

Montana State Hemp Program

Procedure Guidance for Sample Collection, Sample Prep and Delivery

February 20, 2020 - V11

Authority

Title 80, Chapter 18-101 - 111, Montana Code Annotated, the Administrative Rules of Montana, Chapter 19.101 - 106, and the Agriculture Improvement Act of 2018.

Scope

To document the proper procedures for the sampling of hemp plants for the tolerance level of THC within Montana's State Hemp Program to ensure compliance with relevant state and federal regulations.

Hemp growing conditions in Montana vary tremendously, including acreage, varieties, plant densities and irrigation. Additionally, the geographic size of Montana makes it difficult to sample such a large crop in a short period of time. As such, the department will implement more than one option of sampling hemp for THC, depending on the circumstances of variety, harvest timing, resources, weather, acreage, plant density and travel.

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1. Definitions

- (1) Field - means a contiguous area not separated by any fence, drainage, road or waterway, regardless of Township, Range or Section.
- (2) Grower Submitted Sample - means a sample collected by the license holder or a representative of the license holder in accordance with the official procedures outlined herein.
- (3) Lab - means the Department's Analytical Lab (MSU, McCall Hall, Bozeman, MT).
- (4) Lot - means a contiguous or immediate adjoining area of a field or fields, greenhouse, or indoor growing structure containing the same variety of hemp throughout the area and having a harvest date within 3-weeks.
- (5) Lot ID - The official Lot ID will be the Lot/field ID number as recorded in the hemp database, regardless if the grower has a separate Lot ID. Lots must be tracked by the grower from planting through harvest and until the plant is no longer in a raw, unaltered state. If applicable, the Grower Lot ID may change after harvest as long as it is traceable to the previous Lot ID.
- (6) Official sample - means a composite, representative sample of hemp plants or plant parts from a designated Lot collected in accordance with official procedures as outlined herein.
- (7) Post-Harvest Sample - means a sample collected of hemp material in a homogenous form (e.g., biomass, inflorescences, intact-plant, root, etc.) from a specific Lot after harvest and prior to processing.
- (8) Pre-Harvest Sample - means a sample collected from hemp plants while the plant is growing
- (9) Processing - means heating, mixing, grinding, separating, extracting, cutting, freezing or otherwise physically or chemically altering hemp plants or plant parts from a raw, unaltered state.
- (10) Split Sample - means one of two equivalent portions of a whole composite sample identified as such with the same information as the official sample, collected at the same time in the same manner and randomly divided after the composite is collected.
- (11) Sub-sample - consist of 1 bud randomly selected.
- (12) THC - means Total $\Delta 9$ -THC on a dry matter basis
(% Total $\Delta 9$ -THC = % $\Delta 9$ -THC + (% $\Delta 9$ -THCA x 0.877))

2. Varietal Category Testing and Testing Frequency

The department will prioritize sampling based on complaints of non-compliance and the Category of the variety. The goal is to:

- randomly sample 10% of Category A varieties,
- randomly sample 20% of Category B varieties, and
- sample 100% of Category C varieties.

3. Inspection and Sampling Overview

- (1) The department may require the planting date and the estimated harvest date prior to issuance of the Production license certificate so it can estimate timing and work load requirements.
- (2) Each sampling event will include an inspection to verify proper licensure, sampled material including Lot ID, and Lot location. Additionally, random annual audits will be conducted of 20% of all license holders to verify compliance with state and federal regulations pertaining to hemp. These audits will include verification of compliance for seed source, proper seed documentation pertaining to the Montana Seed Act, harvest date as it relates to sampling, and all product entering commerce.
- (3) Official samples collected by the department will be collected within 3 weeks of harvest. Postharvest samples will be collected as soon as possible after harvest to allow for efficient marketing by the grower.
- (4) The inspector will give the grower at least 24-hour, preferably 48-hour notice of the inspection date to set up time and location.
- (5) The license holder or an authorized representative is encouraged to be present at the growing site during inspection and be available by phone prior to or during the inspection. The landowner on record can be an authorized representative if granted by the license holder. Authorization for entrance to and inspection of property and collection of hemp samples for testing is granted by signature of the licensee as a part of the licensing process. If neither the license holder or an authorized agent can be present during the inspection/sampling event, prior communications with the license holder will occur to assure both the licensee and the inspector are aware of the Lots to be sampled, the location of said Lots, and any other information pertinent to the inspection process.
- (6) Inspectors will be provided with complete and unrestricted access to all industrial hemp and other cannabis plants, whether growing or harvested, and all land, buildings, and other structures used for the cultivation and storage of all industrial hemp and other cannabis plants.
- (7) Harvested lots must maintain their identity, not be commingled and be traceable until official results indicate the legality of the lot.
- (8) Lots must be sampled, as outlined in this plan, prior to harvest.
- (9) Non-compliant Lots will be quarantined with the licensee investigated and subject to enforcement actions outlined in the State Plan.
- (10) The department's goal is to notify license holders of official sample test results within 7-business days of sampling. The test results will determine the eligibility to transport or process the harvested materials.

4. Equipment

The equipment required for conducting an inspection and the collection of hemp samples are as follows:

- Coveralls (single use)
- Vinyl gloves

- Pruning shears
- Composite sample collection container (washable bag for carrying shears and sub-sample when collecting the sample)
- Composite sample bags (breathable paper, approximately 12"x 6"x4")
- Tamper-proof security bags for shipping the sample
- Permanent black marker for sample ID
- Alcohol wipes
- Document of Inspection
- Hemp Sample Collection Report/Sample Receipt form
- Field Summary form
- Sample Log/Chain-of-Custody form
- Transport cooler
- Shipping coolers
- Ice-packs

Sanitation of equipment is as follows:

- Clean all sampling equipment with appropriate disinfectant after each composite sample.
- Change gloves after each composite sample and properly dispose of used gloves.
- Properly dispose of single-use coveralls after each inspection.

5. Sampling Protocol

Prior to beginning sampling, the inspector must review with the license holder all grow locations, Lots and Lot IDs, Variety(s) and Category(s) to determine the number of lots to sample. The inspector must consider all grow locations, even if across county or district lines, of the license holder before determining which lots require sampling. If a Lot in a different District requires sampling, coordinate with the inspector in that area. Any form information that can be completed prior to sample collection should be done at the planning stage at the office or with the grower.

Each variety must be sampled separately. However, the variety category testing frequency should be considered. Different lots of the same variety and the same license holder do not have to be sampled but can be at the discretion of the inspector if he/she observes differing varietal characteristics or differing growing conditions. The location(s), variety(s) and materials sampled are determined by the inspector with information provided by the license holder. All samples are property of the department and will be properly disposed of by the lab according to laboratory procedures.

Pre-harvest Sampling

Depending on plant spacing, the department will utilize two separate pre-harvest sampling protocols designated as Field Crop and Orchard. See examples for the minimum number of sub-samples to collect under Appendix A - Hypergeometric Table.

- (1) Field Crop (0.05 acre (e.g., 50' x 40') or more planted at approximately 15 - 30 lbs seed per acre)
 - a. From review of map, Lot size and growing conditions, determine the sub-sample rate within the Lot.
 - b. If sampling a non-registered Lot, log the latitude/longitude of the Lot. For registered Lots, review the coordinates to assure compliance. Record any necessary updates on the inspection form.
 - c. Sample the field in an 'M' pattern beginning in the lower corner of the field and ending in the opposite lower corner. Multiple 'M' patterns may be required if a lot contains more than one field.
 - i. If the plant density is too thick to navigate the 'M' pattern across a large Lot, collect the sub-samples around the perimeter of the field by navigating into the field as far as possible at random but equal distances around the field. Record the sampling procedure conducted if different than the normal 'M' pattern.
 - ii. For Lots greater than 100 acres or consisting of multiple fields, the sampling pattern may be altered as long as the Lot is consistent in planting date, variety, plant size and maturity, and harvest date, and the sample is representative of the entire Lot.
 - d. Collect random sub-samples at uniform distances throughout the field pattern.
 - i. The number of sub-samples depends on bud size and weight. The approximate sample size, on an 'as collected' basis is 100 grams. This will convert to approximately 25 grams (on an oven-dried basis), the preferred sample size for the lab to analyze and retain a portion for subsequent testing.
 - ii. The composite sample should consist of material from similarly mature female plants only. It should not contain material from male, dead, diseased or injured plants.
 - iii. A sub-sample is collected by randomly cutting 1 bud from each single plant sampled. Each sub-sample collected should be from a different location on the plant so that the composite sample represents the entire crop.
 - e. Deposit the sub-samples into the composite sample paper bag.
 - f. Using a permanent marker, ID the composite sample bag and fold over.
 - g. Place the composite sample bag into an evidence security bag and ID with permanent marker following procedures outlined herein.
 - h. Place the security bag in transport cooler with ice.
- (2) Orchard (any size field or greenhouse where plants are grown in pots or the in-ground spacing is greater than 18" apart)
 - a. For areas 1/10 acre (50'x100') or larger, use the Field Crop sampling method above.
 - b. If sampling a non-registered Lot, log the latitude/longitude of the Lot. For registered Lots, review the coordinates to assure compliance. Record any necessary updates on the inspection form.
 - c. For lots or areas less than 50'x100', use the Hypergeometric Table in Appendix A to determine the minimum number of sub-samples to collect. Use a similar 'M' pattern to sample the growing area.

- d. Collect the appropriate number of random sub-samples at uniform distances throughout the sampling pattern.
 - i. The number of sub-samples depends on bud size and weight. The approximate sample size, on an 'as collected' basis is 100 grams. This will convert to approximately 25 grams (on an oven-dried basis), the preferred sample size for the lab to analyze and retain a portion for subsequent testing.
 - ii. The composite sample should consist of material from similarly mature female plants only. It should not contain material from male, dead, diseased or injured plants.
 - iii. A sub-sample is collected by randomly cutting 1 bud from each single plant sampled. Each sub-sample collected should be from a different location on the plant so that the composite sample represents the entire crop.
 - e. Deposit the sub-samples into the composite sample paper bag.
 - f. Using a permanent marker, ID the composite sample bag and fold over.
 - g. Place the composite sample bag into an evidence security bag and ID with permanent marker following procedures outlined herein.
 - h. Place the security bag in transport cooler with ice.
- (3) For operations that have **15 plants or less in a single Lot**, collect 1 or more buds as necessary from each plant, but no less than a minimum of 60 grams (on an 'as collected' basis), randomly from the available plants.
 - (4) The absolute minimum sample size the labs needs for testing is 15 grams, on a dry matter basis.
 - (5) If harvest has started or been completed for a specific Lot prior to sampling without prior approval from the department, record the harvested quantity on the inspection form as a non-compliance. Additionally, collect samples of both harvested and non-harvested material accordingly and label according to procedures outlined herein.

Post-harvest Sampling

For hemp grain and seed sampling, follow normal grain and seed sampling procedures as outlined in those respective program manuals. For all other forms of harvested hemp materials, the overall procedure is as outlined here. The exceptions are noted in the Sub-sample Procedures section below.

Post-harvest samples are only allowed when weather conditions, travel logistics or resources restrict the department's ability to conduct pre-harvest inspections and must only occur when the inspector has access to whole (not processed) flower or buds from a traceable, identified Lot.

- (1) Review the Lot and Lot size to assure the materials to be sampled are known and uniform.
- (2) Determine the appropriate minimum number of sub-samples according to the Hypergeometric Table.
- (3) If sampling a non-registered Lot, log the latitude/longitude of the growing location of the Lot. For registered Lots, review the coordinates of the growing site to assure compliance. Record any necessary updates on the inspection form.

- (4) The composite sample should consist of homogenous material. It should not contain material from diseased or injured plants.
- (5) Collect the appropriate number of random sub-samples at uniform distances throughout the Lot as outlined below. *
- (6) Deposit the appropriate number of sub-samples into the composite sample paper bag.
- (7) Using a permanent marker, ID the composite sample bag and fold over.
- (8) Place the composite sample bag into an evidence security bag and ID with permanent marker following procedures outlined herein.
- (9) Place the security bag in transport cooler with ice.

* Sub-sample Procedures

- (1) Buds (dry)
 - a. Grab a single bud by hand.
- (2) Plants (hanging dry) harvested from a horticultural setting
 - a. Randomly cut 1 bud from each single plant. Each sub-sample collected should be from a different location on the plant so that the composite sample represents the entire crop.

6. Sample Identification

Label the composite sample container with the sample ID that corresponds with the Lot sampled.

The sample ID shall include:

- the four-digit sequential inspection number with the preceding 'H-', and
- the sample letter designation.

Example: "H-0001-A"

The security bag should be labeled as "H-####-X" with inspector initials and inspection date.

7. Sample Prep, Storage and Delivery

The moisture content of samples will vary depending on growing conditions, maturity of plant and whether collection is conducted pre- or post-harvest. Sample moisture can affect sample integrity. As such, samples must be placed in coolers on ice as soon as possible after the composite sample is collected and prior to leaving the inspection. Multiple samples can be contained and shipped in the same cooler.

Storage

Any time samples are stored prior to sending to the lab, keep samples in a locked vehicle or locked room in a cooler with ice.

Delivery to the Lab

The cooler and enclosed sample(s) will be sent to the MDA Analytical Lab. Hand-delivery is the preferred method of delivery. However, mailed samples are allowed. Mailed samples must be sent by FedEx using the department's FedEx account. Mail samples should:

- be sent overnight (if possible), or 2-day delivery at a minimum,
- not be mailed on Friday (not reach destination on the weekend),
- use the FedEx tracking system,
- be placed in standard FedEx overnight packaging,
- not require insurance or self-certification for mailing hemp,
- utilize temperature-control methods to assure sample environment does not exceed 140°F.

Mailed Samples

The samples will be mailed to the Analytical Lab in a shipping cooler with freshly frozen ice packs. The shipping cooler must be sealed. The Sample Collection Report, the Chain of Custody and the return shipping label (so the lab can return the cooler) must be placed inside the cooler in a plastic bag.

8. Chain of Custody

Regardless of storage or delivery options, Chain of Custody measures must be maintained, and the proper documentation completed throughout the process. Proper Chain of Custody measures include:

- Tamper-proof security packaging
- Proper sample identification
- Samples contained in locked vehicle, office space or storage building when not occupied

9. Sample Forms and Reporting

For specific instructions on completing the forms required for sampling hemp, see the designated Form SOPs. The 4 forms required are:

- Hemp Document of Inspection (Form DOI)
- Hemp Sample Collection Report/Sample Receipt (Form CR/SR)
- Hemp Inspection Field Summary (Form HFS)
- Hemp Lot/Field Map (Form HLM)
- Hemp Sample Log / Chain of Custody (Form SL/CoC)

The Hemp DOI form is used to document the inspectional observations and findings of license holder's operation and to serve as license holder's acknowledgement of the inspection information.

The Field Summary form is to document any changes or additions of the operation's Lot(s), including location, size, variety, or category; and to collect the grower's signature verifying the updated information. If there are no changes or additions, the Field Summary form is not required, simply note on the DOI that all Lots are as registered in the database. To review the grower's Lot information on record, print a copy of their Lot Report from the database. Attach the copy of the Field Summary form (if applicable) and the Lot Report you reviewed with the grower to the inspection documentation and send to Helena.

The Sample Collection Report/Sample Receipt form is to document the samples collected, to initiate the chain of custody for the samples, serve as a Collection Report to be sent with the sample(s) to the lab, and serve as acknowledgement of the license holder that the sample collection was conducted.

The Hemp Lot Map form is available only if needed for documenting a new field that is not already registered.

The Hemp SL/CoC form documents the tracking and custody of sample(s) from the collection site to the lab.

Each form must be completed accurately, and copies must be provided to interested parties as outlined in the SOPs. Electronic copies of these documents and the data within will be maintained on department servers.

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11. Appendices

Appendix A

Hypergeometric Table for Random Sampling

Total number of inspectional units:	Randomly select this number of units to inspect:
1-13	Inspect all units
14-15	13
16-17	14
18-19	15
20-22	16
23-25	17
26-28	18
29-32	19
33-38	20
39-44	21
45-53	22
54-65	23
66-82	24
83-108	25
109-157	26
158-271	27
272-885	28
886-200,000	29

Examples (assuming only one variety):

- a) A one tenth acre field planted at field crop spacing (25 lbs. per acre) has approximately 67,500 plants (inspectional units). A composite sample would include **30 sub-samples (assuming the minimum sample weight is achieved)**.
 - b) A one-acre field planted at horticultural spacing (3' x 5') has approximately 3,000 plants (inspectional units). A composite sample would include **30 sub-samples (assuming the minimum sample weight is achieved)**.
 - c) A one tenth acre field planted at horticultural spacing (3' x 5') may have approximately 300 plants (inspectional units). A composite sample would include **28 sub-samples (assuming the minimum sample weight is achieved)**.
 - d) A 20' x 40' greenhouse (800 sq. ft.) planted at horticultural spacing (3' x 5') may have approximately 55 plants (inspectional units). A composite sample would include **23 sub-samples (assuming the minimum sample weight is achieved)**.
- (6) For operations that have **15 plants or less in a single Lot**, collect 1 or more buds as necessary from each plant, but no less than a minimum of 60 grams (on an 'as collected' basis), randomly from the available plants.
- a. The absolute minimum sample size the labs needs for testing is 15 grams, on a dry matter basis.

Appendix C - Hemp Lot Summary form



**Hemp Inspection
Lot Summary**

License Holder Name: _____

Inspection Number: **H** - _____

License Number: _____

Inspection Date: _____

Field / Lot ID	Grower Field ID	On-site Lat/Long	Lot Size	Variety	Category	Field Reg.	Estimated Harvest Date
1		Lat Long	ac. sq'			Yes No	
2		Lat Long	ac. sq'			Yes No	
3		Lat Long	ac. sq'			Yes No	
4		Lat Long	ac. sq'			Yes No	
5		Lat Long	ac. sq'			Yes No	
6		Lat Long	ac. sq'			Yes No	
7		Lat Long	ac. sq'			Yes No	
8		Lat Long	ac. sq'			Yes No	
9		Lat Long	ac. sq'			Yes No	
10		Lat Long	ac. sq'			Yes No	
11		Lat Long	ac. sq'			Yes No	
12		Lat Long	ac. sq'			Yes No	
13		Lat Long	ac. sq'			Yes No	
14		Lat Long	ac. sq'			Yes No	
15		Lat Long	ac. sq'			Yes No	

Inspectee's Initials:	Inspector's Initials:
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Appendix D - Hemp Sample Collection Report/Sample Receipt form

Hemp Inspection Sample Collection Report / Sample Receipt

License Holder Name: _____ Inspection Number: **H** - _____

License Number: _____ Inspection Date: _____

Sample ID	THC Analysis	Number of Sub-samples	Comments	Pre-harvest Sample	Post-harvest Sample	Sample Reason	Field / Lot ID
A	Yes No			___ Field ___ Hort	___ Biomass ___ Flowers ___ Buds ___ Whole Plants ___ Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
B	Yes No			___ Field ___ Hort	___ Biomass ___ Flowers ___ Buds ___ Whole Plants ___ Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
C	Yes No			___ Field ___ Hort	___ Biomass ___ Flowers ___ Buds ___ Whole Plants ___ Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
D	Yes No			___ Field ___ Hort	___ Biomass ___ Flowers ___ Buds ___ Whole Plants ___ Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
E	Yes No			___ Field ___ Hort	___ Biomass ___ Flowers ___ Buds ___ Whole Plants ___ Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
F	Yes No			___ Field ___ Hort	___ Biomass ___ Flowers ___ Buds ___ Whole Plants ___ Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
G	Yes No			___ Field ___ Hort	___ Biomass ___ Flowers ___ Buds ___ Whole Plants ___ Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
H	Yes No			___ Field ___ Hort	___ Biomass ___ Flowers ___ Buds ___ Whole Plants ___ Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
I	Yes No			___ Field ___ Hort	___ Biomass ___ Flowers ___ Buds ___ Whole Plants ___ Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
J	Yes No			___ Field ___ Hort	___ Biomass ___ Flowers ___ Buds ___ Whole Plants ___ Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
K	Yes No			___ Field ___ Hort	___ Biomass ___ Flowers ___ Buds ___ Whole Plants ___ Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
L	Yes No			___ Field ___ Hort	___ Biomass ___ Flowers ___ Buds ___ Whole Plants ___ Stalks ___ Other	___ Routine ___ Survey ___ Complaint	

Inspectee's Initials: _____

Inspector's Initials: _____

Appendix E - Hemp Lot/Field Map form



Hemp
Lot / Field Map

Inspection #: H- _____

License #: _____

MONTANA DEPARTMENT OF AGRICULTURE
AGRICULTURAL SCIENCES DIVISION
PO Box 200201 – Helena, MT 59620
Phone: (406) 444-3730

Draw a diagram showing relative field shape, field characteristics, the sampling pattern and any distinguishable field references.

Field / Lot ID: _____ Field Irrigation: _____ Plant Spacing: _____ Acres: _____

A large, empty rectangular box intended for drawing a diagram of the field. It includes a north arrow in the top right corner and a small square icon in the bottom right corner.

Inspector Signature: _____

Date: _____

Appendix F - Sample Log / Chain of Custody form



| **Hemp**
Sample Log / Chain-of-Custody Report

AGRICULTURAL SCIENCES DIVISION
PO Box 200201
Helena, MT 59620-0201
(406) 444-3730 – agr@mt.gov

Sample Log

Lab Number	Inspection Number	Sample ID	District	Comments	License Holder	
					Field / Lot ID	
General Comments						

Number of samples submitted: ____

Chain of Custody

	Name	Signature	Date	Time of Possession		Time Relinquished	
Inspector 1			Ship Date:				am pm
Inspector 2					am pm		am pm
Transporter 1					am pm		am pm
Transporter 2					am pm		am pm
Receiver / Lab					am pm		