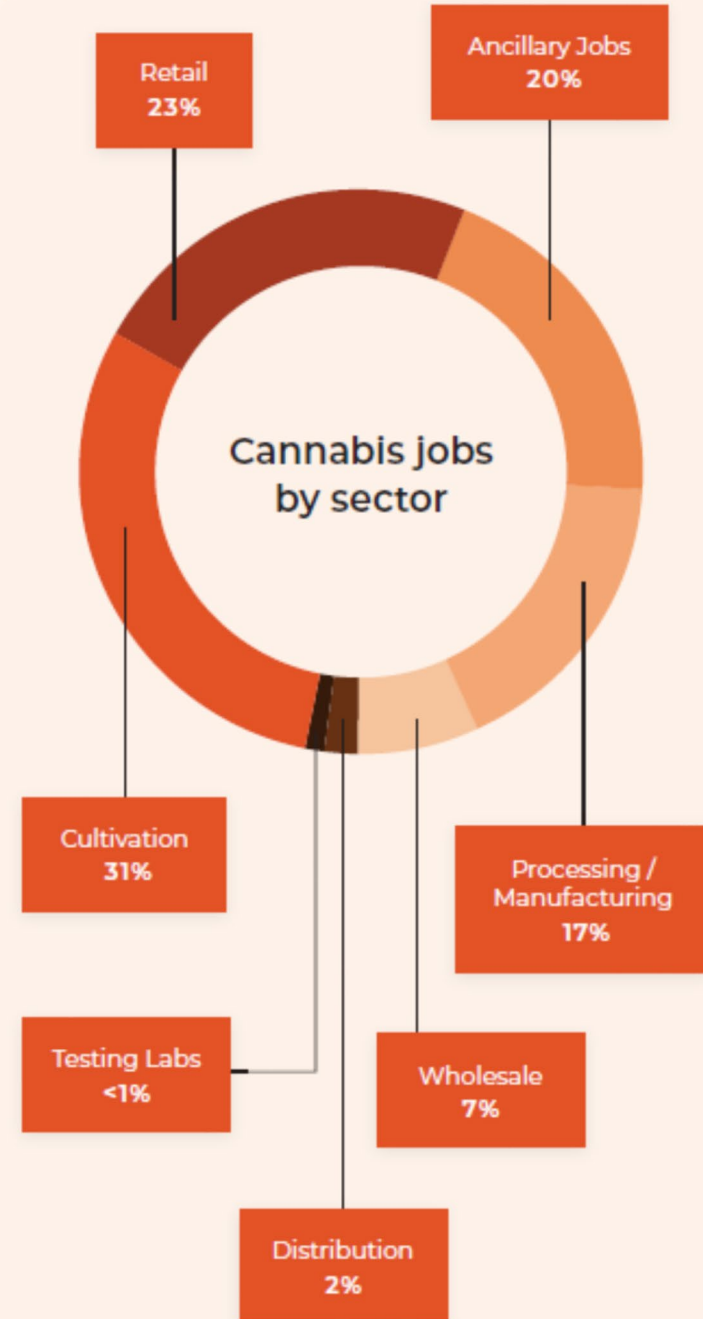
# Job Growth



# Cannabis Jobs by Sector



Vangst Jobs Report..

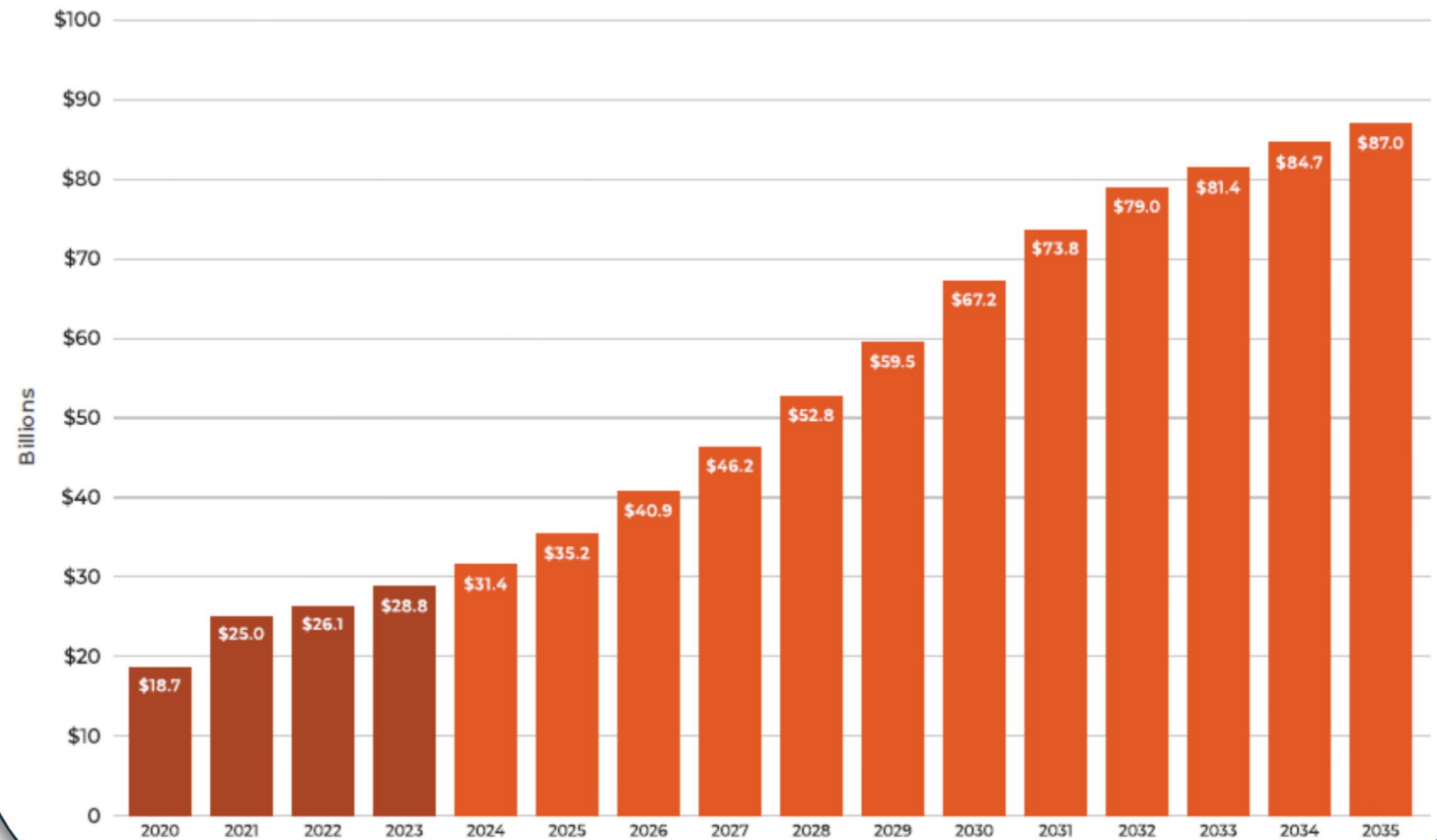




# Cannabis Jobs Forecast

Vangst Jobs Report

Whitney Economics U.S. Legal Cannabis Forecast (2020–2035)



# Process Overview

- ✱ Cultivation
  - ✱ Growing/Harvesting
  - ✱ Drying
  - ✱ Processing/Milling Plant
- ✱ Manufacturing
  - ✱ Extraction
  - ✱ Concentrates/Edibles/Vapes/Topical
  - ✱ Commercial Kitchen
  - ✱ Quality Testing Lab
  - ✱ Packaging Company
- ✱ Distribution
- ✱ Retail Operations





# Indoor Grow Operations



- ✿ Usually does not have any indication of what the operation is.
- ✿ Very secure facilities.
- ✿ Looks like a normal warehouse or greenhouse from the outside.
- ✿ Unlike an outdoor grow operation, the entire process from growing to final product distribution takes place in the same facility.
- ✿ Results in the facility having to comply with multiple regulations and standards.



# The Mother Room



- ✿ Plants are cloned in the “mother room” where they are nurtured until they are ready to be moved into their own growing zone.
- ✿ They grow about 15 weeks before they are harvested, we only harvest the female plants (aka “The Girls”).
  - ✿ Male plants are destroyed so no cross pollination.
- ✿ Currently harvesting about every two weeks.



# Growing Rooms

- ✿ Very labor-intensive phase of work, plants require constant tending for various issues.
- ✿ Employees spend long periods of time in the growing rooms.
- ✿ Have to move in and around the plants on a regular basis.









# Outdoor Grow





# Cannabis Cultivation

- ✿ Transfer plants into progressively larger vessels
- ✿ Water and prune regularly
- ✿ Change rooms to alter light (indoor), or transfer outside





# Harvest

Remove buds from plants

Cure, hang dry plants

“Buck” (or remove) buds off of stems to prepare for processing



# Drying, Processing and Milling

- ✿ Plants are brought into the drying room to dry.
- ✿ The room is bathed in green lights to help the process.
- ✿ The green lights within 2 minutes will over fill your green color receptors in your eyes.
- ✿ When you leave everything will look purplish pink.
- ✿ The longer you are in there the longer it will take for your eyes to get back to normal.
- ✿ No one can say that this is causing damage.



# Processing

- ✿ Trim buds to remove leaves and stems
- ✿ Use excess cannabis or “shake” to pack into pre-rolled joints
- ✿ Place joints or flowers into packaging, add labels
- ✿ Extraction - to produce oils



# Extraction Processes

- ✿ Ethanol and CO<sub>2</sub> Extraction
  - ✿ No Propane
- ✿ Propane/butane Extraction
  - ✿ It is done in a Class 1 Div 1 room
- ✿ Extraction can be messy.





# Wastes

Chemical

Medical

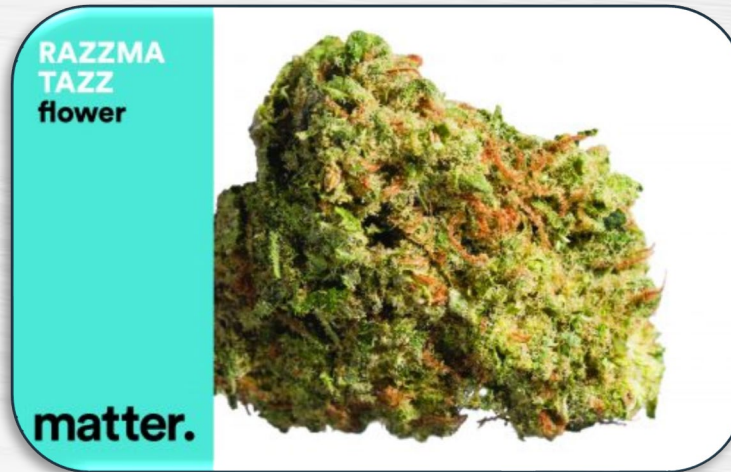
Pesticides

Volume  
Reduction

Universal

Batteries  
industrial

# Packaging

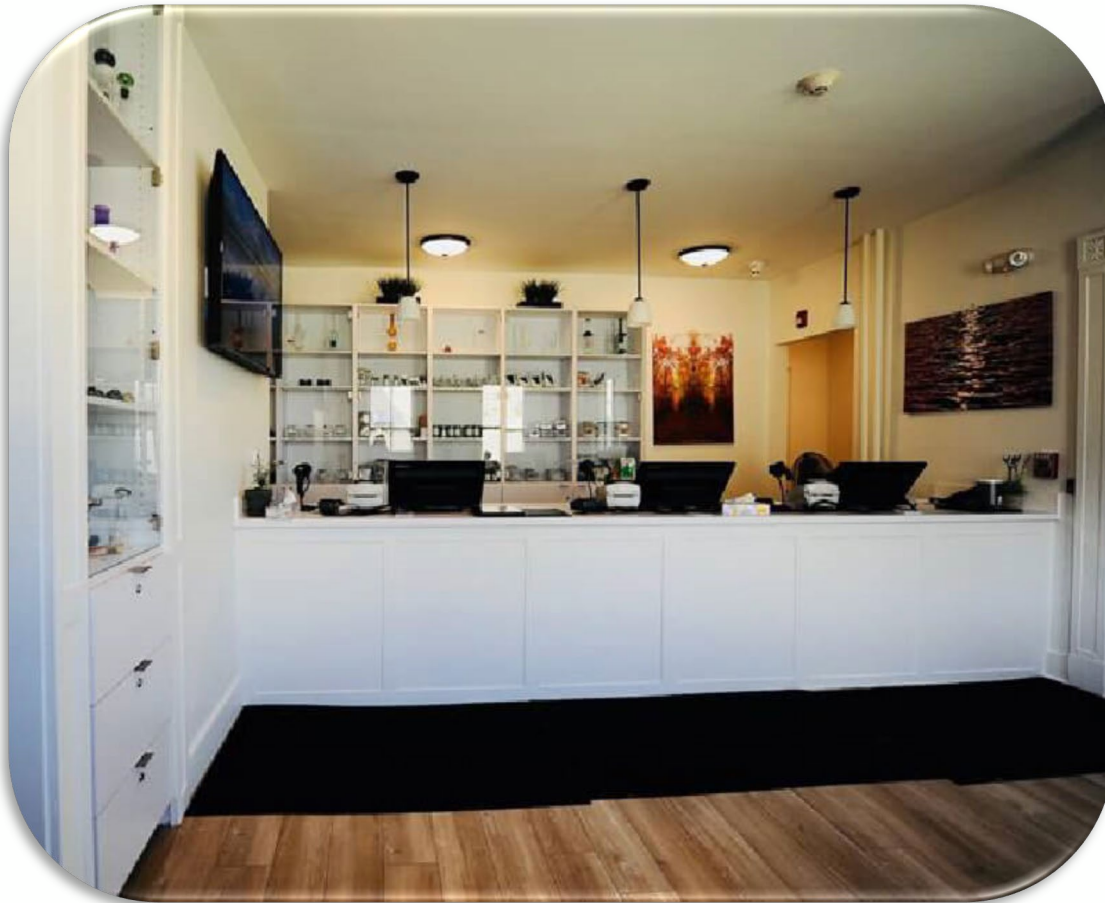




# Warehousing



# Dispensaries and Delivery



- ✿ Unmarked specially outfitted vehicles.
- ✿ DOT requirements.
- ✿ Armed drivers.



# Home Delivery

- ✿ Patients/Users can shop at home through APP or website.
- ✿ Will deliver to home.



# The industry has a lot of maturing to do...

- ✿ Need:
  - ✿ safety policies/SOPs.
  - ✿ safety training.
  - ✿ risk assessments for PPE.
- ✿ Young workforce (some 1<sup>st</sup> job out of school).
- ✿ Repurposing equipment previously used for other types of manufacturing.
- ✿ Lack of machine guards/energy control.
- ✿ Garage technology still in use.
- ✿ Black/Grey Market Competition.





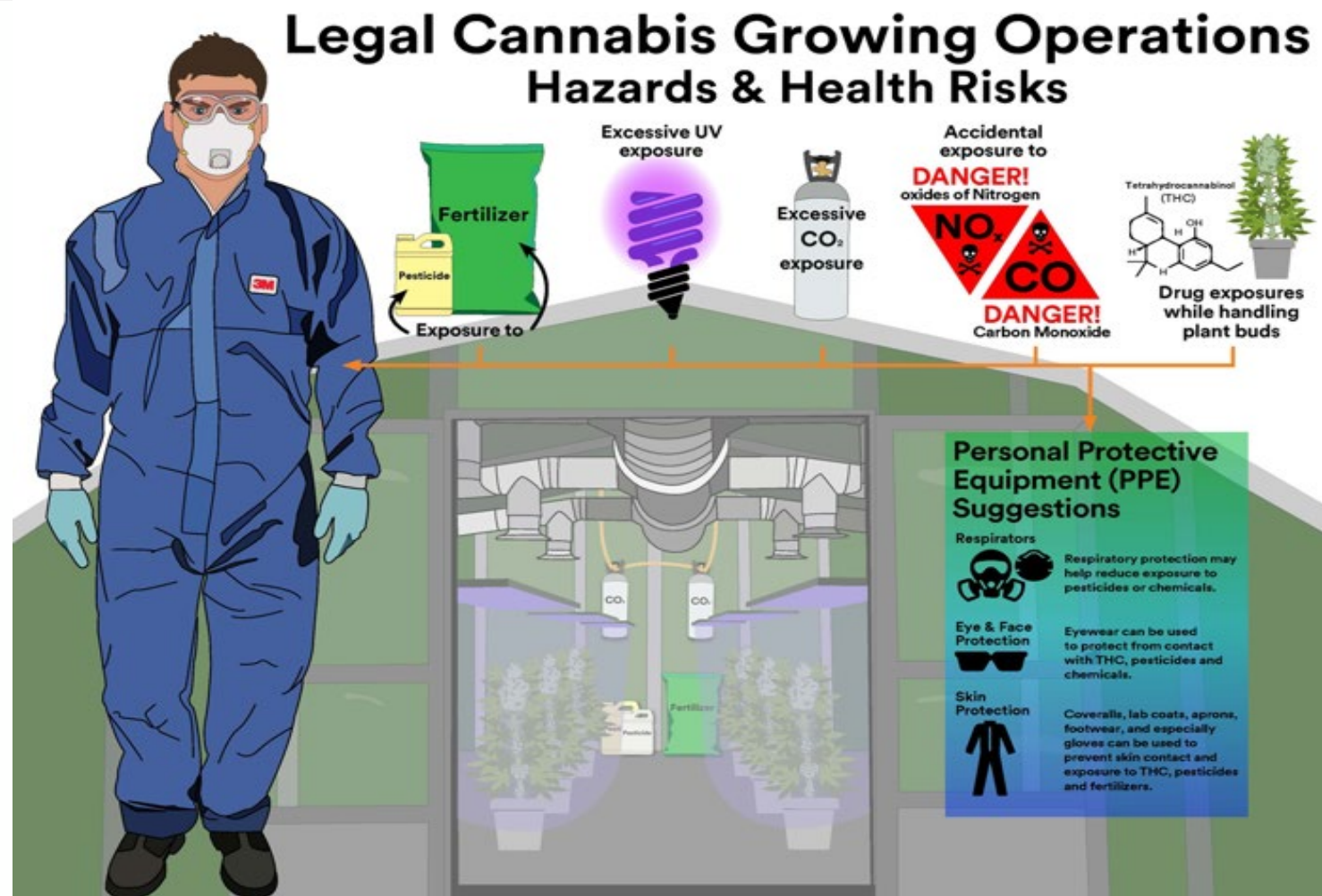
# More Realities / Challenges

- ✱ Shoe sanitizers may be needed.
- ✱ NFPA 1 Chapter 38- Fire & Safety Compliance
- ✱ Armed employees may be needed.
- ✱ Drivers required to be certified and no overnight stops.
- ✱ Drug testing may be needed.
- ✱ Fugitive odors affecting adjacent areas.
- ✱ Lithium battery storage and disposal.
- ✱ Waste management (red bag, hazardous, industrial).
- ✱ Heavy equipment/industrial truck use.



# The industry has a lot of potential exposures to workers.

- ✻ Chemical
- ✻ Physical
- ✻ Biological





# Chemicals Found in the Cannabis Industry

Carbon  
Dioxide

Isopropanol  
70%

Butane

Pesticides

Heptane

Hexane

Propane

Ethanol

# Physical Hazards

- ✿ Electrical and mechanical hazards
  - ✿ Temporary wiring, electricity in highly humid or watering areas.
  - ✿ Mechanical: forklifts; trimming machine, wood-chippers.
  - ✿ Forklifts, chipper shredder, etc.
  - ✿ Slips, trips and falls.
  - ✿ Lithium battery storage.
  - ✿ Water treatment facility (confined spaces, sulfuric acid, etc.).





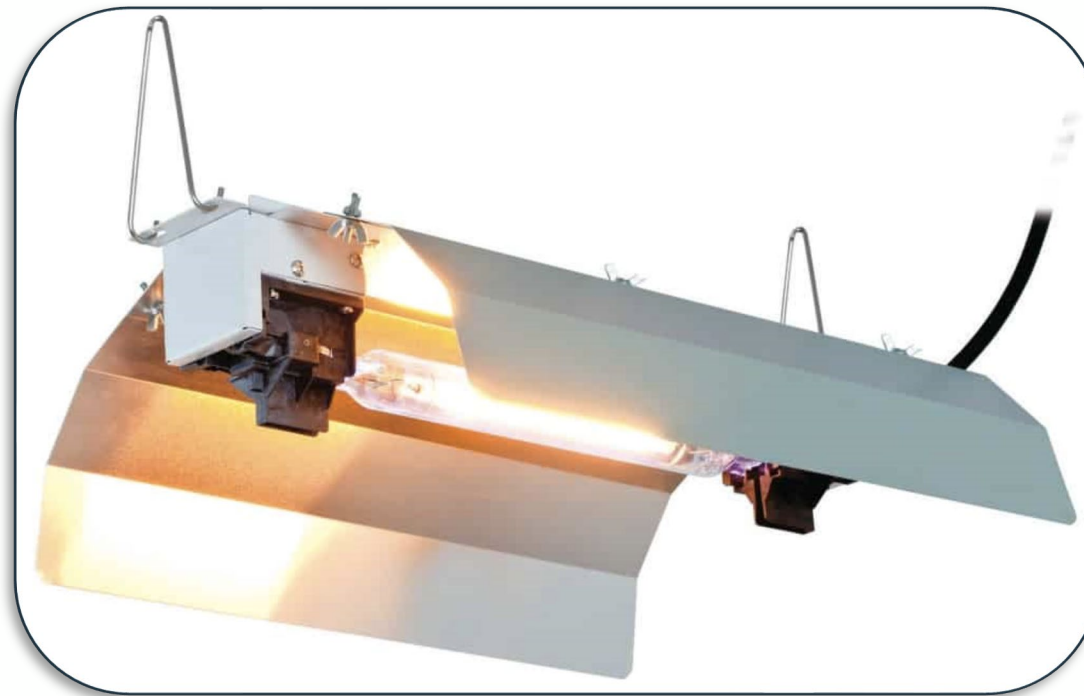
# Physical Hazards

- ✿ Fire Hazards (flammable and explosive).
  - ✿ Explosion and fire hazards.
  - ✿ Extracting oils from the plants.
  - ✿ Working with compressed gasses and flammable/combustible liquids.



# Physical Hazards

- ✿ HID, metal halide, sodium vapor, mercury vapor lamps.
- ✿ Very intense light and UV exposure when working in the grow room.





# Typical Levels of Light Compared to the Grow Rooms

☘ Moonlight	0.01 lux
☘ Museum Display	50 lux
☘ Normal office	200 – 300
☘ Precision work (jewelry making)	1,000 lux
☘ Sunlight	10,752 lux
☘ Common area of Greenhouse	35,000 lux
☘ Lighting in the growing zones	45,000 – 65,000 lux



# Ergonomic Hazards and Risks

- ✿ Repetitive motions.
- ✿ Awkward and static postures.
- ✿ Pressure and force hazards.
- ✿ Material handling hazards.
- ✿ Trimming of dried cannabis flowers (buds) which is performed with tiny scissors/trimmers and can result in pinch grips, wrist extensions, chronic hand soreness and/or carpal tunnel syndrome.





# Biological



- ✦ Humidity
- ✦ Ventilation
- ✦ Sensitizers/ Allergens
- ✦ Rodents
- ✦ Bugs
- ✦ Other wildlife
- ✦ Skin and lung reaction: Contact dermatitis from gloves and plants, allergies from plant materials.
- ✦ Extracting oils from the Plants.
- ✦ Working with compressed gasses and flammable/combustible liquids.

# The Scope of Exposure

- ✿ Employees Affected:
  - ✿ Cultivators
  - ✿ Trimmers
  - ✿ Extractors
  - ✿ Edible Producers
  - ✿ Budtenders
  - ✿ Laboratory Technicians





# Growing Rooms



- ✱ High heat in summer
- ✱ Pesticides
- ✱ Chemical
- ✱ Ergonomics
- ✱ Sterilization
- ✱ Microbial
- ✱ Carbon dioxide
- ✱ Falls from grow tables
- ✱ Light is heavy red/blue spectrum

# Harvesting

## Exposures:

- ✿ Molds/Mildew
- ✿ Particulate Matter
- ✿ VOCs/Terpenes
- ✿ Hunching/Heavy Lifting
- ✿ Repetitive motion exposures





# Processing Areas

## Exposures:

- ✿ Ergonomic challenges.
- ✿ Destemming machine with no guards.
- ✿ Secondary exposure from “puff” when destemming.
- ✿ Fabricated machinery.
- ✿ Molds/mildew/cannabis dust
- ✿ Repetitive motion, poor posture
- ✿ Volatile solvents – e.g., butane



# Extraction Process

- ✱ Flammables
- ✱ CO<sub>2</sub>
- ✱ Dry Ice
- ✱ Static Control
- ✱ Ethanol Transfer
- ✱ Medical and chemical wastes
- ✱ Secondhand exposure
- ✱ PPE
- ✱ Working alone





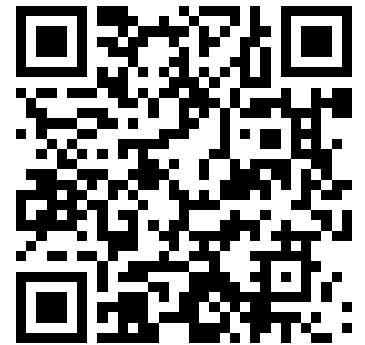
# Massachusetts

- ✱ November 13, 2024
- ✱ Ground cannabis dust is hazardous



# NIOSH Cannabis Health Hazard Evaluations

1. Evaluation of Potential Hazards during Harvesting and Processing Cannabis at an Outdoor Organic Farm (2017).
2. Evaluation of Police Officers' Exposure to Secondhand Cannabis Smoke at Open-air Stadium Events (2019).
3. Evaluation of a Medicinal Cannabis Manufacturing Facility with an Indoor and Outdoor Grow Operation (2019).
4. Evaluation of Potential Hazards During Harvesting and Trimming Cannabis at an Indoor Cultivation Facility (2022).



*Type “Cannabis”  
in the search field.*





**Rob Kleinerman, MPH, CIH**  
**Principal**

***Kleinerman & Associates Environmental Health &  
Safety Consulting, LLC***

# Cannabis Impairment – Workplace Implications

- ✿ The endocannabinoid system (ECS)
- ✿ Cannabis Pharmacology
- ✿ What Employers can do now



# Endocannabinoid System

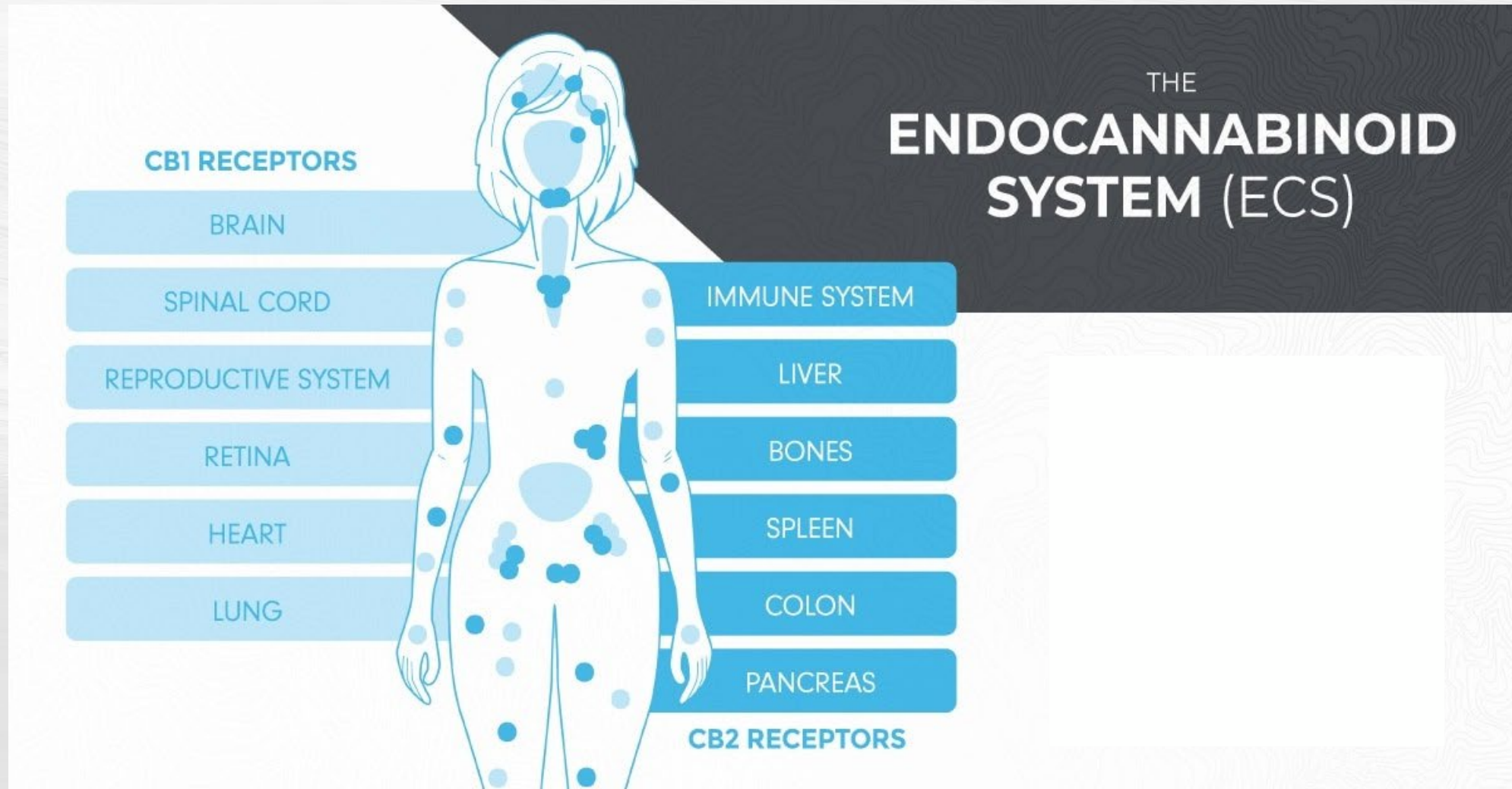
- ✿ The endocannabinoid system (ECS) is a biological system composed of endogenous lipid-based retrograde neurotransmitters that bind to cannabinoid receptors (CBRs) and receptor proteins.
- ✿ They are located throughout the vertebrate central and peripheral nervous systems.
- ✿ While still under investigation, the ECS is thought to be involved in regulating physiological and cognitive processes, including: fertility, appetite, pain, activity of immune system, mood, learning, memory, motor coordination, motivation and addictive-like behavior.

# Cannabinoid Receptors

- ✿ At present, there are two known types of cannabinoid receptors, termed CB1 and CB2, with mounting evidence of more.
- ✿ CB1 receptors are found primarily in the brain, as well as both male and female reproductive systems.
- ✿ CB2 receptors are predominantly found in the immune system with the greatest density in the spleen. CB2 receptors appear to be responsible for the anti-inflammatory and possibly other therapeutic effects of cannabis seen in animal models.



# Cannabinoid Receptors



# Potential Medicinal Benefits

Chronic pain\*

Cancer

Chemotherapy-induced nausea\*

Anorexia and weight loss

Irritable bowel syndrome

Epilepsy

Spasticity related to MS\*

Tourette syndrome

Huntington's disease

Parkinson's disease

Dystonia

Dementia

Glaucoma

Traumatic brain injury

Anxiety

Depression

Sleep disorders\*

Post-traumatic stress disorder

Schizophrenia and other

psychoses

\* Moderate to conclusive evidence



# Potential Health and Safety Risks

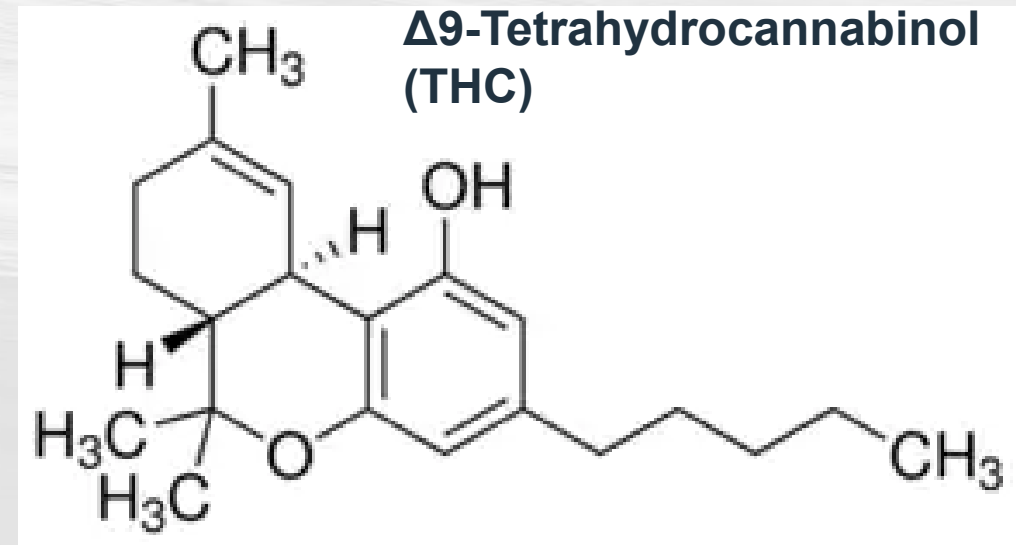
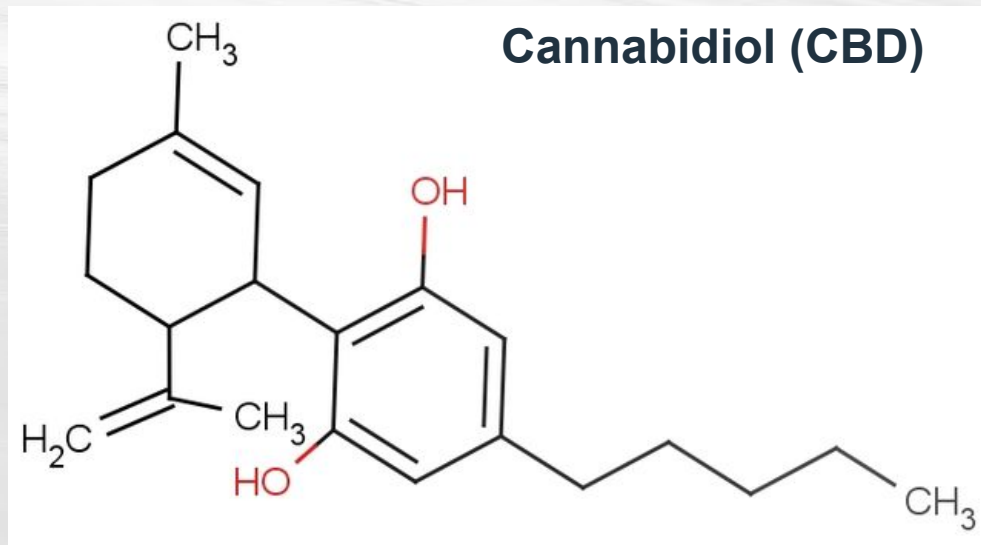
Lung cancer  
Esophageal cancer  
Other cancers  
Acute myocardial infarction  
Stroke  
Chronic obstructive  
pulmonary disorder  
Chronic bronchitis\*  
Asthma  
Pregnancy complications

Occupational injury  
Motor vehicle crash\*  
Neonatal conditions\*  
Schizophrenia and other  
psychoses  
Depression  
Anxiety

\* Moderate to conclusive evidence

# Cannabis Pharmacology

The primary psychoactive compound in cannabis is delta 9 tetrahydrocannabinol (THC); one of 483 known compounds in the plant, including at least 113 other cannabinoids (compounds unique to cannabis) and over 100 different terpenes.





# Cannabis Pharmacology

- ✿ THC (and cannabinoids) is highly lipid soluble. It is rapidly taken up and accumulated in fat tissue. From these fat deposits, THC is then slowly released back into the bloodstream.
- ✿ The metabolism of cannabis also depends on the route of consumption:
- ✿ After oral consumption, THC travels to the liver where most of it (80% to 90%) is eliminated or metabolized within 5 days.
- ✿ After inhalation, THC and its metabolites enter the bloodstream quickly through the lung, with the peak reaching the brain within 6 to 10 minutes. At this point, THC concentrations are higher in the brain than in the blood.



# Cannabis Pharmacology



- ✿ Given that THC (and metabolites) are retained in fat tissue long after the euphoric effects wear off, there is limited evidence that “correlates” a blood THC level or urine metabolite level with degree of impairment.
- ✿ As the ECS is believed to impact mood, memory, motor coordination, learning and emotion; other tests that evaluate cognitive function, behavior and psychomotor response may better characterize impairment....but
- ✿ These tests are not very practical for most workplaces.

# Defining Impairment

Regarding workplace safety, two questions arise in the law surrounding working or driving after using cannabis:

- ✿ To what degree does cannabis impair one's ability to drive or operate industrial equipment (i.e., at what concentration is one impaired and how long does the impairment last), and
- ✿ whether the common practice of testing for THC (the main psychoactive substance in cannabis) or THC metabolites is a reliable means to measure impairment.



# Defining Work Practices

## Definitions

A “**safety-critical**” task is “one where certain forms of personal impairment can put other people at risk” and can include risks both to the worker as well as to others arising out of performance error due to physical or mental conditions.

“**Safety-sensitive**” work can be one or more “safety-critical” tasks that are or may be performed, and where possible consequences include death or serious injury of a worker or a member of the general public, or, alternately, damage to or serious disruption of equipment, production or the environment.

# Defining Work Practices

## Definitions

**“Decision-critical”** work may affect workers’ wellbeing and livelihoods, and impact employer oversight and stewardship of products and services, but without the same direct and near-term adverse effects as “safety-sensitive” work.

Impairment in “decision-critical” workers (particularly of the neuro-cognitive variety) can still pose workplace issues, including:

- ✱ Difficulty with coworkers, supervisors and clients;
- ✱ Attendance, performance, and workplace relationship issues;
- ✱ Potential financial, legal, reputational impacts and/or corporate liability.

# Defining Impairment

More research is needed to define what constitutes impairment resulting from cannabis use.

Many professional organizations have released position statements on the implications of cannabis use for safety-sensitive work including:

- ✿ AIHA
- ✿ American College of Occupational and Environmental Medicine (ACOEM)
- ✿ National Safety Council (NSC) and
- ✿ Occupational and Environmental Medical Association of Canada (OEMAC)



# AIHA Policy Agenda 2019 – 2020

- ✱ Support government-funded research and related efforts to identify hazards within the cannabis industry and support the dissemination of best practices for mitigating or removing these hazards.
- ✱ Champion employer-employee education outreach programs with State and Federal partners to raise awareness of the hazards that exist in the cannabis industry and how to mitigate or remove them.
- ✱ Support programs that educate employers and employees on existing standards and regulations related to worker health and safety.
- ✱ Support research to further understand and define “impairment”.
- ✱ Encourage all employers (including governments in their capacities as employers) to voluntarily prohibit the use of cannabis by workers in “safety sensitive” occupations at least until “impairment” is better understood and defined.

# ACOEM Position Statement

- ✿ Cannabis has the capacity to **impair neurocognitive and psychomotor function**, and its legalization has huge public health implications.
- ✿ Regardless of cannabis' legal status in a jurisdiction, ACOEM **strongly supports the need for employers to prohibit all workers, especially those employed in safety-sensitive positions, from working impaired**, whether under the influence of cannabis or any other potentially impairing substance.



# ACOEM Position Statement

- ✿ One issue is that there is no agreement as to the definition of working impaired.
- ✿ To date there is no consistent definition of a dose or blood concentration of cannabis at which impairment begins or ends.
- ✿ ACOEM is advocating for increased research and collaboration between all stakeholders in defining and/or measuring the impairment risks of cannabis products use as it relates to the workplace.



# ACOE Position Statement

Until the research is able to identify well-validated methods to evaluate and predict impairment caused by cannabis products, **employers should establish workplace policies that address the following principles:**

- ✿ The consequences of being at work while impaired.
- ✿ Specifically state whether use of cannabis products or any other potentially impairing substance should or should not be permitted while an employee is on duty.
- ✿ Workers who are suspected of being impaired as a result of use of cannabis products or any other substance or condition should be subject to further evaluation including, depending on the circumstances, prompt removal from the workplace. or during the workday.

# ACOEM Position Statement

Until the research is able to identify well-validated methods to evaluate and predict impairment caused by cannabis products, **employers should establish workplace policies that address the following principles:**

- ✿ Employers should be permitted to prohibit employees in safety-sensitive jobs from using potentially impairing cannabis for a minimum specified period (**at least 8-12 hours**) prior to reporting for work as well as while at work, to ensure that they are not impaired upon arrival or during the workday.

# Workplace Policy

So, what can employers do now?

For employers with “**zero tolerance**” policies, traditional biological monitoring-based drug screening (i.e., pre-employment, random, post-incident) as prescribed by:

- ✱ Regulatory requirements (i.e., DOT, DOE, DOD, etc.);
- ✱ Contractual obligations (union or otherwise);
- ✱ Insurance requirements; or
- ✱ Risk-based internal policy (due to safety sensitive, decision critical positions).

The employer’s policy should be written, reviewed by legal advisors, and communicated across all levels within the organization. Employers should also consider establishing a Workplace Supported Recovery (WSR) program.





## National Institute for Occupational Safety and Health (NIOSH)

[EXPLORE TOPICS](#) ▾[SEARCH](#)[NIOSH](#) > [SUBSTANCE USE](#)

DECEMBER 21, 2023

# Workplace Supported Recovery

### AT A GLANCE

Employers should consider creating a [Workplace Supported Recovery \(WSR\) program](#) to prevent substance use, reduce stigma, and encourage recovery. This page offers strategies that employers can use to develop a program at their workplace.



<https://www.cdc.gov/niosh/substance-use/workplace-supported-recovery/>

# Workplace Policy

For employers with “non-zero tolerance” workplaces, the following should be considered:

- ✿ Evaluate workplace to identify any safety sensitive and/or decision critical positions;
- ✿ Determine if drug screening will be needed and to what degree (recommend post-incident in most cases);
- ✿ Prepare written policy (including a WSR program, if appropriate);
- ✿ Communicate and train staff across all levels within the organization; and
- ✿ Have policy approved by your organizations legal counsel and periodically review your policy as laws surrounding cannabis change (which they will).

# Summary

- ✿ Cannabis is an emerging, rapidly evolving multi-billion dollar industry;
- ✿ Most workplaces will to some degree, be impacted by legalized cannabis;
- ✿ Removing Cannabis from the Schedule I list will facilitate many practical solutions to cannabis business issues as well as remove barriers to research on impairment and potential medical applications;
- ✿ The regulations that apply to cannabis businesses are inconsistent from state to state, county to county;
- ✿ There is a tremendous need for more research across the board (health and safety, medicinal and therapeutic applications, defining impairment, impairment testing, etc.); and
- ✿ Many companies, especially those with safety sensitive and decision critical positions, will need to evaluate and adjust their policies to address legal cannabis in the workplace.



# Thank You!

Forensic Analytical Consulting Services, Inc.

**Right**  
People.

**Right**  
Perspective.

**Right**  
Now.



## DOSH Hazard Alert

Helping employers prevent workplace injuries

March 2023

### Cannabis dust can cause work-related asthma

**Attention:** Workers in the legalized cannabis industry with exposure to cannabis dust are at risk for developing asthma.

#### Real evidence — Real lives.

Exposure to cannabis dust at work can cause asthma or exacerbate it.

In 2022, a 27 year-old employee collapsed and died from occupational asthma following inhalation exposure to cannabis dust while working in the pre-roll area at a state-licensed facility in Holyoke, Massachusetts.<sup>1</sup> She had previously worked in the flower-production area.

In addition, respiratory symptoms have been documented in cannabis production workers,<sup>2</sup> and research has identified cases of work-related asthma associated with cannabis dust in Washington state.<sup>3,4</sup>

#### Are you being exposed to cannabis dust?

If you work in cannabis production, processing, or other jobs that involve handling cannabis materials, you are more likely than not to be exposed to cannabis dust. Other jobs that encounter cannabis exposure include lab workers, law enforcement, and social service workers.

Cannabis dust is generated during chopping, grinding, sifting, trimming, weighing, packing, and even when cleaning dusty facilities and transporting product. If you inhale enough cannabis dust, it can increase your chances for respiratory symptoms or asthma.

#### Important facts about asthma.

- Asthma is a lung disease. Symptoms include wheezing, cough, chest tightness, and shortness of breath.



Working with dried cannabis materials can release potentially hazardous dust.

- If you have never had asthma, you can still develop it. For some people, asthma develops after exposure to a substance over a period of weeks or years; for others all it takes is one sudden high-dose exposure.
- If you already have asthma, you may find your symptoms are aggravated by workplace exposures.
- You can develop work-related asthma whether or not you consume cannabis.
- It is not possible to 'toughen up' your lungs to resist the toxic effect of cannabis dust.
- In addition to the cannabis dust, you may be exposed to other asthma-causing substances such as mold, pesticides, ozone, cleaning chemicals, and soil components like diatomaceous earth.



Division of Occupational Safety and Health  
www.lni.wa.gov/HazardAlerts | 1-800-423-7233



ational Safety



A technician inspects the leaves of cannabis plants growing inside a controlled environment in North Macedonia on Sept. 29, 2019.

Photographer: Konstantinos Tsakalidis/Bloomberg

## Cannabis Worker's Death Triggers Closer OSHA Industry Scrutiny

DEEP DIVE

Oct 2, 2022, 2:30 AM

Listen



<https://news.bloomberglaw.com/safety/cannabis-workers-death-triggers-closer-osa-industry-scrutiny>



## Guide to Worker Safety and Health in the Marijuana Industry

Marijuana Occupational Health and Safety Work Group

January 2017



[colorado.gov/cdphe/marijuana-occupational-safety-health](https://colorado.gov/cdphe/marijuana-occupational-safety-health)

<https://www.colorado.gov/pacific/cdphe/news/marijuana-worker-safety-guide>



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# OSHA Cannabis Industry

Seed to Shatter: A safety and health guide for cannabis growers, processors, and retailers

Home > Employer essentials > Cannabis Industry

Cannabis Retailers

The guide also helps employers determine which Oregon OSHA rules apply to their businesses and highlights seven "core" requirements that apply to all employers.

## Do Oregon OSHA's rules apply to your business?

Yes	No
<p>Oregon OSHA's rules apply to your business if you have one or more employees or you are a sole proprietor or a member of a partnership that has workers' compensation coverage.</p> <p><a href="#">See Core Requirements &gt;</a></p>	<p>Independent contractors, sole proprietors, and partnerships that have no workers' compensation coverage and no employees.</p> <p>Corporations that have an owner as the sole employee and do not have workers' compensation coverage.</p> <p>Corporate family farms that employ only family members.</p>

Want more information?

See Oregon OSHA's [Program Directive A-231](#). The document describes Oregon OSHA's jurisdiction over independent contractors, limited liability corporations (LLCs), partnerships, corporate officers, and corporate family farms.

<https://osha.oregon.gov/essentials/cannabis/pages/default.aspx>

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Labor & Industries

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SAFETY TOPICS

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Environmental Hazards

Biological

Prevention Measures

## Cannabis

Examples of safety hazards that can harm workers who grow, process, or sell cannabis (or cannabis products) include:

- Hazardous chemicals and substances
- Awkward postures, repetitive motion, and other physical stressors
- Confined spaces (e.g., tanks)
- Slippery or uneven walking surfaces
- Process machinery with dangerous moving mechanical parts
- Pressurized equipment
- Unsafe electrical systems (e.g., damaged cords and plugs)
- Equipment noise

REQUIREMENTS

VIDEOS, TRAINING, AND PREVENTION

### Rules

- [Agriculture](#) (Chapter 296-307 WAC)
  - All growers must follow the Agriculture rule. Some processors must follow the Agriculture rule if they are processing their own flower. This rule includes the Worker

<https://www.lni.wa.gov/safety-health/safety-topics/industry-topics/cannabis#requirements>

# References

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