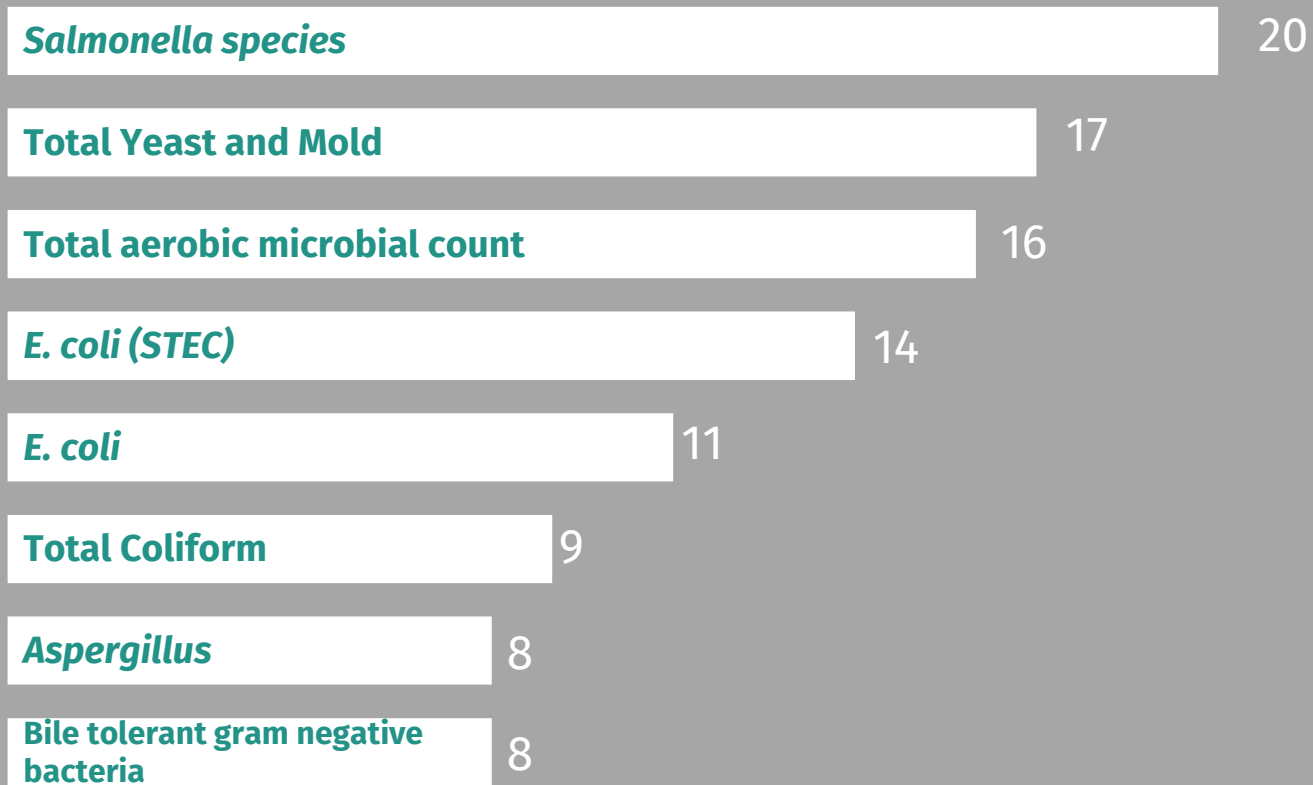


Summary of 50 State Review for Medical Marijuana Laboratory Testing Advisory Committee



ARIZONA DEPARTMENT
OF HEALTH SERVICES

Most states are testing for *Salmonella* species, total yeast and mold, and total aerobic microbial count.



Microbial Testing

- No consensus standards amongst states.
- California and Oregon focus on safety standards more in line with the Arizona statute language.
- *E. coli* testing serves as a proven indicator for safety and sanitation.
- Inhaling *Aspergillus* is a known concern for immuno-compromised individuals. Special considerations should be made.

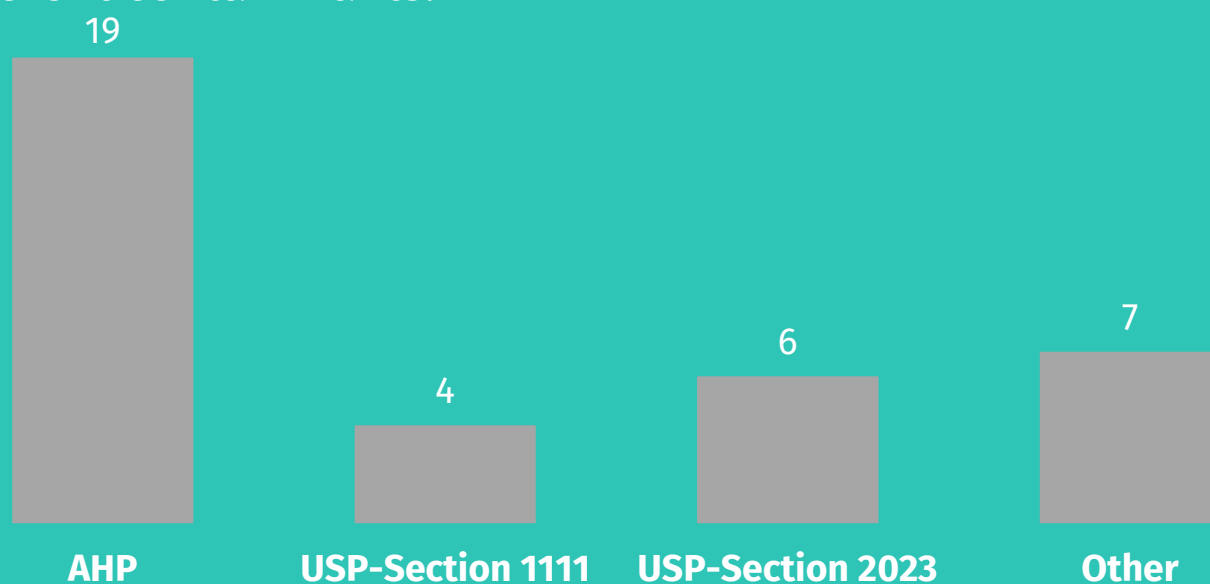
Summary of Evidence & Best Practices

Microbial Testing Limits

There were several different standards that states are using for each of the microbial contaminants. These included:

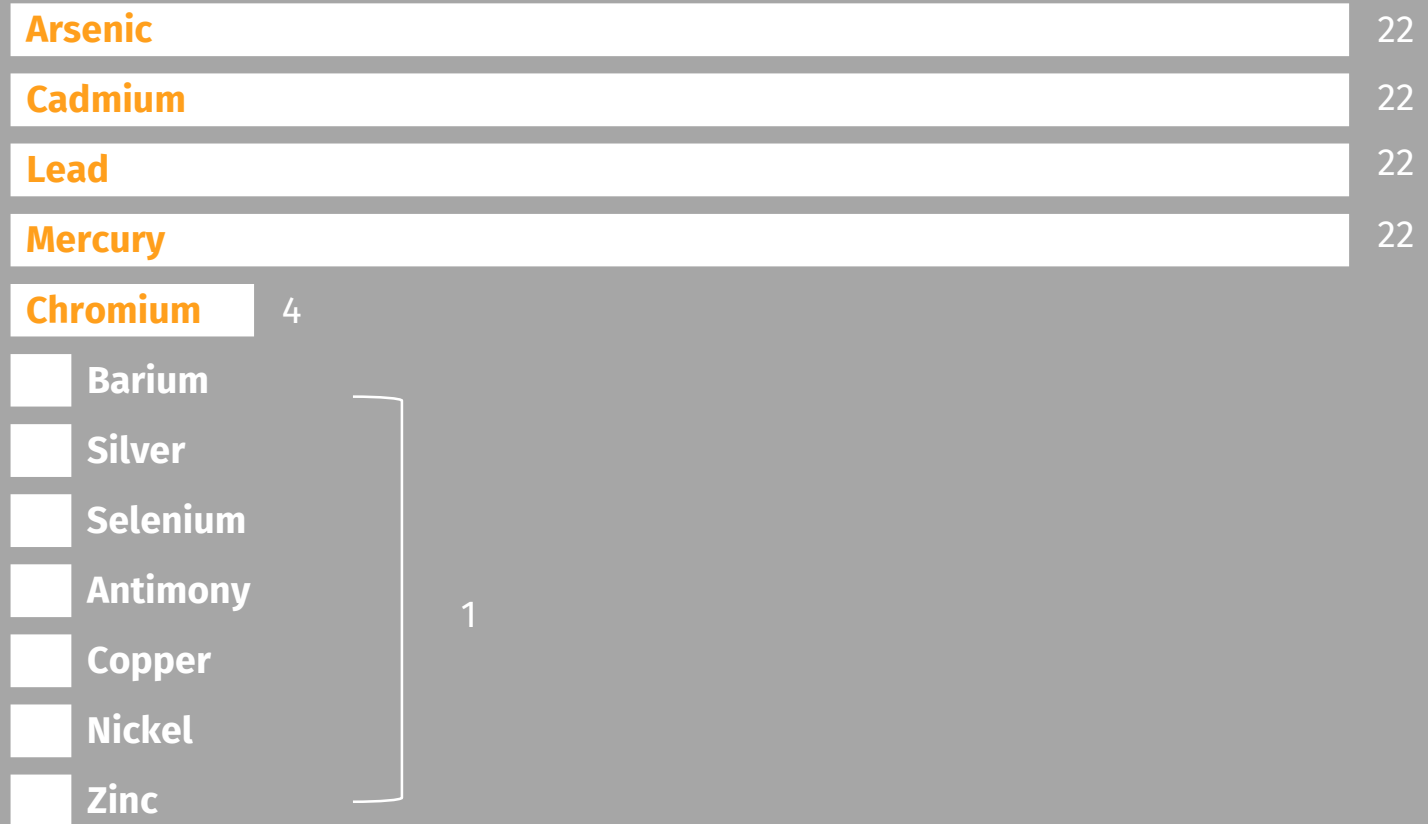
- American Herbal Pharmacopoeia (AHP)
- United States Pharmacopoeia – Section 1111 (USP)
- United States Pharmacopoeia – Section 2023 (USP)
- Other
 - This included standards with unique limits that were not found in any known standard

Out of the 26 states reviewed, the standards that were used varied and included combinations of different standards for different contaminants.



Aspergillus was not included in the graph above because there is no known standard available.

Most states are testing for arsenic, cadmium, lead, and mercury.



Heavy Metal Testing

- All states with metals testing require arsenic, cadmium, lead, and mercury due to cannabis' ability to bio-accumulate these heavy metals.
- Some states have found issues with chromium in cannabis products as a result of the cultivation environment.
- The remaining heavy metals listed above are not known to commonly occur in medical marijuana at this time .

Summary of Evidence & Best Practices

Most states are testing for hexane, heptanes, and butanes.

Hexane (or n-hexane)	20
Heptanes	20
Butanes (n-Butane)	20
xylene (or total m,p,o)	18
Toluene	18
Propane	16
Benzene	16
Pentane	15
Acetone	15
2 Propanol (IPA)	15

Solvent Testing

- Some of the states have adopted a standard based on the United States Pharmacopeia (USP) limits. It is unknown where other states' limits originate from.
- Oregon developed more specific standards for cannabis testing through the expertise of a technical committee.

Appendix

There are 74 total solvents that different states commonly tested.

Solvent	Number of States
Butanes (n-Butane)	20
Heptanes	20
Hexane (or n-hexane)	20
Toluene	18
xylene (or total m,p,o)	18
Benzene	16
Propane	16
2 Propanol (IPA)	15
Acetone	15
Pentane	15
Ethanol	13
Dichloromethane	12
Ethyl acetate	11
Methanol	11
Acetonitrile	10
Ethyl ether	10
Chloroform	9
Cyclohexane	9
Ethylene oxide	7
Trichloroethylene(1,1,2-TCE)	7
Tetrahydrofuran	7
2-Butanol	7
Cumene	7
1,4- Dioxane	7
2-Ethoxyethanol	7
Ethylene glycol	7
Isopropyl acetate	6
1 Pentanol	6
1-Butanol	6
1,2-Dimethoxyethane	6
N,N-Dimethylacetamide	6
N,N-Dimethylformamide	6
Dimethylsulfoxide	6
1 Propanol	6
Pyridine	6
Sulfolane	6
Propyl acetate	5

Solvent	Number of States
Formamide	5
1,2 Dichloroethane	5
Chlorobenzene	5
2-Methoxyethanol	5
Methylbutylketone	5
Methylcyclohexane	5
Methylethylketone	5
Methylisobutyl ketone	5
2 Methyl 1 propanol	5
N-Methylpyrrolidone	5
Tetralin	5
Nitromethane	5
1,2 Dichloroethene	4
Carbon tetrachloride	4
1,1 Dichloroethene	4
1,1,1 Trichloroethane	4
Acetic acid	4
Anisole	4
Butyl acetate	4
Tert-Butylmethyl ether	4
Isobutyl acetate	4
Methylacetate	4
3-Methyl 1-butanol	4
Ethyl formate	4
Isobutane	4
Formic acid	4
Ethylbenzene	2
3-Methylpentane	2
2-Methylpentane	2
2,3 Dimethylbutane	2
2,2 Dimethylbutane	2
2 Methylbutane	2
2 Butanone	2
1,2 Dimethylbenzene	2
1,3 Dimethylbenzene	2
1,4 Dimethylbenzene	2
Methylpropane	2

Most states are testing for imidacloprid, myclobutanil, and cyfluthrin.



Pesticide Testing

- The states' standards for pesticides, fungicides and growth regulators varied widely and there is very little consensus on standards for cannabis testing.
- Oregon based its standards on a comprehensive study conducted by a technical committee to develop a list of the pesticides of greatest concern for public safety.
- Most states do not require testing for herbicides

Appendix

There are 72 total pesticides/ that different states commonly tested.

Analyte	Number of States
Imidacloprid	19
Myclobutanil	19
Cyfluthrin	18
Etoxazole	18
Spinosad	17
Trifloxystrobin	17
Bifenazate	16
Imazalil	16
Spirotetramat	16
Bifenthrin	15
Spiromesifen	15
Abamectin (Avermectins)	14
Paclobutrazol	14
Permethrin	14
Pyrethrins	14
Flonicamid	13
Malathion	13
Piperonyl butoxide	13
Thiamethoxam	13
Acequinocyl	12
Azoxystrobin	12
Chlorantraniliprole	12
Chlorpyrifos (-ethyl)	12
Cypermethrin	12
Diazinon	12
Fludioxonil	12
Metalaxyl	12
Methomyl	12
Oxamyl	12
Phosmet	12
Tebuconazole	12
Acetamiprid	11
Aldicarb	11
Boscalid	11
Carbaryl	11
Carbofuran	11

Analyte	Number of States
Clofentezine	11
Daminozide	11
Dichlorvos (DDVP)	11
Dimethoate	11
Fenpyroximate	11
Fipronil	11
Hexythiazox	11
Kresoxim-methyl	11
Methiocarb	11
Naled	11
Propiconazole	11
Pyridaben	11
Thiacloprid	11
Ethoprophos	10
Etofenprox	10
Fenoxycarb	10
Prallethrin	10
Acephate	9
Chlorfenapyr	9
Propoxur	9
Methyl parathion	8
MGK-264	8
Spiroxamine	8
Chlormequat Chloride	5
Dimethomorph	4
Fenhexamid	4
Spinetoram	4
Captan	3
Pentachloronitrobenzene	3
Chlordane	2
Parathion-methyl	2
Coumaphos	1
Mevinphos	1
Ancymidol	1
Flurprimidol	1
Pendimethalin (herbicide)	1