Washington State
Liquor and Cannabis Board

Topic:	**Petition for Adoption, Amendment, or Repeal of a State Administrative Rule – (WAC 314-55-102 (3) – Mandating Heavy Metals Testing)**
Date:	January 31, 2024
Presented by:	Denise Laflamme, Rules Coordinator

Background

On December 8, 2023, Dr. James MacRae submitted a petition for adoption, amendment, or repeal of a state administrative rule to the Washington State Liquor and Cannabis Board (Board). The petitioner requests that the agency consider initiating the rulemaking process to amend WAC 314-55-102 to require heavy metals testing as part of the quality control analysis and screening. The petition requests a change to an existing rule:

INFORMATION ON RULE PETITION

Agency responsible for adopting or administering the rule: WSLCB - possible DOH, WSDA, and DOE relevance

☐ **1. NEW RULE - I am requesting the agency to adopt a new rule.**

☒ The subject (or purpose) of this rule is: Mandate appropriate heavy metals testing as part of QA testing suite

☒ The rule is needed because: Heavy metals have been identified in regulated cannabis tests in WA. Many regulated producers are situated on legacy orchard lands and/or industrial facilities and/or in the plume areas identified by DOE associated with the Tacoma and Trail, BC smelters and/or near major roadways.

☒ The new rule would affect the following people or groups: New expense for many licensees. Consumers of regulated cannabis would enjoy safer products. Labs that have invested in this key consumer-safety capability would do more tests.

Issue

Whether the Board should accept this petition and file a CR 101 Preproposal Statement of Inquiry to consider initiating the rulemaking process to amend WAC 314-55-102 to expand testing of metals to all cannabis products, not just medically-compliant products, as part of quality assurance and quality control.

Authority

Laws

RCW 69.50.342 identifies the Board's authority to engage in rulemaking regarding standards of ingredients and quality pertaining to useable cannabis, cannabis concentrates, and cannabis-infused products.

RCW 69.50.375 identifies the authority of the Washington State Department of Health (WADOH), in conjunction with the Board, to engage in rulemaking regarding

requirements for cannabis concentrates, useable cannabis, and cannabis-infused products that include approved pesticides and pesticide testing requirements and standards of ingredients, and quality.

Rules

WAC 314-55-102 describes quality assurance and quality control parameters for laboratory testing of cannabis including pesticides and heavy metal limits. Pesticide testing is required for cannabis flower and intermediate products (including cannabis mix, concentrates and extracts).

WAC 246-70-050 describes testing requirements of WADOH compliant (medical) cannabis including flowers, trim, leaves or other plant matter, and intermediate products. Includes daily intake limits for four metals (inorganic arsenic, cadmium, lead and mercury).

Metals limits - Washington
WAC 246-70-050 provides that heavy metal screening (for arsenic, cadmium, lead and mercury) are required only for WADOH compliant product (medical cannabis). Heavy metals testing of cannabis products is optional for non-DOH compliant product. LCB may conduct random or investigation driven heavy metal screening for compliance. LCB's heavy metal limits in WAC 314-55-102 apply to all product types, and any product found to exceed these limits is subject to recall and destruction. LCB and WADOH have equivalent heavy metals screening limits established in rule (Table 1). [1]

Table 1. Washington heavy metal screening limits for DOH-compliant cannabis products (WAC 314-55-102):

Metal	**µg/g**
Arsenic	2.0
Cadmium	0.82
Lead	1.2
Mercury	0.40

LCB cannabis regulations developed in 2013, filed as WSR 13-21-104, require cannabis products to be tested for moisture content, potency, foreign matter, and microbiological contaminants. LCBs heavy metal screening limits for cannabis products became effective in rule on April 2, 2022, filed as WSR 22-06-097, and were part of a larger LCB rulemaking effort related to quality control testing that included mandatory pesticide testing of cannabis and cannabis intermediate products. Public comments submitted during rulemaking included comments supporting the inclusion of metals testing to address consumer safety as well as comments opposing metals testing due to concerns about the costs of testing.

WADOH regulates heavy metals in medical cannabis products with limits enacted in 2016 (WAC 246-70-050).[2] Any harvest, lot or batch found to fail heavy metals limits

must be destroyed according to chapter 314-55 WAC. Flower, trim, leaves or other plant material that fail heavy metal limits can't be used to make extracts or concentrates. WADOH metals testing requirements are in addition to tests required by LCB.[3]

Heavy metal testing was already required for CBD additives (WAC 314-55-109) in LCB rules that became effective December 1, 2018, filed as WSR 18-22-056.[4] Heavy metal screening limits for CBD additives are equivalent to WADOH's heavy metal screening limits for medical cannabis products and LCB's metals screening limits applicable to all cannabis products.

CCRS data

Starting in 2021, laboratories are required to submit metals testing results for DOH-compliant cannabis products to LCB's Cannabis Central Reporting System (CCRS). Twenty-five different licensees have submitted metals testing results to CCRS. A total of 979 metals results have been submitted to CCRS for 2022 and 2023 (263 samples in 2022, and 716 samples in 2023). Less than 1% of all cannabis samples submitted to CCRS were tested for heavy metals.[5]

To date, there have been two exceedances of metals limits submitted to CCRS for DOH-compliant products. These exceedances occurred in 2022 and were for lead detected in products listed as an ethanol concentrate and a food grade solvent concentrate. These samples were submitted from two different cannabis processor licensees. The lead concentrations reported were 1.3 and 2.1 ug/g (limit is 1.2 ug/g).

Metals Limits - Other States

There are no U.S. federal testing guidelines or standards for heavy metals in cannabis products from federal agencies who set standards for agriculture, food, and drugs because cannabis remains classified as a Schedule I drug and is federally illegal. Twenty-four states currently have legalized cannabis programs that include non-medical, adult-use statutes. [6,7]

At least fourteen states with adult-use cannabis laws require metals testing that include action limits. (Table 2) Most states with metals testing limits applicable to adult use cannabis include arsenic, cadmium, lead and mercury. Eight other metals are included in a few states (antimony, barium, chromium, copper, nickel, selenium, silver and zinc).[8]

Table 2. States with adult use cannabis metals testing requirements, whether metals limits differ by media and/or product type, and metals included.

State (effective year)	Metals Limits	Metal limits by media or product	Metals
Alaska (2016)	No	No limits listed	No specific metals
California (2018)	Yes	Yes	As, Cd, Hg, Pb
Colorado* (2014)	Yes	Yes	As, Cd, Hg, Pb
Illinois (2020)	Yes	Yes	As, Cd, Hg, Pb + Cr
Maine* (2021)	Yes	No	As, Cd, Hg, Pb
Massachusetts* (2016)	Yes	Yes	As, Cd, Hg, Pb
Michigan* (2022)	Yes	Yes	As, Cd, Hg, Pb+ Cr, Ni, Cu
Minnesota (2023)	Yes	Yes	As, Cd, Hg, Pb
Nevada (2015)	Yes	No	As, Cd, Hg, Pb
New Jersey* (2022)	Yes	Yes	As, Cd, Hg, Pb, + Ba, Cr, Se, Ag
New Mexico (2022)	Yes**	Yes	As, Cd, Hg, Pb
New York* (2023)	Yes	Yes	As, Cd, Hg, Pb + Sb, Cr, Cu, Ni
Oregon* (2023)	Yes	No	As, Cd, Hg, Pb
Vermont* (2022)	Yes	Yes	As, Cd, Hg, Pb + Cr, Cu, Ni, Zn

* Levels for these states are some version of **California's** action levels.
** New Mexico quality control standards apply to metals limits in soil and water used in cannabis production.
Symbols: arsenic (As), cadmium (Cd), lead (Pb), mercury (Hg), antimony (Sb), barium (Ba), chromium (Cr), copper (Cu), nickel (Ni), selenium (Se), silver (Ag), zinc (Zn).

Several states specify different metals action limits for different media or product delivery route (i.e., inhalable and non-inhalable). For example, California sets separate action levels for cannabis and cannabis products that are inhalable and non-inhalable (Table 3). Many states with metals limits for adult-use cannabis are either the same as or closely related to California's limits at least for some products. Oregon and Maine have adopted California's metals limits for inhalable cannabis and cannabis products, and applied these limits to all products regardless of product type or delivery route.[9,10,11]

Table 3. Washington's and California's action levels for metals.

Metals	WA	California Department of Cannabis Control, 15723. §Heavy Metals Testing (µg/g)	
		Action Level (µg/g) for Inhalable Cannabis and Cannabis Products	Action Level (µg/g) for Non-Inhalable Cannabis and Cannabis Products
Arsenic	2.0	0.2	1.5
Cadmium	0.82	0.2	0.5
Lead	1.2	0.5	0.5
Mercury	0.40	0.1	3.0

Washington's limits for metals in cannabis products are higher (less protective) than adult-use cannabis limits established in many other states (Table 3). This difference in action limits can be attributed to the derivation of the limits. Metals limits in California and many other states are based on limits developed for elemental impurities in drug products published by the U.S. Pharmacopeia. [12] These limits are derived for oral and inhalation drug products and provide different limits for each route of intake. Heavy metal limits in Washington's WADOH and LCB rules are based on limits for elemental impurities in dietary supplements developed by the American Herbal Products Association applicable to oral intake.[13,14]

Cannabis metals testing results and exceedances from other states are not readily available. There are reports of recalls of cannabis products in other states due to failed metals testing. Below is a list of recalls and advisories from other states that is not meant to be comprehensive, but to provide some examples.

- Oregon recalls cannabis flower containing arsenic (2023).[15]
- Michigan recalls medical marijuana products for metals including violations for cadmium, arsenic and chromium in flower, concentrate and vape cartridge (2019).[16]
- Colorado issued a health and safety advisory due to mercury above the acceptable limits on medical marijuana flower (2021).[17]
- Colorado issued a health and safety advisory due to unsafe levels of cadmium in retail marijuana flower (2021).[18]

Recent posts among states via a Cannabis Regulators Association (CANNRA) message board indicate failure rates (% of failed tests reported out of total number of tests) ranging from <1-10% depending on type of product. Failure rates for metals reported in Maine showed similar results at 2.5% for 120 samples.[19] Depending on what matrix is tested, failure rates below 10% could reflect many products. Of the limited number of failure rate reports available, there does not appear to be a pattern of which metals most often exceeded limits. Oregon reported that most of their metal exceedances were for arsenic and cadmium, while Nevada reported that most of their exceedances were for lead.

Cannabis Consumer Survey

WADOH, in collaboration with LCB, conducted a cannabis consumer survey during December 2023-January 2024 (closed January 14). The purpose of the survey was to help the WADOH and LCB update and improve health and safety information for adults (age 21+) in Washington State who use cannabis. Licensed retailers were provided information and signage about the survey to encourage their patrons to take the online survey.

The survey included two questions that referenced metals testing:

> Please answer the following to the best of your ability (part of a longer true/false question with multiple parts):

- Question. Only medically compliant products are required to be tested for heavy metals (Answer options: true, false, not sure, choose not to answer)
- Question. How does medical cannabis (MC) differ from recreational cannabis? (Answer options: medical cannabis is required to be tested for heavy metals; MC is required to be tested for THC and CBD; MC has higher CBD content; there are no differences; not sure; choose not to answer)

Results from these questions will help address what consumers know, and maybe expect, around metals testing of cannabis products. Results are due in early 2024.

Cost of metals testing

- Cost to test samples: At least two laboratories have capabilities to include metals testing in addition to the standard I502 panel. Currently the LCB certifies two laboratories to conduct metal testing. Costs for the standard I502 panel is $250; adding metals testing is an additional $90-$100 beyond the I502 panel. Metals testing alone is $100-$120 as an individual test.[20,21]
- Certified testing laboratories that are not certified for heavy metals testing are allowed to refer (send out) that testing to other certified labs by subcontracting.[22]
- In order to estimate the total cost of expanding metals testing to all products, we could assume metals would be tested for in same products tested currently for pesticides (i.e., cannabis flower, cannabis mix, concentrates, and infused cooking oil or fat).

Analysis

When deciding the Board recommendation, the Director's Office Staff considers the following factors to the extent practicable:

- LCB's statutory authority and obligations;
- Alignment with the Agency's policy goals and priorities;
- The immediacy of the safety, environmental, or security concern raised;
- Potential impact to public health outcomes;
- The potential impact on criminal activity;
- Level of public interest;
- Whether the problems or issues are already under consideration by the LCB in other rulemaking issues;
- Merits of the petition; and
- Equity impacts.

Accepting the rule petition does not mean the Agency would begin developing rules to require metals testing for non-DOH compliant cannabis, but rather provides an opportunity for the Agency to solicit and gather feedback from the public to assess whether and how a regulation should be revised to achieve a desired outcome. If the Board accepts a petition, the collaborative rulemaking process will be initiated, consistent with the Administrative Procedures Act (APA).[23]

Statutory Authority and Obligations

The proposed rule change is within LCB's statutory authority and aligned with LCB's statutory obligations. The petitioner is requesting an amendment to WAC 314-55-102(3), which provides the quality control testing requirements for licensees. RCW 69.50.342 grants the Board statutory authority to adopt rules that ensure the quality and safety of cannabis products.[24] Consistent with statute, WAC 314-55-102(3)(g) states heavy metal screening is required for all WADOH compliant product.[25]

According to the petitioner, a new rule is needed because heavy metals have been detected in currently regulated cannabis in the state and some cannabis producers are located in areas affected by historical sources of metals including leaded gas, industrial emissions and use of some agricultural pesticides. Many of these sources of metals have been identified by the Washington State Department of Ecology (Ecology) and are, or have been, investigated and remediated under Ecology's authority. Metals can persist in soil for decades depending on conditions in areas that have not been remediated. It is unknown where and how metals contaminated soil in the state might be used for growing cannabis (e.g., directly grown in soil, soil used in above ground or other types of beds, etc.).

The petitioner also acknowledges that there would be additional costs to licensees for any new testing with possible benefits including increased testing work for some laboratories. RCW 69.50.345(6)(c) requires the Board to adopt rules that consider economies of scale, and the impact on licensees' ability to comply with the regulatory requirements and undercut the illegal market.[26]

Safety, Environmental and Security Concerns

The petitioner asserted that heavy metals have been identified in cannabis products in Washington, that there are known sources of environmental metals in Washington related to historical lead arsenate pesticide use on orchards and industrial sources, and that consumers would benefit from additional safeguards from expanding testing of metals to include adult-use products.

Public Health Outcomes

Studies and other information related to metals in cannabis and cannabis products were reviewed to identify possible exposures and health risks from the use of cannabis products. Cannabis plants are known to readily take up metals from surrounding soil during growth.[27] Industrial hemp has been studied for use in remediation efforts at hazardous waste sites as a way to remove metals from soil.[28] Metals have been shown to accumulate into cannabis leaves and flower specifically.[29] A recent study found that marijuana users had higher levels of cadmium and lead in their blood and urine compared to people who didn't use marijuana or tobacco, suggesting marijuana as a source of metals exposures.[30]

In addition to metals accumulating into cannabis plants, metals, including lead, have been found in vaping devices including metal components of vape cartridges.[31,32] Metals have also been found in packaging materials and rolling paper.[33,34]

According to CCRS data, 25 licensees have submitted metals test results for medically compliant products. Producers who may want to offer medically compliant product may be reluctant to test for metals to risk having an exceedance that would require the destruction of a batch.[35]

Medical cannabis users may be relying more on non-DOH compliant cannabis products because of a decreasing amount of medically compliant products and fewer retailers licensed to carry medical products. WADOH data indicate a steady decrease in cannabis medical cards, from a high of 20,623 in 2017 to 9,368 in 2023 (WADOH data and statistics).[36] This decrease in medical cards may not accurately reflect a lower number of people using cannabis products for medically related conditions. Since cannabis medical cards need to be renewed every year[37], this much of a decrease is unlikely due to reduced medical needs only. Additionally, medical cannabis users may be at higher risk of harmful effects from exposures to metals via cannabis products due to their health conditions and/or frequency of use.

Currently 49% of the 471 licensed cannabis retail stores hold a medical endorsement (WADOH Data and Statistics).[38] WADOH currently reports that there are 444 medical cannabis certified consultants with active credentials. According to WADOH, less than 5 cannabis producers make fully medically compliant products. WADOH has provided a statement in support for expanding metals testing as part of new rulemaking (see WADOH statement below under Inter-Agency Interests).

The petitioner specifically mentions concerns about regulated cannabis growing in areas of the state with metals in soils from historical pesticide use and industrial sources. CCRS data indicate that 14/25 licensees who submitted DOH-compliant metals testing are producers who listed indoor; and indoor and outdoor grow types. The remainder are processors whose flower bio-mass material is not readily traceable to location.

Areas in Washington with elevated metals in soils:

- There are areas in Washington with high levels of metals due to historical pesticide use, contamination from industry (e.g., smelter emissions) and naturally occurring levels. Ecology publishes a map showing known areas of metals contamination which is searchable by address.[39]
- Northeastern portions of the state with elevated soil levels of metals associated with Trail BC smelter.[40]
- Lead and arsenic elevated soil levels in parts of western WA as a result of ASARCO emissions.[41]
- Soil adjacent to roadways associated with historical use of leaded gasoline.[42]

Criminal Activity

LCB has not been conducting random testing for metals testing. Licensees may be under-reporting metals results by designating samples as part of R&D samples, but it is unknown how this would contribute to criminal activity.

If the Board accepts this petition and rulemaking is initiated, it may be necessary to review and update other sections in WAC 314-55-102 to ensure that LCB has the necessary information needed to conduct effective investigations and verify whether a licensee is complying with metals testing and reporting requirements.

Level of Public Interest

As of January 29, one public comment has been received in support of accepting the petition. Based on this comment, there hasn't been much public interest to date to amend WAC 314-55-102(3) to require heavy metals testing of all cannabis products.

Equity Impacts

To provide social equity licensees with the greatest opportunity to succeed in the marketplace, it would be prudent to review the current rules and evaluate whether the rule requirements impose an undue compliance burden for licensees, and whether there are ways to reduce costs of testing without sacrificing public health and safety.

In addition, it also may be important to identify whether certain groups, including patients with medical cannabis authorizations, are more likely to be exposed to metals from cannabis products and to identify barriers for accessing DOH-compliant products that already meet existing metals standards. Medical patients may be relying on non-DOH compliant cannabis for a variety of reasons that could include lack of access to healthcare. This may result in patients accessing adult-use products that could be putting them at risk of increases in exposure to metals.

LCB Policy Goals and Priorities

The petitioner's request is aligned with the Agency's policy goals and priorities to:

- Develop evidence-based policy and rules with the most up-to-date research; and,
- Improve public health, safety, and equity.

Merits of the Petition

There has been prior public support for metals testing during quality control rule amendments.

Currently, there is a lack of medically-compliant cannabis products for patients. Medical cannabis patients may be exposed to metals by using untested adult-use products when

they are unable to access DOH-compliant products. Medical cannabis patients may be more vulnerable to harmful effects from exposure to metals due to compromised health status and/or underlying conditions.

There may be a greater chance of metals uptake into cannabis grown on land in certain areas of the state with elevated levels of metals from historical industrial sources and/or prior use of pesticides. This would most likely apply only to crops grown outdoors on and/or using existing, unamended soils. Some fertilizers can also contribute metals to soils and may impact metals levels in cannabis grown with these products.

Division Impacts and LCB resources

Licensing

- *According to WADOH, it is unlikely that there would be an impact on issuing medical cannabis endorsements. Retail endorsements focus on the store having the hardware and software necessary to produce medical cards, as well as consultants and their training. Retail stores with medical endorsements are required to carry a variety of medical cannabis products (RCW 69.50.375); this rule change would likely increase the amount of medical products available for wholesale purchase to retailers. This would make it easier for a medically endorsed store, or a store trying to obtain a medical endorsement, to meet this requirement by increasing the availability of product currently deemed medical/compliant product.*

Education and Enforcement (E&E)

- *Adding metals testing will increase reporting of test results that licensees submit.*
- *New education around complying with new metals testing requirements.*
- *Resources for investigating compliance.*
- *Possible resources for recalls.*

Information *technology (IT)*

- *Possibly resources for IT from increase in reporting metals results and requests for metals data.*

Public health/prevention

Additional testing would provide consumers more confidence in the safety of cannabis products. Heavy metal testing requirements can help identify potentially harmful contaminants in cannabis products. Additional testing would help to remove products from the market that trigger recall and destruction.

Finance

- *Possible impact of metal testing on product sales, e.g., if testing results in a decline in available products.*

Research
If the Board votes to accept the petition and rulemaking is initiated, the research team will be consulted for developing evidence-based policy and rules protective of public health and safety. This may include collaborating around determining impacts to licensees, identifying at-risk populations, and developing testing protocols.

Tribal

- *Increase in testing business for laboratories currently operated by Tribes who have capability to conduct metals testing.*

Inter-Agency Interests

Washington State Department of Health (WADOH)

WADOH supports expanding heavy metals testing to adult-use products and has provided the following statement:

> "The DOH Medical Cannabis Program has reviewed the LCB petitioning requesting that all adult-use cannabis products be tested for heavy metals. Cannabis has been shown to absorb heavy metals from contaminated growing mediums and can have a wide array of accompanied health risks on the body. Testing for heavy metals is essential to identify contaminated cannabis products so that products sold at retail stores are safer for consumption. For these reasons, the Department of Health's rules under Chapter 246-70 WAC - Marijuana Product Compliance, requires Quality assurance testing under section WAC 246-70-050, specifically sub-section (1) Testing interval and sample size and sub-section three (3) Heavy metal screening, along with posted standards for a sample needs to pass a heavy metal screening test for medical-grade product.
>
> We believe heavy metals testing is important for adult as well as medical product so that additional safety measures are in place for all cannabis users."

Washington State Department of Agriculture (WSDA)

WSDA is currently involved in rulemaking to transfer and expand laboratory quality standards from LCB to WSDA for cannabis testing (CR-102 filed 11/20/2023).[43] This rulemaking implements House Bill 1859 (2022) that includes method performance criteria for heavy metals screening (new section WAC 16-309-140).

Washington State Department of Ecology (Ecology)

Ecology oversees the identification and remediation of contaminated sites in the state including areas with known metals contamination under their Model Toxics Control Act

(MTCA) Program. Ecology information can be used to identify current and future cannabis growing locations at risk of increased metals uptake.

Ecology is currently conducting draft rulemaking around cannabis laboratory accreditation being transferred from LCB under RCW 43.21A and RCW 69.50.348.[44] This rulemaking includes accreditation for metals testing. Cannabis laboratory accreditation may ultimately be transferred to the WSDA under HB 2151 currently in the (2023) legislature.

Conclusion

Based on the information and analysis provided above, the Director's Office staff recommends that the Board accept the petition and initiate rulemaking to consider amending WAC 314-55-102 to require of metals testing as part of quality control analysis and screening of non-DOH compliant cannabis product.

Board Action

After considering the recommendation of Director's Office staff, the Board accepts/denies the petition for rulemaking received from Dr. McRae on December 8, 2023.

_____ Accept	_____ Deny	_____	_____
		David Postman, Chair	Date
_____ Accept	_____ Deny	_____	_____
		Ollie Garrett, Board Member	Date
_____ Accept	_____ Deny	_____	_____
		Jim Vollendroff, Board Member	Date

Attachments

1. Rule petition.
2. Email containing rule petition and follow-up email.
3. Public comments – 1/9/2024 from Mr. Kingsbury.

Table 2 sources:

- Alaska: Marijuana Regulations Changes, 2022. https://www.commerce.alaska.gov/web/Portals/9/pub/MCB/StatutesAndRegulations/3%20AAC%20306%201.19.22.pdf
- California Dept. of Cannabis Control, Medicinal and Adult-Use Commercial Cannabis Regulations, California Code Regulations Title 4. Division 19: https://cannabis.ca.gov/cannabis-laws/dcc-regulations/
- Colorado: Colorado Marijuana Rules. 1 CCR 212-3. Available at: https://sbg.colorado.gov/med/rules
- Illinois, Illinois Department of Agriculture, Part 1300 Cannabis Regulations and Tax Act, Section 1300.700 Laboratory Testing. Available at: https://ilga.gov/commission/jcar/admincode/008/008013000H07000R.html
- Maine, 2023 Medical marijuana testing results including metals testing. Available at: https://legislature.maine.gov/doc/10435#:~:text=The%20mandatory%20testing%20standards%20for,%3B%20residual%20solvents%3B%20and%20pesticides.
- Michigan: Michigan Sampling and Testing – Technical Guidance for Marijuana Products, 2022. Available at: https://www.michigan.gov/cra/-/media/Project/Websites/cra/bulletin/5Technical/Sampling_and_Testing-_Technical_Guidance_for_Marijuana_Products_694124_7.pdf
- Massachusetts: Massachusetts Exhibit 4 limits for metals etc. available at: https://www.mass.gov/doc/exhibit-4-analysis-requirements-and-recommended-limits-for-metals-in-finished-medical-marijuana/download
- Minnesota: Minnesota Administrative Rules available at: https://www.revisor.mn.gov/rules/4770.3022/
- Nevada. CANNRA posting
- New Mexico. https://www.rld.nm.gov/wp-content/uploads/2023/08/QUALITY_CONTROL_INSPECTION_AND_TESTING_OF_CANNABIS_PRODUCTS-_16.008.0007.pdf
- New York: Metals testing Nov. 2023 https://cannabis.ny.gov/system/files/documents/2023/11/ocm-testing-limits.pdf
- New Jersey: The New Jersey Cannabis Regulatory Commission's Testing Guidance, Sept. 28, 2022. Available at: https://www.nj.gov/cannabis/documents/businesses/Business%20Resources/CRC%20Testing%20Guidance%209.28.22.pdf . Had adopted Maryland's metals limits for medical cannabis as interim (2021)
- Oregon: Medical Marijuana Information Bulletin 2022-01 – Revised. Subject: New Cannabis Testing Rules Effective March 31, 2022. Available at: https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/MEDICALMARIJUANAPROGRAM/Documents/Information_Bulletin_2022-01-Testing_changes_summary_eff_03-21-2022.pdf
- Vermont: VT Testing Laboratory Action Limits and Parameters Guidance, April 2022. Available at: https://ccb.vermont.gov/sites/ccb/files/2022-04/Action.Limits.Parameters.Guidance_FINAL.pdf . Vermont Cannabis Quality Control Program, Lab Certification Process and Testing Tables (10/16/2020). Available at: https://agriculture.vermont.gov/sites/agriculture/files/documents/PHARM/hemp/FINAL_cannabis_testing_tables_10-16-20.pdf

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[1] ***Heavy metal screening limits - unit conversion***. *Heavy metal screening limits for LCB in WAC 314-55-102 are in units of ug/g concentration for WADOH compliant cannabis products, while WADOH heavy metal screening limits are in units of µg/daily dose (5 grams). Converting µg metal/(day) daily dose to µg metal/gram concentration using the following formula:*

(µg metal/day) ÷ (5 grams product/day) = µg metal/gram product

[2] **WAC 246-70-050 (3)**.

(3)(a) Heavy metal screening. For the purposes of heavy metal screening, a sample shall be deemed to have passed if it meets the following standards:

Metal	Limit, µg/daily dose (5 grams)
Inorganic arsenic	10.0
Cadmium	4.1
Lead	6.0
Mercury	2.0

(b)A harvest, lot, or batch deemed to have failed heavy metal screening must be destroyed according to chapter 314-55 WAC. Marijuana flowers, trim, leaves, or other plant matter deemed to have failed heavy metal screening must not be used to create extracts or concentrates. Imported cannabinoids deemed to have failed heavy metal screening must not be added to any marijuana product.

[3] **WAC 246-70-050**. *Quality assurance testing.*

(1)(a). The testing requirements of this section are in addition to the tests required under WAC 314-55-102 and shall be performed by a third-party testing lab certified by the WSLCB.

[4] **WAC 314-55-109**

(4)(b)(iii) Heavy metal screening. For the purpose of heavy metal screening, a sample fails quality assurance testing and must be disposed of consistent with WAC 314-55-097 if it meets or exceeds the following limits:

Metal	Limit, µg/daily dose (5 grams)
Inorganic arsenic	10.0
Cadmium	4.1
Lead	6.0
Mercury	2.0

[5] CCRS: In 2022, 263 heavy metal samples submitted out of total samples of 1,688,455 (0.02%). In 2023, 716 heavy metal samples submitted out of total samples of 2,187,586 (0.03%).

[6] Jameson et al., 2022. Comparison of State-Level Regulations for Cannabis Contaminants and Implications for Public Health. Environ. Health Perspectives, 130(9).

[7] National Conference of State Legislatures, State Medical Cannabis Laws. Non-Medical/Adult-Use Update (as of Nov. 8, 2023). Accesses 01/12/2024. Available at: https://www.ncsl.org/health/state-medical-cannabis-laws

[8] From Supplemental material; Jameson et al., 2022. Comparison of State-Level Regulations for Cannabis Contaminants and Implications for Public Health. Environmental Health Perspectives: 130(9): September 2022.

[9] Oregon Heath Authority, 2022. Cannabis Testing Guide. Available at: https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/MEDICALMARIJUANAPROGRAM/Documents/Cannabis_Testing_Quick_Guide.pdf

[10] Oregon Health Authority, Medical Marijuana Information Bulletin 2022-01 Revised. New Cannabis Testing Rules Effective March 31, 2022. Available: https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/MEDICALMARIJUANAPROGRAM/Documents/Information_Bulletin_2022-01-Testing_changes_summary_eff_03-21-2022.pdf

[11] Oregon Health Authority, Public Health Division – Chapter 333. Division 7 Marijuana and Hemp Testing, 333-007-0425. Available at: https://secure.sos.state.or.us/oard/viewSingleRule.action?ruleVrsnRsn=287429
OAR 333-007-0415 Table 8. List of heavy metals and their action levels. Effective March 31, 2022. Available at: https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/MEDICALMARIJUANAPROGRAM/Documents/rules/333-007-0400_0410_0415_0425_Exhibit_A_eff_March312022.pdf

[12] California metals limits based on elemental impurities limits for drug substances, excipients, or drug products developed by the U.S. Pharmacopeial Convention (USP) available at: https://www.usp.org/impurities/elemental-impurities-updates .

[13] AHPA, 2020. AHPA Guidance Policy, Heavy Metals (elemental impurities). Available at: https://www.ahpa.org//Files/Document%20Library/AHPAGuidancePolicies/AHPA_Guidance_Heavy_Metals.pdf

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[15] Oregon Liquor and Cannabis Commission, News Release, July 13, 2023. OLCC recalls cannabis flower that contains arsenic. Available at: https://www.oregon.gov/olcc/Docs/news/news_releases/2023/nr071323-Cannabis-Arsenic-Recall.pdf

[16] MRA Recalls Four Medical Marijuana Products Across the State, August 30, 2019. Available at: https://www.michigan.gov/cra/news-releases-old/mra-recalls-four-medical-marijuana-products-across-the-state

[17] Colorado Dept. of Revenue, Health and Safety Advisory: First Class LLC. Available at: https://drive.google.com/file/d/1ap4Pkw4aJxhvzy9G0tbZNkViwE69_6Ry/view

[18] Colorado Dept. of Revenue, March 31, 2021. Available at: https://sbg.colorado.gov/sites/sbg/files/documents/20210330%20TZ%20Financial%20LLC%20403R-00123%20HSA%20Final.pdf

[19] Maine, 2023 Medical marijuana testing results including metals testing. Available at: https://legislature.maine.gov/doc/10435#:~:text=The%20mandatory%20testing%20standards%20for,%3B%20residual%20solvents%3B%20and%20pesticides.

[20] Medicine Creek Analytics – Pricing Sheet Oct. 2023. https://medicinecreekanalytics.com/wp-content/uploads/2023/10/Pricing_Oct2023_MCA.pdf

[21] Confidence Analytics - $120 just for metals, add $100 if added to the I502 panel ($250 for I502) as of 12/21/2023.

[22] WAC 314-55-102(1)(b) Certified labs may be certified for heavy metal testing. Certified labs must comply with the guidelines for each quality control field of testing described in this chapter if they offer that testing service. (c) Certified labs may reference samples for mycotoxin, heavy metal, or pesticide testing by subcontracting for those fields of testing.

[23] Chapter 34.05 RCW - Administrative Procedures Act (APA)

[24] **RCW 69.50.342**

(1) For the purpose of carrying into effect the provisions of chapter 3, Laws of 2013 according to their true intent or of supplying any deficiency therein, the board may adopt rules not inconsistent with the spirit of chapter 3, Laws of 2013 as are deemed necessary or advisable. Without limiting the generality of the preceding sentence, the board is empowered to adopt rules regarding the following:

(c) Methods of producing, processing, and packaging cannabis, useable cannabis, cannabis concentrates, and cannabis-infused products; conditions of sanitation; safe handling requirements; approved pesticides and pesticide testing requirements; and standards of ingredients, quality, and identity of cannabis, useable cannabis, cannabis concentrates, and cannabis-infused products produced, processed, packaged, or sold by licensees;

RCW 69.50.345

(11) In consultation with the department and the department of agriculture, establishing accreditation requirements for testing laboratories used by licensees to demonstrate compliance with standards adopted by the board, and prescribing methods of producing, processing, and packaging cannabis, cannabis concentrates, useable cannabis, and cannabis-infused products; conditions of sanitation; and standards of ingredients, quality, and identity of cannabis, cannabis concentrates, useable cannabis, and cannabis-infused products produced, processed, packaged, or sold by licensees;

[25] WAC 314-55-102

(3)(g) *Heavy metal screening. Heavy metal screening is required for all WADOH compliant product as described in chapter 246-70 WAC. Heavy metal screening is optional for non-DOH compliant product; however, heavy metal limits provided below apply to all products. Any product exceeding the provided limits is subject to recall and destruction. The board may conduct random or investigation driven heavy metal screening for compliance. A sample and related quantity of product fail quality control testing for heavy metals if the results exceed the limits provided in the table below.*

Metal	µg/g
Arsenic	2.0
Cadmium	0.82
Lead	1.2
Mercury	0.40

[26] **RCW 69.50.345**

(6) In making the determinations required by this section, the board shall take into consideration:

(c) Economies of scale, and their impact on licensees' ability to both comply with regulatory requirements and undercut illegal market prices;

[27] Dryburgh et al., 2018. Cannabis contaminants: sources, distribution, human toxicity and pharmacologic effects. British Journal of Clinical Pharmacology, 84:2468-2476.

[28] Flajsman et al., 2023. Industrial hemp (Cannabis sativa L.) a Industrial hemp (*Cannabis sativa* L.)—a valuable alternative crop for growing in agricultural soils contaminated with heavy metals. Env. Sci. & Poll. Res. (2023) 30: 115414-29. https://doi.org/10.1007/s11356-023-30474-z

[29] Zafeiraki E, Kasiotis KM, Nisianakis P and Machera K (2021) Macro and Trace Elements in Hemp (Cannabis sativa L.) Cultivated in Greece: Risk Assessment of Toxic Elements.Front. Chem. 9:654308. doi: 10.3389/fchem.2021.654308

[30] McGraw, et al., 2023. Blood and Urinary Metal Levels among Exclusive Marijuana Users in NHANES (2005-2018). Env. Health Perspectives: 131(8).

[31] Seltenrich, 2019. Cannabis Contaminants: Regulating Solvents, Microbes, and Metals in Legal Weed. Environmental Health Perspectives 127(8). https://doi.org/10.1289/EHP5785.

[32] McDaniel et al., 2021. Metals in Cannabis Vaporizer Aerosols: Sources, Possible Mechanisms, and Exposure Profiles. Chemical Research in Toxicology 34(11): 2331-2342.

[33] Analytical Cannabis, 2022. Understanding Sources of Heavy Metals in Cannabis and Hemp: Benefits of a Risk Assessment Strategy – Part 4. Available at: https://www.analyticalcannabis.com/articles/understanding-sources-of-heavy-metals-in-cannabis-and-hemp-benefits-of-a-risk-assessment-strategy-313945

[34] Rolling Papers Tested for Heavy Metals and Pesticides, Analysis Report, 2020. SC Laboratories, Inc. Available at: https://leafly-cms-production.imgix.net/wp-content/uploads/2020/09/02114941/SC-Labs-Report-Rolling-Papers.pdf

[35] Personal communication, WADOH. J. Wong, 12/20/24 email.

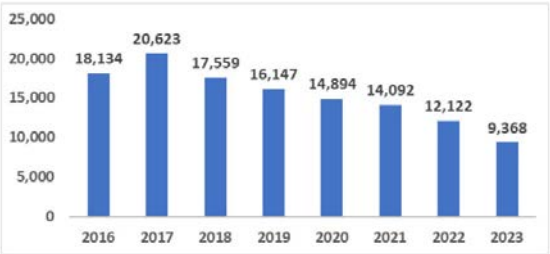
[36] WA DOH, Medical Cannabis Data and Statistics, Nov. 2023.

Updated November 2023

The following statistics are reported by the medical cannabis database administrator and the agency's credentialing office.

Recognition Cards Created from the Database

Total Cards Created: 122,939
Cards Created in 2023: 6,368



* Numbers account for each card generated from the database (initial, renewal, replacement, and corrections) and includes both patient and designated providers.
* System went live in July 1, 2016. With the exception of 2016, all years contain four quarters of data.

[37] WA DOH Medical Cannabis Patients and Consumers, Q&A, 2021. Available at: https://doh.wa.gov/sites/default/files/legacy/Documents/Pubs/608040.pdf

[38] LCB maintains a list of medically endorsed stores at: https://lcb.wa.gov/records/frequently-requested-lists

[39] Washington State Dept. of Ecology, Dirt Alert map. Available at: https://apps.ecology.wa.gov/dirtalert/?lat=47.273840&lon=-122.500000&zoom=7

[40] Washington State Dept. of Ecology, Upper Columbia River, Lake Roosevelt Site. Available at: https://apps.ecology.wa.gov/cleanupsearch/site/12125

[41] Washington State Dept. of Ecology, Tacoma Smelter Plume project. Available at: https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Cleanup-sites/Tacoma-smelter

[42] Petitioner has posted information on his blog showing an analysis of locations of licensed growers/producers near major roadways in the state potentially impacted by historical use of lead gas.

[43] WSDA Chapter 16-309 WAC. Rulemaking activities: Cannabis Testing Laboratory Quality Standards. CR-102 with proposed rule language, filed 11-20-2023.
[44] Ecology rulemaking: https://ecology.wa.gov/regulations-permits/laws-rules-rulemaking/rulemaking/wac-173-55 .