PLAN TO REGULATE HEMP PRODUCTION
IN THE
COMMONWEALTH OF VIRGINIA

7 CFR 990.3(a)(1) PRACTICE AND PROCEDURES FOR COLLECTING, MAINTAINING, AND REPORTING INFORMATION TO THE SECRETARY OF AGRICULTURE OF THE UNITED STATES

- State plan must include a practice and procedures to collect, maintain, and report to the Secretary of Agriculture of the United States real-time information for each hemp producer authorized in the state to produce hemp, including contact information described in 7 CFR 990.70(a)(1), a legal description of the land on which a producer will produce hemp, and the status of authorized producers and authorization numbers of producers.
- Contact information described in 7 CFR 990.70(a)(1) includes: (i) full name, authorization identifier, business address, telephone number, and email address (if available); and (ii) if the producer is an entity, the full name of the entity; address of the principal business location; authorization identifier; and full name, title, and email address (if available) of each employee for whom the entity is required to submit a criminal history record report.

VIRGINIA REGULATORY PLAN

- Section 3.2-4115 of the Virginia Industrial Hemp Law (Law) authorizes the Commissioner of Agriculture and Consumer Services (Commissioner) to establish a registration program to allow a person to grow industrial hemp in the Commonwealth and requires that anyone seeking to grow industrial hemp in the Commonwealth apply to the Commissioner for a registration to do so. Section 3.2-4115 of the Law establishes the minimum information that an applicant for this registration must provide to the Commissioner, including the applicant’s name and mailing address and a legal description and geographic data sufficient for locating the land on which the applicant intends to grow hemp.
- The Virginia Department of Agriculture and Consumer Services (VDACS) will maintain and report to USDA the contact information for Registered Industrial Hemp Growers, the coordinates of the land on which a Registered Industrial Hemp Grower intends to produce hemp, and status and registration numbers of Registered Industrial Hemp Growers as required by 7 CFR Part 990.
- See Appendix One for the draft application for an Industrial Hemp Grower Registration.

7 CFR 990.3(a)(2) PROCEDURE FOR ACCURATE AND EFFECTIVE SAMPLING

- State plan must include a procedure for accurate and effective sampling of all hemp produced.
- State or local law enforcement agency or other state designated person shall collect samples from the flower material of cannabis produced within 15 days prior to the anticipated harvest of the cannabis.
- Procedures to ensure that the method used for sampling is sufficient at a confidence level of 95 percent that no more than one percent of the plants in the lot would exceed the acceptable hemp THC level and that sample represents a homogenous composition of the lot.
- Procedure to require the producer or an authorized representative of the producer to be
present at the growing site during sample collection.

- Procedure to allow representatives of the sampling agency to have complete and unrestricted access during business hours to all hemp and other cannabis plants and all land, buildings, and other structures used for cultivation, handling, and storage of all hemp and other cannabis plants.
- Procedure to ensure that a producer does not harvest cannabis crop prior to samples being taken.

**Virginia Regulatory Plan**

- Section 3.2-4114.2 of the Law authorizes the Commissioner to monitor and randomly test industrial hemp, at the cost of the grower, for compliance with tetrahydrocannabinol limits. This section also authorizes the Commissioner to inspect and sample industrial hemp at any production field during normal business hours without advance notice if the Commissioner has reason to believe a violation of the Law is occurring or has occurred.
- Section 3.2-4115(B)(5) requires an Industrial Hemp Grower Registration applicant to provide written consent allowing Commissioner to enter the premises on which hemp is grown.
- VDACS’s Field Sampling Guidelines instruct the individual collecting a sample from an industrial hemp production field (hereinafter, “inspector”) on collecting a sample that is comprised of the inflorescence of the plants sampled and that is representative of a homogenous composition of the field.
- VDACS will request that Registered Industrial Hemp Growers submit an Industrial Hemp Planting and Propagation Report and an Industrial Hemp Pre-Harvest Report, both of which VDACS will use to ensure that sampling is conducted no more than 15 days prior to the grower’s expected harvest date.
- VDACS’s Field Sampling Guidelines provide that a grower or his agent shall accompany the inspector throughout the production field sampling process.
- The Industrial Hemp Planting and Propagation Report will alert a Registered Industrial Hemp Grower that he shall not harvest his industrial hemp production field until an inspector collects a sample from the field.
- See Appendix Two for the draft Field Sampling Guidelines for 2020.

**7 CFR 990.3(a)(3) Procedure for Testing**

- State shall have a procedure for testing that is able to accurately identify whether the sample contains a delta-9 THC concentration that exceeds the acceptable hemp THC level. Testing methods must be validated and use postdecarboxylation or other similarly reliable method; must consider the potential conversion of delta-9 THCA into THC and the test result measures the total available THC (THC + THCA); and must determine total THC concentration on a dry weight basis.
- Procedure shall prohibit handling, processing, or entering the stream of commerce of any hemp grown in a lot where the sample is not in compliance with the acceptable hemp THC level, as determined by a DEA-registered laboratory.
- Procedure to ensure samples of hemp plant material from one lot shall not be commingled with hemp plant material from other lots.
- Procedures to require hemp testing laboratories to adhere to standards of performance for detecting THC concentration, including Measurement of Uncertainty (MU) and to dispose
of samples that do not meet the requirements of 7 CFR Part 990 in accordance with DEA regulations.

**VIRGINIA REGULATORY PLAN**

- Section 3.2-4114.2 of the Law authorizes the Commissioner to monitor and randomly test industrial hemp, at the cost of the grower, for compliance with tetrahydrocannabinol limits.
- The delta-9 THC concentration of hemp samples collected by VDACS is analyzed by the Virginia Department of General Services, Division of Consolidated Laboratory Services (DCLS), which possesses a controlled substance registration issued by the U.S. Drug Enforcement Administration (DEA Controlled Substance Registration Number PC0177762).
- DCLS’s hemp sample analysis and waste disposal are completed in accordance with “The Determination of Delta-9-THC and Related Compounds in Hemp Using Gas Chromatography.”
- DCLS’s measurement uncertainty is estimated in accordance with “Estimation of Analytical Measurement of Uncertainty” and will be reported on each Report of Analysis or Certificate of Analysis issued to VDACS for the analysis completed on the hemp samples collected by VDACS.
- Va. Code § 3.2-4114.2 authorizes the Commissioner to require a Registered Industrial Hemp Grower to destroy a hemp crop that has been tested and found to have a THC concentration greater than that allowed by federal law. Va. Code § 3.2-4116 requires a Registered Industrial Hemp Grower to destroy a hemp crop that has been tested and found to have a THC concentration greater than that allowed by federal law, if required by the Commissioner. VDACS will use this authority to prevent the handling, processing, or entering into the stream of commerce of any hemp grown in a lot where the acceptable hemp THC level is noncompliant.
- Va. Code § 3.2-4114.2(F) authorizes the Commissioner to require a Registered Industrial Hemp Grower to destroy a hemp crop that has been tested and found to have a THC concentration greater than 0.6 percent, if the U.S Secretary of Agriculture approves this provision. Va. Code § 3.2-4114.2(F) also requires the Commissioner to allow a grower to request resample and retest of an Cannabis sativa with a THC concentration that is greater than 0.6 percent but less than one percent before requiring destruction, if such provision for resample and retest is approved by the U.S. Secretary of Agriculture. VDACS will use this authority to prevent the handling, processing, or entering into the stream of commerce of any hemp grown in a lot where the acceptable hemp THC level is greater than 0.6 percent, if the U.S. Secretary of Agriculture approves this provision.
- VDACS’s Field Sampling Guidelines and DCLS’s “The Determination of Delta-9-THC and Related Compounds in Hemp Using Gas Chromatography” include procedures to ensure samples of hemp plant material from one lot shall not be commingled with hemp plant material from other lots.
- See Appendix Two for draft Field Sampling Guidelines for 2020.
- See Appendix Three for “The Determination of Delta-9-THC and Related Compounds in Hemp Using Gas Chromatography” and “Estimation of Analytical Measurement of Uncertainty”.

**7 CFR 990.3(a)(4) PROCEDURE FOR NOTIFICATION AND DISPOSAL OF PLANTS OR**
PLANT MATERIAL THAT DO NOT MEET THE DEFINITION OF HEMP

- State shall promptly notify USDA of any occurrence of cannabis plants or plant material that do not meet the definition of hemp and attach the records demonstrating the appropriate disposal of all of those plants and material in the lot from with the representative samples were taken.
- 7 CFR 990.70(b), regarding state reporting requirements, includes a provision requiring that cannabis be disposed of in accordance with the federal Controlled Substances Act and DEA regulations.

VIRGINIA REGULATORY PLAN

- Va. Code § 3.2-4114.2 authorizes the Commissioner to require a Registered Industrial Hemp Grower to destroy a hemp crop that has been tested and found to have a THC concentration greater than that allowed by federal law. Va. Code § 3.2-4116 requires a Registered Industrial Hemp Grower to destroy a hemp crop that has been tested and found to have a THC concentration greater than that allowed by federal law, if required by the Commissioner.
- VDACS will request that a Registered Industrial Hemp Grower who has produced cannabis that does not have an acceptable level of THC submit an Industrial Hemp Destruction Plan for approval by the Commissioner. The Industrial Hemp Destruction Plan shall describe how the grower will render all subject plants or parts thereof unusable.
- Once the Registered Industrial Hemp Grower has an approved Industrial Hemp Destruction Plan, he will have five calendar days within which to complete the destruction of the cannabis he produced that does not have an acceptable level of THC and submit documentation thereof to the Commissioner.
- VDACS will notify USDA of any occurrence of cannabis plants or plant material that do not meet the definition of hemp and attach the records demonstrating the appropriate disposal of all of those plants and material in the lot from which the representative samples were taken.
- See Appendix Four for Industrial Hemp Destruction Plan.

7 CFR 990.3(a)(5) PROCEDURE FOR ENFORCEMENT

- State plan must include a procedure to comply with the enforcement procedures in 7 CFR 990.6.
- 7 CFR 990.6(b) establishes that negligent violations shall include (1) failure to provide legal description of land; (2) failure to obtain an authorization to produce; and (3) production of cannabis with THC exceeding the acceptable hemp THC level. 7 CFR 990.6(c) establishes that corrective action plans for negligent violations shall include (1) a reasonable date to correct the violation; (2) reporting requirements for two years from date of the negligent violation; (3) violations are not subject to federal, state, tribal, or local government criminal enforcement action; (4) that producer who negligently violates a USDA-approved state plan three times within a five-year period is ineligible to produce hemp for a period of five years from the date of the third violation; and (5) state or tribal government shall conduct inspections to determine if corrective action plan has been implemented.
- 7 CFR 990.6(d) establishes that, when a producer’s violation is made with a culpable mental state greater than negligence, the state shall immediately report the producer to the
U.S. Attorney General and the chief law enforcement officer of the state.

7 CFR 990.6(e) establishes that states shall (1) provide for a ten-year ineligibility restriction for persons with a state or federal felony conviction relating to a controlled substance; (2) provide for controlled substance felony conviction exception for participants in state hemp pilot program authorized under the 2014 Agricultural Act before December 20, 2018; and (3) establish procedures to determine which employees of a business entity that is a producer are considered subject to felony conviction restriction.

7 CFR 990.6(f) establishes that a state shall determine that any person who materially falsifies any information in his application is ineligible to participate in the program.

**VIRGINIA REGULATORY PLAN**

- Va. Code § 3.2-4114.2(I) authorizes the Commissioner to establish a corrective action plan to address negligent violations of the Industrial Hemp Law.
- Va. Code § 3.2-4118(C) requires a Registered Industrial Hemp Grower who negligently (i) fails to provide a description and geographic data sufficient for locating his production field or (ii) grows Cannabis sativa with a tetrahydrocannabinol concentration greater than that allowed by federal law to comply with any corrective action plan established by the Commissioner.
- Va. Code § 3.2-4118(D) requires a person who grows industrial hemp and who negligently fails to register pursuant to subsection A of § 3.2-4115 to comply with any corrective action plan established by the Commissioner.
- Va. Code § 3.2-4118(E) requires that a corrective action plan established by the Commissioner in response to a negligent violation of a provision of the Industrial Hemp Law identify a reasonable date by which the person who is the subject of the plan shall correct the negligent violation and shall require such person to report periodically for not less than two calendar years to the Commissioner on the person's compliance with the provisions of the Industrial Hemp Law.
- Va. Code § 3.2-4118(F) provides that no person who negligently violates the provisions of the Industrial Hemp Law three times in a five-year period shall be eligible to grow industrial hemp for a period of five years beginning on the date of the third violation.
- Va. Code § 3.2-4114.2(G) requires the Commissioner to advise the Attorney General of the United States and the Superintendent of State Police or the chief law-enforcement officer of the appropriate county or city when, with a culpable mental state greater than negligence, a grower grows any cannabis with a THC concentration greater than that allowed by federal law.
- Va. Code § 3.2-4115(B)(3) provides that a person with a prior felony drug conviction within 10 years of applying for a registration under the Industrial Hemp Law shall not be eligible to be registered.
- VDACS will require that applicants for an Industrial Hemp Grower Registration submit a state and federal criminal history report at the time of application. If the applicant for an Industrial Hemp Grower Registration is a business entity, VDACS will require that all key participants (i.e., a sole proprietor, a partner in a partnership, or a person with executive managerial control in a corporation) in the business submit a state and federal criminal history report at the time of application.
- Va. Code § 3.2-4115 establishes the information that must be included in an application for an Industrial Hemp Grower Registration. Failure to provide this information via a false statement violates the requirements in Va. Code § 3.2-4115, and Va. Code § 3.2-4118(A) requires the Commissioner to deny the application of a person who, with a culpable mental
state greater than negligence, violates a provision of the Industrial Hemp Law.

**7 CFR 990.3(a)(6) ANNUAL INSPECTION**
- Procedure for conducting annual inspections of, at a minimum, a random sample of producers to verify that hemp is not produced in violation of 7 CFR Part 990.

**VIRGINIA REGULATORY PLAN**
- Section 3.2-4114.2 of the Law authorizes the Commissioner to monitor and randomly test industrial hemp, at the cost of the grower, for compliance with tetrahydrocannabinol limits. This section also authorizes the Commissioner to inspect and sample industrial hemp at any production field during normal business hours without advance notice if the Commissioner has reason to believe a violation of the Law is occurring or has occurred.

**7 CFR 990.3(a)(7) PROCEDURE FOR SUBMITTING INFORMATION TO USDA**
- Procedure for submitting the information described in 7 CFR 990.70 to the Secretary not more than 30 days after the date on which the information is received.
- 7 CFR 990.70(a) requires a state to submit a monthly report providing the contact information and status of the authorization to grow for each producer.
- 7 CFR 990.70(b) requires a state to submit a monthly report notifying USDA of any occurrence of non-conforming plants or plant material and providing a disposal record of those plants and materials. This subsection requires that cannabis be disposed of in accordance with the federal Controlled Substances Act and DEA regulations.
- 7 CFR 990.70(c) requires a state to submit an annual report regarding total planted, harvested, and disposed of acreage.
- 7 CFR 990.70(d) requires producers to ensure that test results are submitted to USDA.

**VIRGINIA REGULATORY PLAN**
- VDACS will submit all required reports, including the test results obtained from DCLS, required by 7 CFR 990.70.

**7 CFR 990.3(a)(8) CERTIFICATION REGARDING RESOURCES**
- Certification that the state has resources and personnel to carry out the practices and procedures described in 7 CFR 990.3(a)(1) through 7 CFR 990.3(a)(8).

**VIRGINIA REGULATORY PLAN**
- Governor Northam’s introduced budget for the 2020-2022 biennium pursues an appropriation from Virginia’s General Assembly to provide (i) $100,000 annually in funding to contract for seasonal hemp sampling, (ii) $550,000 for the development of an online industrial hemp registration database with a geographic information system component and an offline inspection and sample tracking module, and (iii) one additional FTE and funding for program support functions. VDACS currently receives funding for two FTEs to support the hemp registration program and has a hemp sampling team comprised of 15 inspectors from the agency’s Office of Plant Industry Services whose primary responsibilities include conducting nursery inspections and surveying for plant
pests. The provisions in Governor Northam’s introduced budget that support the commercialization of industrial hemp in Virginia were developed using projections based on the administration of Virginia’s Industrial Hemp Law during the 2019 industrial hemp growing season.

- DCLS estimates needing significant resources to purchase additional instrumentation and hire and train staff to meet ISO17025 competency requirements in order to perform THC testing for a very short window of time. VDACS’s animal health laboratory system is evaluating its ability to conduct THC concentration testing to supplement the testing conducted by DCLS, should DCLS be unable to manage the volume of samples required to be tested under USDA’s Domestic Hemp Production Program regulations.
- VDACS will explore opportunities to designate third party hemp sample collectors and testing laboratories with which Virginia’s Registered Industrial Hemp Growers will contract to obtain the required sampling and testing.

7 CFR 990.3(a)(9) PROCEDURE TO SHARE INFORMATION WITH USDA

- State plan must include a procedure to require producers to share hemp crop acreage with USDA’s Farm Service Agency; a procedure to assign producers an authorization identifier that is in a format prescribed by USDA; and a procedure to require producers to report to the state the total acreage of hemp planted, harvested, and disposed of and by which the state will collect and report this data to USDA’s Agricultural Marketing Service.

VIRGINIA REGULATORY PLAN

- VDACS’s Industrial Hemp Grower Registration application materials will direct growers to report their hemp crop acreage to FSA.
- VDACS will format Industrial Hemp Grower Registration numbers in accordance with the format prescribed by USDA.
- VDACS will submit all required reports required by 7 CFR 990.70, including the total acreage of hemp planted, harvested, and disposed of.
INDUSTRIAL HEMP GROWER REGISTRATION APPLICATION

OPPR-200 (Rev. 11/19)

The annual Industrial Hemp Grower Registration application fee is $50. Please make a check for $50 payable to Treasurer of Virginia and mail your check and application materials to the address above.

Applicants are encouraged to review the Registration Guide available on our website prior to submitting an application.

SECTION ONE – APPLICANT IDENTIFICATION

Do you currently have an Industrial Hemp Grower Registration? Yes ☐ No ☐

If yes, please provide your registration number and its expiration date:

<table>
<thead>
<tr>
<th>Registration Number</th>
<th>Expiration Date</th>
</tr>
</thead>
</table>

Do not complete both Section 1-A and Section 1-B.

SECTION 1-A. Please complete Section 1-A if you are applying as an individual.

Applicant Name: ____________________________________________

Physical Address Where Applicant Resides: ________________________

Mailing Address: ____________________________________________

Telephone Number: __________________________________________

Email Address: _____________________________________________
**SECTION 1-B. Please complete Section 1-B if you are applying on behalf of a business.**

**NOTE:** The business will be the registered grower and the registration will be issued in the name of the business entity. A “key participant” is a sole proprietor, a partner in a partnership, or a person with executive managerial control in a corporation, including the chief executive officer, the chief operating officer, or the chief financial officer. Please attach an additional sheet if the business has more than four key participants.

<table>
<thead>
<tr>
<th>Business Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal EIN Number:</td>
</tr>
<tr>
<td>Physical Address of Principal Place of Business:</td>
</tr>
<tr>
<td>Mailing Address:</td>
</tr>
<tr>
<td>Name and Title of Key Participant:</td>
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<tr>
<td>Name and Title of Key Participant (if applicable):</td>
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<tr>
<td>Name and Title of Key Participant (if applicable):</td>
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<tr>
<td>Name and Title of Key Participant (if applicable):</td>
</tr>
<tr>
<td>Telephone Number:</td>
</tr>
<tr>
<td>Email Address:</td>
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</tbody>
</table>

**SECTION TWO – CRIMINAL HISTORY**

A Virginia State Police criminal history record check and an FBI Identity History Summary must be completed and attached to the Industrial Hemp Grower Registration Application upon submission. If applying on behalf of a business entity, a Virginia State Police criminal history record check and an FBI Identity History Summary must be completed and attached for all key participants. The applicant is solely responsible for all associated criminal background check fees.

**NOTE:** An individual with a felony drug conviction within 10 years of the application date is not eligible for an Industrial Hemp Grower Registration.
SECTION THREE – PRODUCTION FIELD(S)

“Production field” means the land or area on which a grower is growing or intends to grow industrial hemp. This includes both indoor and outdoor areas intended for the cultivation of industrial hemp.

Please identify the production field(s) on which you plan to grow industrial hemp. Please attach an additional sheet if you plan to grow industrial hemp on more than two production fields.

NOTE: Failure to submit an application with completed production field information will result in delay of processing. If you are unsure how to obtain the coordinates for your production field(s) or storage site(s), please visit our website and access the “Coordinate Location Guide.”

<table>
<thead>
<tr>
<th>Production Field 1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Acres/Square Feet</td>
<td>Coordinates <em>(for center of field, in Decimal Degrees)</em> (Ex.37.123456, -77.123456)</td>
</tr>
<tr>
<td>Physical Address/Location</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Production Field 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Acres/Square Feet</td>
<td>Coordinates <em>(for center of field, in Decimal Degrees)</em> (Ex.37.123456, -77.123456)</td>
</tr>
<tr>
<td>Physical Address/Location</td>
<td></td>
</tr>
</tbody>
</table>

If you plan to store raw hemp material, please identify the location of the storage site. Please attach an additional sheet if you plan to store industrial hemp at more than two storage sites.

<table>
<thead>
<tr>
<th>Storage Site 1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Square Feet</td>
<td>Coordinates <em>(storage site location, in Decimal Degrees)</em> (Ex.37.123456, -77.123456)</td>
</tr>
<tr>
<td>Physical Address/Location</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Storage Site 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Square Feet</td>
<td>Coordinates <em>(storage site location, in Decimal Degrees)</em> (Ex.37.123456, -77.123456)</td>
</tr>
<tr>
<td>Physical Address/Location</td>
<td></td>
</tr>
</tbody>
</table>
Please indicate your anticipated planting date(s).

Please indicate your anticipated harvest date(s).

SECTION FOUR - AGENTS

The Virginia Industrial Hemp Law provides that it is lawful for a grower or his agent to grow industrial hemp in the Commonwealth for any lawful purpose and that no grower or his agent shall be prosecuted under § 18.2-247, 18.2-248, 18.2-248.01, 18.2-248.1, 18.2-250, or 18.2-250.1 for the possession or growing of industrial hemp. Please provide the names of the individuals you expect will be your agents for the purpose of growing hemp under the Virginia Industrial Hemp Law on the production field(s) listed in this application.

<table>
<thead>
<tr>
<th>Full Name of Potential Agents</th>
</tr>
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<tr>
<td></td>
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</table>

NOTE: Registered growers may wish to provide the “Agent Documentation” form available on the VDACS website to each person they intend to serve as their agent for the limited purpose of growing industrial hemp. You do not need to submit this form to VDACS.

SECTION FIVE - NOTICES AND AFFIRMATIONS

By initialing and signing below, the applicant acknowledges that the applicant has read the following notices:

- [ ] Initials
  - VDACS will forward a record of each Industrial Hemp Grower Registration issued by the Commissioner to the chief law enforcement officer of the locality in which the registered grower will grow industrial hemp.

- [ ] Initials
  - VDACS will notify the Superintendent of State Police of the locations of all industrial hemp production fields.

- [ ] Initials
  - The Commissioner of Agriculture and Consumer Services will require the submission of an Industrial Hemp Planting Report (i) within 14 calendar days following the first day of each planting or (ii) by July 31 for registered production fields upon which industrial hemp will not be planted.

- [ ] Initials
  - The Commissioner of Agriculture and Consumer Services may require a grower to destroy, at the cost of the grower and in a manner approved of and verified by the
Commissioner, any Cannabis sativa that the grower grows that has been tested and is found to have a concentration of THC greater than that allowed by law.

- The Commissioner of Agriculture and Consumer Services may advise the Superintendent of State Police or the chief law-enforcement officer of the appropriate county or city when a grower grows any Cannabis sativa with a concentration of THC that is greater than that allowed by law.

- All records, data, and information filed in support of a registration application shall be considered proprietary and excluded from the provisions of the Virginia Freedom of Information Act.

- Raw plant material, including, but not limited to, hemp micro greens and flowers, if sold in Virginia, may only be sold to an individual who is a registered Industrial Hemp Grower, Dealer, or Processor.

- Registered Industrial Hemp Growers shall report hemp crop acreage to the USDA Farm Service Agency (FSA).

- Registered Industrial Hemp Growers shall not harvest or enter into the stream of commerce any industrial hemp grown that has not been tested or determined to have an acceptable THC concentration.

I hereby affirm that, to the best of my knowledge, information, and belief, I have made no misrepresentation on this application or failed to disclose any information requested on this application.

I affirm that I am authorized to give consent to enter the above-described production field(s) and I hereby consent to the Virginia Department of Agriculture and Consumer Services, local law enforcement officials, or the Virginia Department of State Police entering the above-described production field(s) and storage site(s) to conduct physical inspections of the industrial hemp to ensure compliance with the requirements of the Virginia Industrial Hemp Law (Va. Code § 3.2-4112 et seq.).

Signature

Date

Print Name
Summary of Practice

These guidelines provide procedures for entering a growing area and collecting a representative plant sample that is necessary to represent a homogeneous composition of the stand. An authorized representative of the Virginia Department of Agriculture and Consumer Services enters a growing area, strategically examines the growing area, establishes an approach for navigating the growing area, and collects individual specimens of representative plants in order to obtain a representative sample of industrial hemp in the growing area. Because test methodology requires small aliquots of material, care must be taken to provide samples that accurately reflect entirety of the growing area.

This practice does not purport to address all of the safety concerns, if any, associated with its use. The user of this standard shall exercise caution and follow applicable safety and health practices.

Terminology

Definitions:

a) sample – the combined total number of industrial hemp samples taken from the plants in the growing area
b) department – the Virginia Department of Agriculture and Consumer Services
c) grower – any person registered pursuant to subsection A of Va. Code § 3.2-4115 to grow industrial hemp
d) growing area - the area on which one variety of industrial hemp is grown
e) sample specimen – the inflorescence of the industrial hemp plant
f) stand - a group or growth of industrial hemp
g) THC - Delta-9-Tetrahydrocannabinol (Δ9THC)

Equipment and Supplies

a) Garden pruners
b) Paper sample bags
c) VDACS labels to seal the bags
d) Permanent markers
e) Sample collection forms that include a chain of custody form
f) GPS Unit or other tool to determine GPS location
g) Disinfectant for tools
h) Disposable gloves
Accessing Inspection and Sample Collection Field Packets

a) OPPR will prepare inspection and sample collection field packets (PDF) for each production field selected for sampling and advise OPIS once packets are ready for review. Each packet will consist of the following:

   a. An Industrial Hemp Inspection and Chain of Custody Form;
   b. A copy of the Industrial Hemp Planting and Propagation Report submitted by the grower for the selected production field;
      i. In the absence of an Industrial Hemp Planting and Propagation Report, this packet will be supplemented with a copy of the Industrial Hemp Grower Registration Application or Industrial Hemp Registration Change Request Form.
   c. A copy of the grower’s Industrial Hemp Grower Registration; and
   d. A letter to be provided to the grower from the inspector containing information on what to expect following sampling.

b) Inspection and sample collection field packets (PDF) will be sorted by inspector and county. Inspectors will access the inspection and sample collection field packets (PDF) assigned to them from the Everyone drive, using the following example path:

   a. "L:\Office of Policy, Planning, and Research\Hemp\2019 Sampling\Inspector\County\Hemp, Sample.pdf"

c) Upon completion of inspection and sample collection, the inspector will email OPPR a picture of the completed Industrial Hemp Inspection and Change of Custody Form. Once received, OPPR will insert the photograph of the completed form into the corresponding inspection and sample collection field packet (PDF) and move the packet from the “County” folder to the “Completed” folder. Inspectors may access completed inspection and sample collection field packets (PDF) using the following example path:

   a. "L:\Office of Policy, Planning, and Research\Hemp\2019 Sampling\Inspector\Completed"

b. Contact Information:

   Jasmine.Harwell@vdacs.virginia.gov
   (804) 786-1241

   Erin.Williams@vdacs.virginia.gov
   804-786-7157 (o)
   804-363-9201 (c)

   Tina MacIntyre
   804-786-3515 (o)

Grower Contact Procedures

a) The inspector will contact the grower by phone to schedule a time for inspection and sample collection. Once a time has been scheduled for inspection and sample collection, the inspector will report the time to OPPR by email.
b) If the inspector is unable to reach the grower following their initial attempt by phone, and able to leave a voicemail, the inspector will leave a voicemail requesting a return call within 2 business days.
   a. If the inspector does not receive a return call within 2 business days of their initial voicemail, the inspector will attempt to contact the grower a second time by phone.
      i. If the inspector is unable to reach the grower following their second attempt by phone, and able to leave a voicemail, the inspector will leave a second voicemail requesting a return call within 2 business days. If the inspector does not receive a return call within 2 business days of their second voicemail, the inspector will report their inability to make contact with the grower to OPPR by email.
      ii. If the inspector is unable to reach the grower following their second attempt by phone, and unable to leave a voicemail, the inspector will send an email to the grower requesting a return call within 3 business days. If the inspector does not receive a return call within 3 business days of their email, the inspector will report their inability to make contact with the grower to OPPR by email.
   b. Upon contacting OPPR to report the lack of contact, the inspector will determine a time for inspection and sample collection. OPPR will prepare the inspection letter to advise the grower of the assigned inspection and sample collection time. OPPR will send copies of this letter by certified mail and regular mail.

b) If the inspector is unable to reach the grower following their initial attempt by phone, and unable to leave a voicemail, the inspector will send an email to the grower requesting a return call within 3 business days.
   a. If the inspector does not receive a return call within 3 business days of their email, the inspector will attempt to contact the grower a second time by phone.
      i. If the inspector is unable to reach the grower following their second attempt by phone, and able to leave a voicemail, the inspector will leave a voicemail requesting a return call within 2 business days. If the inspector does not receive a return call within 2 business days, the inspector will report their inability to make contact with the grower to OPPR by email.
      ii. If the inspector is unable to reach the grower following their second attempt by phone, and unable to leave a voicemail, the inspector will send a second email to the grower requesting a return call within 3 business days. If the inspector does not receive a return call within 3 business days of their second email, the inspector will report their inability to make contact with the grower to OPPR by email.
   b. Upon contacting OPPR to report the lack of contact, the inspector will determine a time for inspection and sample collection. OPPR will prepare the inspection letter to advise the grower of the assigned inspection and sample collection time. OPPR will send copies of this letter by certified mail and regular mail.

d) If the inspector receives a call from a grower who has received the inspection letter and needs to arrange for a different inspection and sample collection time, the inspector will use their discretion in re-scheduling the inspection and sample collection time. The inspector will advise OPPR by email of any changes made to previously scheduled inspection and sample collection times. If the grower has questions outside of scheduling a time for inspection and sample collection, the inspector will refer the grower to OPPR.
Field Sampling Procedures

a) The grower or his agent shall accompany the state inspector throughout the sampling process. Ask the grower or his agent for a copy of the grower’s Industrial Hemp Grower Registration unless already provided by OPPR.

b) Inspector shall verify the GPS coordinates of the growing area as compared with the GPS coordinates on the grower’s license or registration. Record this information on the sample form.

c) The inspector shall estimate the average height, appearance, approximate density, condition of the plants, and degree of maturity of the inflorescences.

d) The inspector shall visually establish the homogeneity of the stand to establish that the growing area is of like variety.

e) Any concerns of stand homogeneity shall be immediately reported to supervisory staff.

f) Time of Sampling.

   Unless otherwise instructed, routine sampling shall be conducted as the seed begins to mature (i.e., when the first seeds of 50% of the plants are resistant to compression), but no sooner than approximately 15 days before the anticipated date of harvest.

g) For growing areas of four (4) acres or less, select a minimum of four (4) plants for cuttings to form a composite sample.

h) Each variety or cultivar will be sampled separately and only once during the season per field.

i) To sample greenhouses, if flowers are present, select a minimum of four (4) plants for cutting to form a composite sample from each cultivar or variety present. If growing clones, sample the mother plants if in flower. Otherwise reschedule visit when grower indicates mother plants will be in flower. If grower indicates mother plants will never flower due to cultural practices or are not in their possession, fill out sampling form and note grower’s comments.

j) If grower reports the field has no hemp, verify this with a site visit. Fill out the sampling form and note the grower’s comment.

k) If the field has been harvested, determine where the harvested material is located and if possible take samples at this location.

l) For growing areas larger than ten (10) acres, the number of plants that will be selected to form a composite sample is based upon the Codex Alimentarius Recommended Methods of Sampling for the Determination of Pesticide Residues for Compliance with MRLS CAC/GL 33-1999.

Table I. Total samples to be taken per number of acres

<table>
<thead>
<tr>
<th>N - Growing Area, acres (lots)</th>
<th>Total Clippings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
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<td>4</td>
<td>4</td>
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<tr>
<td>5</td>
<td>5</td>
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<tr>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>
When collecting samples from each growing area if possible walk through the plants to randomly sample throughout the field. If the stand is so dense walking through it is not possible, walk access roads, drainage ditches, or other accessible paths that allow penetration into the stand and for detection of plant growth differences and sampling.

While walking through the growing area, the inspector shall cut inflorescences at random but convenient distances. Avoid collecting sample specimens from the borders of the field. **Sample from female plants only.**
The cut shall be made just underneath an inflorescence (about 3-5 inches of tip). Inflorescences should be collected from the top one-third (1/3) of the plant.

Record the sample number. The samples shall be identified using the following system for assigning sample numbering:

The sample number consists of:
Inspector initials (XXX), Industrial Hemp Grower Registration number (xxxx-VGxxx), field number (xxx) (starts with one and increases sequentially by one for each sample).

Example of sample Number:

<table>
<thead>
<tr>
<th>Inspector Initials</th>
<th>Grower License #</th>
<th>Sequential Field #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspector Initials</td>
<td>Hemp Grower Registration #</td>
<td>Sequential Field #</td>
</tr>
<tr>
<td>TMM</td>
<td>2019-VG001</td>
<td>001</td>
</tr>
</tbody>
</table>

Record as: TMM-2019-VG001-001

Fill out the following information on each sample bag:
- Sample Number
- Date
- Inspector
- Grower Name

Seal sample bag with labels, tape, or staples.

Complete Industrial Hemp Sample Collection Form provided by OPPR or found on page 9 and 10. Review form with the responsible party. Obtain signatures of responsible party.

Samples must be stored in an area that is locked and secure. Freeze samples if holding them for a day or more before delivering to Division of Consolidated Laboratories Services (DCLS).

Email OPPR a picture of the completed Industrial Hemp Inspection and Change of Custody Form. jasmine.harwell@vdacs.virginia.gov

Samples should be taken to Division of Consolidated Laboratories Services (DCLS). To maintain the chain of custody, inspectors will need to drive their samples to DCLS. Samples should be delivered to the loading dock on 4th Street during normal business hours. Directions to the loading dock can be found on page 8.

Samples may also be turned over to Tina MacIntyre if travel time to Richmond is prohibitive.

Clean tools between samples. Wear disposable gloves or clean hands between samples.
x) **Interferences** - Conditions that may cause the THC levels to test high. Please be aware of these conditions as you are sampling and note them on the inspection form if they apply.

- Varieties express different THC levels when exposed to higher UVb levels. The higher the altitude or latitude the greater the UVb exposure.
- Higher temperatures will generally cause higher THC concentrations as will high day time temps and lower night time temps.
- THC will be higher in well-drained soil.
- THC will be higher if available nitrogen is high.
- Samples that receive more sunlight will have higher THC than samples with less sunlight. Do not sample from the edge of fields where plants get a lot of sunlight.

**SAMPLE QUANTITY**

Use your judgement to ensure sufficient quantities are taken. The volume of material selected should reflect the size and volume of material being grown. The more plant material sampled, the better representation of the variety's THC levels will be reflected. If a grower expresses concern about the volume collected, explain to him that we are doing it for his benefit so that the sample reflects the broad THC level of the field and not one single plant.

When taking samples from small research areas be conscious of the volume you need to take to avoid damaging the project any further than necessary. For very small plantings where individual or very limited number of plants of a variety are present, a minimum of 2 oz is required. The 2 oz sample may be used in cases where breeding projects are being inspected. In such cases allowing the grower to remove seeds from the sample under your supervision is acceptable so long as the sample quality is not degraded for THC testing purposes.
**Directions to DCLS**

The samples will be turned over to Scott Winters or Tina MacIntyre.

Scott Winters
Senior Chemist
scott.winters@dgs.virginia.gov
804-648-4480 ext 371
Division of Consolidated Laboratory Services (DCLS)
600 North 5th Street
Richmond, Virginia 23219

Please contact Scott Winters to make sure he is present to sign the chain of custody form. Do not leave your sample with the guard.

Please contact Tina (804-564-9696) to coordinate sample transfers if you have a long drive to Richmond or cannot reach Scott.

---

**Directions to DCLS - From North of Richmond**

Take I-95 South to Richmond. Take Exit 75 – toward Downtown, Third St., Coliseum. Exit onto 3rd Street. Once on 3rd Street merge into the left lane. At first traffic light, turn left onto Jackson St. The next traffic light will be 4th Street, turn right and then immediately turn left into the loading dock area, park near the back door. A picture of the back of our building which faces 4th Street is below, the door you will enter is to the right of the farthest bay.
**INDUSTRIAL HEMP INSPECTION AND CHAIN OF CUSTODY FORM**  
One form per sample

<table>
<thead>
<tr>
<th><strong>Registration Number:</strong></th>
<th><strong>Grower Name:</strong></th>
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</table>

<table>
<thead>
<tr>
<th><strong>Sample Number:</strong></th>
<th><strong>Mailing Address:</strong></th>
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<tr>
<th><strong>Collection Date:</strong></th>
<th><strong>Crop Address:</strong></th>
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<table>
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<tr>
<th><strong>Approximate Area:</strong> (AC or Square Feet)</th>
<th><strong>Grower Name:</strong> (DCLS only)</th>
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<table>
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<tr>
<th><strong>Sample Weight:</strong></th>
<th><strong>Grower Phone:</strong></th>
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<tr>
<th><strong>Grower Signature:</strong></th>
<th><strong>Date:</strong></th>
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<table>
<thead>
<tr>
<th><strong>Variety Sampled:</strong></th>
<th><strong>Development Stage:</strong> Not flowering/Flowering/ Seed head</th>
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<table>
<thead>
<tr>
<th><strong>Grown for:</strong> Fiber or Grain or Floral</th>
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<table>
<thead>
<tr>
<th><strong>Sample Location GPS Coordinates:</strong></th>
<th><strong>Permit:</strong> From</th>
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<tr>
<th><strong>From Inspection:</strong></th>
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<tr>
<th><strong>Additional Comments:</strong></th>
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<tr>
<th><strong>Sample Collected By:</strong></th>
<th><strong>Inspector Signature:</strong></th>
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<th><strong>Print Name:</strong></th>
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<tr>
<th><strong>CONDITION OF PLANT</strong></th>
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Include height, appearance, approximate density, and degree of inflorescence maturity

<table>
<thead>
<tr>
<th><strong>Fertilized:</strong> Yes No</th>
<th><strong>Irrigated:</strong> Yes No</th>
<th><strong>Soil well drained:</strong> Yes No</th>
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<table>
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<tr>
<th><strong>SUBMITTER DESCRIPTION</strong></th>
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</table>

Include the number of containers and a physical description of each sample submitted for testing

Example: 1 paper bag with 12 tips each

<table>
<thead>
<tr>
<th><strong>LABORATORY CHAIN OF CUSTODY FORM</strong></th>
</tr>
</thead>
</table>


Chain of Custody: Persons relinquishing and receiving evidence must provide their signature, organization and date/time to document evidence transfers. Submitter, start with box number 1.

<table>
<thead>
<tr>
<th>Relinquished By (Submitter)</th>
<th>Organization</th>
<th>Date/Time</th>
<th>Received by</th>
<th>Organization</th>
<th>Date/Time</th>
</tr>
</thead>
<tbody>
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<th>Date/Time</th>
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<th>Organization</th>
<th>Date/Time</th>
<th>Received by</th>
<th>Organization</th>
<th>Date/Time</th>
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<th>Date/Time</th>
<th>Received by</th>
<th>Organization</th>
<th>Date/Time</th>
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<td></td>
<td>[ ] No</td>
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</tbody>
</table>

**DCLS USE ONLY**

**Laboratory Description of Sample**
Include the number of containers, identification number(s) and a physical description of each sample submitted for testing

<table>
<thead>
<tr>
<th>Signature:</th>
<th>Date:</th>
</tr>
</thead>
</table>

**Evidence Disposal**
To be completed by Laboratory Evidence Custodian

<table>
<thead>
<tr>
<th>Disposition Site:</th>
<th>Disposition No:</th>
<th>Method of Disposition:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performed By:</td>
<td></td>
<td>Date:</td>
</tr>
<tr>
<td>Witnessed By:</td>
<td></td>
<td>Date:</td>
</tr>
</tbody>
</table>
Appendix Three

Commonwealth of Virginia
Department of General Services
Division of Consolidated Laboratory Services
Richmond, Virginia

Estimation of Analytical Measurement of Uncertainty

I. SCOPE AND APPLICATION:
Measurement uncertainty may be provided as part of a method, calculated based on uncertainty budgets provided by equipment manufacturers or quality control data analyzed as part of regular sample analysis, method verification or other activities. This procedure outlines the process to determine measurement uncertainty for quantitative analyses. This procedure is not applicable to qualitative analyses.

II. SUMMARY:
Uncertainty associated with a measurement can include random error as well as systematic error. Measurement uncertainty can, in many cases, be estimated based on variations in the results from the measurement of samples under reproducibility conditions. The uncertainty estimate should be based on at least 20 data points for representative statistics; however, if collection of 20 data points is not practical, fewer may be used with approval from the Group Manager in consultation with a Director of Laboratory Operations and Quality Assurance. Alternatively, an estimate of uncertainty may be determined using a combination of the uncertainty associated with each step in the measurement process.

III. PROCEDURES:
A. Measurement uncertainty shall be assessed when required for accreditation purposes, when requested by the customer, or when laboratory management determines a business need exists.
B. Measurement Uncertainty can be calculated using data determined from:
   1. Reference or control samples
   2. Method validation or other data
   3. Uncertainty budgets derived from the uncertainty surrounding the various components contributing to a variation in a test method.
C. Laboratory Control Sample Selection:
   1. The laboratory control sample (LCS) selected to evaluate the uncertainty of a given analysis should be in matrix, have a known value and go through the entire analytical processes.
   2. The material must be homogeneous and if purchased, the concentration of the analytes to be measured must be certified by the vendor. For example, Standard Reference Materials (SRM) for matrices such as soil or biological tissue.
   3. The material should be stable over the time of the study so as to yield consistent results over multiple analyses. If the supply of material is exhausted a replacement must be found and a new standard deviation must be calculated.
   4. The LCS should be analyzed in the same manner as customer samples and results must meet QC guidelines set forth in the appropriate standard operating procedure. It is assumed that any variation from the mean will be due to random error and indicative of the uncertainty of the measurement.
D. Laboratory Control Sample Analysis:
   1. Analyses of LCS samples included as part of the uncertainty estimate should be conducted under reproducible conditions and encompass as many variables as would be encountered during analysis of customer samples. Examples include but are not limited to different analysts, instruments and equipment.
   2. At least twenty replicates should be analyzed, preferably as part of batches containing customer samples. If collection of 20 data points is not practical, fewer may be used with approval from the Group Manager in consultation with a
Director of Operations and Quality Assurance. The standard deviation of the results is calculated and multiplied by the coverage factor determined from a student t-table for n-1 degrees of freedom at the 95% confidence level to yield the uncertainty estimate with a 95% level of confidence. Refer to Appendix I.

Control charts may be used to ensure there are no systematic errors or trends in the data. If systematic errors are discovered, steps should be immediately taken to correct such errors.

E. Estimating Uncertainty Via Uncertainty Budget:
Uncertainty may be estimated through a combination of uncertainty budgets for cases where repeated measurements are not feasible. Measurement uncertainty is calculated by taking the square root of the sum of the squares of the uncertainty associated with each step completed during an analysis.

IV. DATA EVALUATION:
A. Examples of estimated uncertainty calculations are listed below to illustrate how uncertainty may be estimated under various analytical conditions.
B. Example – Chemistry Analysis of Naphthalene in Water via GC/MS:
For the below calculations refer to Measurement of Uncertainty Form (Qualtrax ID# 2141).

1. Samples are extracted via liquid/liquid extraction and analyzed via GC/MS. A standard reference material is not available for naphthalene in this matrix; therefore, a LFB is included with each batch consisting of 1.00 liters of reagent water spiked to result in a concentration of naphthalene of 10.00 ug/L. Samples are extracted by different people and analyzed on the only instrument used for this analysis. Results for the analysis of 20 LFB samples are as follows:

<table>
<thead>
<tr>
<th>Date/Time Extracted</th>
<th>Analyst</th>
<th>Result (ug/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/9/2017 9:15</td>
<td>John</td>
<td>9.97</td>
</tr>
<tr>
<td>1/9/2017 13:00</td>
<td>Jane</td>
<td>9.59</td>
</tr>
<tr>
<td>1/10/2017 8:30</td>
<td>Jane</td>
<td>9.71</td>
</tr>
<tr>
<td>1/10/2017 15:45</td>
<td>John</td>
<td>10.17</td>
</tr>
<tr>
<td>1/12/2017 10:00</td>
<td>John</td>
<td>10</td>
</tr>
<tr>
<td>1/12/2017 15:00</td>
<td>Bob</td>
<td>10.32</td>
</tr>
<tr>
<td>1/17/2017 9:00</td>
<td>Barb</td>
<td>10.39</td>
</tr>
<tr>
<td>1/17/2017 11:15</td>
<td>Bob</td>
<td>10.31</td>
</tr>
<tr>
<td>1/17/2017 15:00</td>
<td>Bob</td>
<td>10.29</td>
</tr>
<tr>
<td>1/18/2017 9:00</td>
<td>Jane</td>
<td>9.58</td>
</tr>
<tr>
<td>1/18/2017 12:30</td>
<td>John</td>
<td>10.38</td>
</tr>
<tr>
<td>1/18/2017 16:00</td>
<td>Bob</td>
<td>9.61</td>
</tr>
<tr>
<td>1/19/2017 8:00</td>
<td>Mary</td>
<td>10.25</td>
</tr>
<tr>
<td>1/19/2017 10:30</td>
<td>Jane</td>
<td>10.12</td>
</tr>
<tr>
<td>1/19/2017 14:15</td>
<td>Mary</td>
<td>10.07</td>
</tr>
<tr>
<td>1/19/2017 17:00</td>
<td>John</td>
<td>10.47</td>
</tr>
<tr>
<td>1/20/2017 9:45</td>
<td>Jane</td>
<td>9.86</td>
</tr>
<tr>
<td>1/20/2017 11:45</td>
<td>Bob</td>
<td>10.5</td>
</tr>
<tr>
<td>1/20/2017 15:30</td>
<td>Barb</td>
<td>9.79</td>
</tr>
<tr>
<td>1/20/2017 17:15</td>
<td>Mary</td>
<td>9.9</td>
</tr>
</tbody>
</table>

2. The standard deviation for this set of analyses is 0.30; therefore, the estimated

Title: Estimation of Analytical Measurement of Uncertainty
Document #: 1821
Revision: 2
Date Published: 07/25/17
Issuing Authority: Laboratory Director

Uncontrolled Copy
uncertainty $U$ for the determination of naphthalene in water via GC/MS at a 95% confidence level is calculated as the standard deviation ($sd$) multiplied by the coverage factor ($k$):

$$U = k \times sd = 2.09 \times 0.30 = 0.63$$

**NOTE:** These calculations/equations are available in MS Excel and Northwest Analytical Control Chart Software.

**Example Equations**

**NOTE:** The Control Chart software may perform these calculations.

3. Calculate the mean of the selected data points

   
   $$\text{Mean: } \frac{\text{sum of all values}}{\text{number of the values}}$$

4. Calculate the standard deviation of the selected data points

   $$\text{Standard Deviation: } \sqrt{\frac{\sum (X-\bar{X})^2}{N-1}}$$

   - $\sum =$ Sum
   - $X =$ each value in the data set
   - $\bar{X} =$ Mean of all values
   - $N =$ Number of values in the data set

5. Multiply the standard deviation and the t value at 95% confidence level

   Example:

   - Standard Deviation = 0.30
   - t value (@ 20 points) = 2.09
   - Measurement of Uncertainty = 0.30 x 2.09
   - Measurement of Uncertainty = ±0.63

C. **Example – Microbiological Quantitative Methods:**

   For the below calculations refer to Measurement of Uncertainty Form (Qualtrax ID# 2141).

1. List the source of uncertainty
2. Estimate the percentage of uncertainty in decimal places (4% = 0.04)
3. Sum the Squared Uncertainties
4. To get Combined Standard Uncertainty: (Sum of the Squared Uncertainties) ^0.5
5. Multiply by 2 and convert to % to get Measurement Uncertainty
6. Convert recorded colony concentration to log 10 value
7. Multiply the colony concentration log 10 value with the percentage of Measurement Uncertainty to get the Measurement of Uncertainty Factor
8. Determine the log 10 lower and upper bound of the uncertainty
   a. Lower bound = log 10 of colony count minus the measurement uncertainty factor. Then convert this number to base ten.
   b. Upper bound = log 10 of colony count plus the measurement uncertainty factor. Then convert this number to base ten.
<table>
<thead>
<tr>
<th>Major Sources of Uncertainty</th>
<th>Derivation of the Estimate</th>
<th>Standard Uncertainty</th>
</tr>
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<tbody>
<tr>
<td>Media preparation</td>
<td>4%</td>
<td>0.04</td>
</tr>
<tr>
<td>Analyst</td>
<td>5%</td>
<td>0.05</td>
</tr>
<tr>
<td>Equipment</td>
<td>1%</td>
<td>0.01</td>
</tr>
<tr>
<td>Other factors</td>
<td>1%</td>
<td>0.01</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Statistical Parameters</th>
<th>Value</th>
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<tbody>
<tr>
<td>Sum of the Squared Uncertainties</td>
<td>0.004</td>
</tr>
<tr>
<td>Combined Standard Uncertainty</td>
<td>0.066</td>
</tr>
<tr>
<td>Measurement Uncertainty (%)</td>
<td>13.1%</td>
</tr>
<tr>
<td>CFU Count</td>
<td>120</td>
</tr>
<tr>
<td>Log 10 of CFU Count</td>
<td>2.0792</td>
</tr>
<tr>
<td>Measurement of Uncertainty Factor</td>
<td>0.2727</td>
</tr>
<tr>
<td>Lower bound (\times 10) Uncertainty Level</td>
<td>64</td>
</tr>
<tr>
<td>Upper Bound (\times 10) Uncertainty Level</td>
<td>225</td>
</tr>
</tbody>
</table>

D. Example – Uncertainty Budget:
An estimate of uncertainty can also be derived from a combination of the uncertainty associated with the steps in a measurement process, whether experimentally measured or established by an equipment manufacturer. A list of each step in the measurement process is generated. The uncertainty associated with each step is squared and the squares are summed together. The square root of the resultant multiplied by the coverage factor yields the measurement uncertainty. The example below is a hypothetical uncertainty budget for illustration purposes only.

Uncertainty Budget: Instrument Analysis-LECO Combustion Analysis-Fertilizer

Sample Size: 1.0000g

<table>
<thead>
<tr>
<th>Component</th>
<th>Standard Uncertainty</th>
<th>Derivation of Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Mass Weighing</td>
<td>0.00010g</td>
<td>Balance calibration uncertainty from calibration certificate, Type ‘B’.</td>
</tr>
<tr>
<td>Sample Preparation</td>
<td>0.0025g</td>
<td>Splitter variation. 0.125g per 50 g. Type ‘A’</td>
</tr>
<tr>
<td>Instrument Variation</td>
<td>0.00048g</td>
<td>Calibration Sample Variation, Type ‘A’</td>
</tr>
<tr>
<td>Coverage Factor</td>
<td>2.04</td>
<td>Student t table, 95% confidence. 30 replicates</td>
</tr>
<tr>
<td>Sum of the Squared Uncertainties</td>
<td>(0.0001)^2 + (0.0025)^2 + (0.00048)^2 = 6.49x10^{-6}</td>
<td></td>
</tr>
<tr>
<td>Combined Standard Uncertainty</td>
<td>[ 6.49x10^{-6} ]^{1/2} = 0.0025g</td>
<td></td>
</tr>
<tr>
<td>Measurement Uncertainty</td>
<td>0.0025 x 2.04 = 0.0052g</td>
<td></td>
</tr>
</tbody>
</table>
V. COMMUNICATION:

N/A

VI. CORRECTIVE ACTION:

N/A

VII. REFERENCES:


C. ASTM Standard, Standard Practice for Estimating and Monitoring the Uncertainty of Test Results of a Test Method in a Single Laboratory Using a Control Sample Program, E 2554-07


### APPENDIX I: t test values

<table>
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<th>0.001</th>
<th>0.0005</th>
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<td>1.556</td>
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<td>1.477</td>
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<td>1.546</td>
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<td>1.534</td>
<td>1.433</td>
<td>1.376</td>
<td>1.345</td>
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<td>40</td>
<td>1.405</td>
<td>1.313</td>
<td>1.266</td>
<td>1.236</td>
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<td>60</td>
<td>1.300</td>
<td>1.221</td>
<td>1.174</td>
<td>1.144</td>
</tr>
<tr>
<td>80</td>
<td>1.237</td>
<td>1.164</td>
<td>1.117</td>
<td>1.088</td>
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<tr>
<td>100</td>
<td>1.190</td>
<td>1.124</td>
<td>1.077</td>
<td>1.049</td>
</tr>
<tr>
<td>1000</td>
<td>1.150</td>
<td>1.085</td>
<td>1.038</td>
<td>1.010</td>
</tr>
</tbody>
</table>

San Jose State University  
Commonwealth of Virginia  
Department of General Services  
Division of Consolidated Laboratory Services  
Richmond, Virginia

The Determination of Delta-9-THC and Related Compounds in Hemp Using Gas Chromatography

I. SCOPE AND APPLICATION:

A. Purpose: This procedure measures Δ⁹-Tetrahydrocannabinol (THC) in Hemp, which is the primary psychoactive constituent of marijuana and hemp products.

B. Intended Use: This method will be used to ensure that the hemp being grown in Virginia does not exceed the regulatory limit of 0.3% THC.

C. Satisfactory Matrices: This procedure is applicable to hemp or industrial hemp which is a variety of the Cannabis Sativa plant species.

D. The following target analyte (TA) can be determined by this method:

   Analyte
   1. Δ⁹-Tetrahydrocannabinol (THC)

E. Method Detection Limits (MDL’s) for this method are to be generated annually. The MDL’s can be found on the DCLS intranet or Sharepoint as MDLs by MUR/Environmental. The concentration range for this method is applicable over a concentration range of 0.05% THC to 2.0% THC.

F. Restrictions - Each analyst is required to demonstrate the ability to generate acceptable results with this method using the procedure described in Section IX before being allowed to perform this method independently.

G. In this method, acceptable manufacturer’s standards, reagents, equipment, and instruments are stated. However, other equivalent manufacturer’s standards, reagents, equipment, and instruments may be used if all QC requirements are able to be met.

II. SUMMARY:

A. Each submitted sample of hemp is dried to constant weight in an oven at 90 ± 5°C and allowed to cool in a desiccator. After removing the stems and seeds, the remaining dried sample is worked through a #8 sieve. The resultant sieved sample is then ground in a mortar and pestle.

B. 0.2 grams of the ground hemp is extracted with 40 mls of methanol and mixed for 5 minutes at approximately 500 rpm using the Digital Pulse Mixer.

C. The hemp is allowed to settle for approximately 1 hour and 1ml of the extract is transferred to a GC vial.

D. The extract is analyzed on a Gas Chromatograph (GC) equipped with a Flame Ionization Detector (FID).

E. The GC/FID is calibrated with multi-level THC standards (minimum 5 points) that encompass the federal limit for THC (0.3%). Quality is assured through the analysis of method blanks and matrix spikes.
III. DEFINITIONS:

A. Cannabidiol (CBD) and Cannabinol (CBN) — two of at least 85 active cannabinoids identified in cannabis. These compounds are much less psychoactive than THC.

B. Δ⁹-Tetrahydrocannabinol (THC) — the primary psychoactive cannabinoid found in marijuana and hemp products.

C. Assured Waste Solutions LLC (AWS) — A United States Drug Enforcement Administration (USDEA) approved company, certified for destruction of controlled substances. DEA#: RM0432322. Address: 148 Boxwood Lane, Gastonia, NC. 28054

IV. INTERFERENCES

None

V. SAFETY:

A. Attire and Personal Protective Equipment

1. Totally enclosed shoes are required in this laboratory at all times.

2. The required minimum Personal Protective Equipment (PPE) in this laboratory is a lab coat and safety glasses.

3. Gloves are required when handling samples, infectious agents, chemicals, and when working in a Biological Safety Cabinet (BSC) or chemical fume hood. Nitrile gloves are preferred. **NOTE: If latex gloves are in use, an alternative, non-latex glove must be available and the laboratory door signage must reflect the usage of latex gloves.**

4. There are no additional PPE required for this procedure.

B. Safety precautions must be taken when handling reagents, samples, and equipment in this laboratory.

C. Special Precautions: A chemical fume hood is used for this procedure. All samples analyzed by this method are considered to be health hazards and solvents flammable.

D. Location of Eye Wash and Emergency Shower

1. An eye wash/drench hose is present on each sink in this laboratory.

2. The emergency showers are located in the COMP standards room (Room 359) and inside the southern entrance of the COMP extraction room (Room 368).

E. Hazards Associated With Procedure

1. Chemical Hazards

   The following hazardous chemicals are used in this test procedure:

   a. Methanol: Use nitrile gloves and fume hood when using this chemical. Store in flammables cabinet.
b. Acetone: Use nitrile gloves and fume hood when using this chemical. Store in flammables cabinet.

c. National Fire Protection Association (NFPA) hazard ratings for solvents and reagents in this method are listed below:

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Health</th>
<th>Flammability</th>
<th>Reactivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methanol</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Acetone</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

d. NFPA Rating Definitions (excerpted from website) – The National Fire Protection Association (NFPA) has developed a color coded, numerical system for indicating the health, flammability, and reactivity hazards of chemicals. In addition, a special precaution symbol may be used if necessary.

Refer to DCLS Safety Manual (Qualtrax ID # 1805) for additional safety information.

2. Biological Hazards
   There are no biological hazards associated with this procedure.

3. Radiological Hazards
   There are no radiological hazards associated with this procedure.

4. Safety Data Sheets
   The laboratory is responsible for maintaining a current, complete file of Safety Data Sheets (SDS) related to this procedure. These SDS are available to the analyst and are located in the SDS binder at the work station.

F. Spill Response

1. Small spills - handled by the laboratory staff (refer to SDS) or call Administration for Spill Response Team notification.

2. Large spills – call Administration for Spill Response Team notification.

Refer to DCLS Safety Manual (Qualtrax ID # 1805) for additional safety information.

VI. EQUIPMENT & SUPPLIES:

A. Equipment

1. Gas Chromatograph with Flame Ionization Detector (GC/FID). See Appendix 1 for instrument components and typical set-points.

2. Analytical Balance – Mettler - Toledo or equivalent.

3. Centrifuge capable of holding 50 ml centrifuge tubes.

4. Digital pulse mixer.

5. Oven used for drying the hemp at 90 ± 5°C.

B. Supplies

1. 50 ml disposable centrifuge tubes with caps.

2. Volumetric Flask – various sizes.

3. Pipettor – various sizes.

4. Gas tight syringes – various sizes.
5. Pasteur pipettes - glass, disposable.
6. Disposable luer lock syringes, approx. 3 ml size.
7. Nylon syringe filters (0.45 μm x 25mm). In addition 0.22μm x 25mm may also be used.
8. 2 ml auto-sampler vials with snap top caps.
10. Aluminum foil.
11. Desiccator.
12. #8 Sieve.

VII. REAGENTS AND STANDARDS:

A. Labeling

See “Measurement and Data Traceability” (Qualtrax ID # 1789) for labeling requirements or refer to the DCLS Safety Manual (Qualtrax ID # 1805).

B. Reagents – the reagents listed below are stored at room temperature and replaced on or before the manufacturer’s expiration date or 6 years from the date received if expiration date not provided.

1. Methanol - Fisher Scientific, Optima® or equivalent.
2. Oregano

C. Standards

1. Documentation – Enter all standard receipt and preparation information into the Hemp Standard Logbook – H01 (Qualtrax ID # 8205).

2. Storage - Store all Standard Stock Solutions (SSSs) and Primary Dilution Standard (PDS) solutions in the refrigerator in room 368 between 3.5 ± 2.5° Celsius.

3. Expiration - Replace purchased SSSs by the earlier of the manufacturer’s expiration date. Standards when refrigerated at 3.5 ± 2.5° Celsius have been found to last 1 to 3 months. This should be verified by QC analyzed with each set of samples prior to use.

4. Replace Calibration (CAL) solutions within the expiration period of the SSS.

5. Preparation the CAL solutions using the following dilutions:

<table>
<thead>
<tr>
<th>Level</th>
<th>CAL SSS (μg/ml)</th>
<th>Amount (μl)</th>
<th>Dilution (ml)</th>
<th>CAL Conc. (μg/ml)</th>
<th>% THC (0.2g wt.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1000</td>
<td>100</td>
<td>1.0</td>
<td>100</td>
<td>2</td>
</tr>
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<td>12.5</td>
<td>5.0</td>
<td>2.5</td>
<td>0.05</td>
</tr>
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</table>

**VIII. SAMPLE COLLECTION, PRESERVATION, SHIPMENT AND STORAGE:**

A. Samples are collected by inspectors working for VDACS Division of Consumer Protection and transported to DCLS under ambient temperatures. Samples are considered "legal" and are handled according to the DCLS "Evidence Receipt/Storage and Disposition" procedure (Qualtrax ID # 1804).

1. At a mutually agreed upon time and place between VDACS and DCLS, samples are received from VDACS through chain-of-custody and transported to room 362 where they are stored in a locked refrigerator until analysis.

2. Copies of the VDACS Sample Submission Form (Attachment 4) are made and taken to Sample Support Services Section (S3) where the samples are accessioned into the LIMS system.

B. Sample may be rejected for the following reasons:

1. Sample bag wet or ripped during shipment

2. Inadequate sample for the analysis required, ex. liquid sample

3. Missing, improper or incomplete paperwork

C. After analysis samples will be handled in the following manner:

1. Passing samples (analytical result ≤ 0.3%) will be stored in a locked refrigerator in Room 362 at 3.5 °C ± 2.5 °C. After 14 days, they can be given back to VDACS at a time that is mutually agreeable to DCLS and VDACS personnel. Upon request and approval by DCLS director, aliquots of samples may be given to a third party, using Qualtrax ID #28215 or equivalent.

2. Failing samples of > 0.3% THC are considered controlled substances. Once identified they will be recorded and documented in the "Schedule I THC Controlled Substances Log" (Qualtrax ID # 27246). The sample will be sealed and prepared for long term storage per the "Evidence Receipt/Storage and Disposition Procedure" (Qualtrax ID # 1804). The sample shall be stored in a refrigerator at 3.5 °C ± 2.5 °C in a locked cooler in room 326, evidence storage. This process will be witness by a second individual and documented in the "Schedule I THC Controlled Substances Log" (Qualtrax ID # 27246). The Schedule I THC Controlled Substances Log will serve as a running inventory log. Access to room 326 is restricted through the use of key card to staff that have completed the required evidence handling training. Access is further restricted through the use of locked coolers for storage. Keys to the coolers will be maintained by the group manager and by the CDC Select Agent Responsible Official and Alternate Responsible Officials as defined in Select Agents and BSL-3 Incident Response Plan (Qualtrax ID # 1806). Upon request and approval by DCLS director, aliquots of samples may be given a third party, using Qualtrax ID #28215 or equivalent.
.3. Failing samples can be grouped and shipped to Assured Waste Solutions LLC (AWS) for destruction after appropriate COC paperwork has been completed and approved. Destruction of samples will be recorded in the "Hemp Failure Destruction Logbook" (Qualtrax ID # 27254). The date of destruction will also be documented in the "Schedule I THC Controlled Substances Log" (Qualtrax ID # 27246) for each sample as well as to document that there is no current inventory after destruction. These processes will be documented with a witness. Documentation of the destruction from AWS will be kept with the destruction logbook.

IX. QUALITY CONTROL & QUALITY ASSURANCE:

A. Initial Demonstration of Capability (IDC) – Before analyzing any samples, perform an IDC analysis.

1. Prepare a calibration curve and 4 Laboratory Control Samples (LCSs) at a final concentration of 15 µg/ml. To prepare the LCS’s, add 600 µls of primary stock solution (1000 µg/ml) directly to approximately 0.2 grams of control. Follow the extraction procedure per Section X.

2. Perform an instrument calibration following the instructions in Section X.

3. Calculate the % Recoveries (%R’s), the mean %R, the Standard Deviation (SD) and Relative Standard Deviation (RSD) of the %R’s. Acceptance criteria are:
   a. Mean %R = the true value ± 30%
   b. RSD < 20%

4. Complete an IDC template report "Cannabinoids in Hemp by GC/FID: IDCs (Qualtrax ID # 16550) and give it to the Senior Scientist or Group Manager for review.

B. Method Detection Limit (MDL) study

1. Prepare a series of 7-8 Laboratory Control Samples (LCS’s) using THC free hemp or a suitable substitute (e.g. oregano). Add 250 µls of the SSS to each sample to give a final concentration of 0.125% THC. THC free hemp can be a previously analyzed sample that was found to contain < 0.05% THC.

2. Perform an instrument calibration following the instructions in Section X.

3. Calculate the % Recoveries (%R’s), the mean %R, the Standard Deviation (SD) and Relative Standard Deviation (RSD) of the %R’s. This is automatically done by using the MDL template report "MDLs by MUR Template" (Qualtrax ID # 26309). Acceptance criteria are:
   a. MDL < Reporting Limit (R.L.) of 0.1%

4. Complete a MDL template report "MDLs by MUR Template" (Qualtrax ID # 26309) and give it to the Senior Scientist or Group Manager for review.

C. Procedures in COMP group may only be performed by approved testing personnel. See DCLS Training Matrix spreadsheet for a list of approved testing personnel for this
procedure. Testing personnel must comply with DCLS Competency (Qualtrax ID # 16472). Personnel will demonstrate competency twice during the first year. Competency assessment with documentation will be performed annually in subsequent years.

Training guidelines used to determine personnel competency include, but are not limited to:

1. Read and understand this SOP and the DCLS Safety Manual (Qualtrax ID # 1805).
2. Read and understand basic and technical background information relevant to the procedure, as provided in the SOP reference materials and/or the method source document.
3. Be aware of, and comply with the laboratory ethics and data integrity guidelines.
5. Perform without assistance, while being observed by an experienced analyst.
6. Have an opportunity to perform/practice independently, without being observed and comfortably learn the procedures.
7. Successfully complete the competency program

D. Quality Control (QC) checks are included for each step in the analytical process.

1. A multilevel calibration curve (CC) ensures quantitation within the instrument’s linear range.
2. An Initial Calibration Verification (ICV) second source standard verifies calibration curve accuracy.
3. A Method Blank (MB) demonstrates reagent purity and a contamination free laboratory environment.
4. A solvent blank demonstrates no phthalate or other contamination carry-over from previous analysis.
5. A Continuing Calibration Check standard (CCC) verifies stability of instrument calibration.
6. A Laboratory Control Spike (LCS) verifies the method is in control. LCS percent recoveries are used to develop method control limits and are plotted on control charts.
7. A LCS duplicate (LCSD) or duplicate sample (DS), and Matrix Spike (MS) and Matrix Spike Duplicate (MSD), if sufficient sample is available, shows method precision.

E. Control charts are stored in Northwest Analytical (NWA) files on the DCLS network in the folder T:\COMP_NWA. Control limits are updated with 20 data points, with the next sets of data plotted against these limits. Refer to DCLS SOP Quality of Test Results (Qualtrax ID # 1790).

F. See Table 1 for QC parameters, descriptions, frequencies, acceptance criteria and corrective actions.

X. CALIBRATION AND STANDARDIZATION:

A. Set GC conditions to the instrument components and typical set points shown in Appendix 1.

B. Establish a calibration curve, confirmed by a second source standard, prior to analyzing any QC or samples.
C. If an existing calibration curve is to be used for analysis, prior to analyzing QC and samples, a Continuing Calibration Check (CCC) will be tested to confirm that the calibration curve is still in control. If the CCC does not meet acceptance criteria, a new calibration curve will be established.

D. Open and print the Cannabinoids in Hemp Review Sheet (Qualtrax ID # 16564). Document all QC results and corrective actions on the QC review sheet, sign and date the sheet.

E. Analyze the calibration standards from low to high concentration followed by the Initial Curve Verification (ICV) standard.

F. The OpenLab EZChrom software generates a linear regression calibration curve by plotting peak area (response) against concentration. The lowest acceptable coefficient of determination for the calibration curves is 0.99.

G. A minimum of five (5) calibration standards is required spanning the regulatory limit of 0.3%. If R² is less than 0.99, it is permitted to omit the highest or lowest of the Calibration Standards (CAL's) to bring R² equal to or above 0.99 and the minimum 5 point requirement is still met. Refer to Manual Integrations SOP (Qualtrax ID # 6545) and Standard Curve Calibration Points SOP (Qualtrax ID # 6546) for instruction on calibration curve manipulation. See Attachment 1 for examples of the Calibration Reports for the three Cannabinoid compounds.

H. Figure 1 illustrates the performance of the GC column.

XI. PROCEDURE:

A. Upon opening the sample, photographs will be taken of the sample after removal from the outermost packaging. Photographs will be taken alongside a ruler for scaling purposes. Photographs will be printed and kept with sample packs.

B. Sample Drying Step

1. Fold up the edges of a flat piece of aluminum foil to form a tray or use available pans.

2. Record the weight of the tray/pan on Cannabinoids in Hemp Weight Tracking Form (Qualtrax ID # 27265).

3. Spread the entire sample onto the tray and record the weight of the sample + tray/pan on the Hemp Weight Tracking Form (Qualtrax ID # 27265).

4. Dry the sample in an oven at 90 ± 5°C for approximately 2 hours.

5. Remove the tray/pan from the oven and allow cooling in a desiccator for approximately 15 minutes.

6. Again record the weight of the sample + tray/pan on the Hemp Weight Tracking Form (Qualtrax ID # 27265).

7. Place the tray/pan back in the oven at 90 ± 5°C for a minimum of 15 minutes, but
no longer than approximately 2 hours.

8. Remove the tray/pan from the oven and allow cooling in a desiccator for approximately 15 – 30 minutes.

9. Again record the weight of the sample + tray/pan on the Hemp Weight Tracking Form (Qualtrx ID # 27265).

10. If the weight of the dried sample is within 0.1g of the previous dried weight, the sample is ready to move on to section "B". If not within 0.1g, repeat steps 6 through 9 until sample weight is within 0.1g of the previous dried weight.

NOTE: This may take up to three days for a constant weight.

C. Hemp Sample Sieving

1. After cooling, the dried sample is worked through a #8 sieve to remove the stems and seeds from the dried hemp samples prior to homogenization. Stems and seeds will be weighed, wrapped in aluminum foil, and saved in the original paper bag for VDACS return.

2. The resultant sieved sample is then ground in a mortar and pestle.

D. THC extraction and GC Analysis

1. Samples: Weigh out approximately 0.2 grams of the ground hemp and extract with 40 mL of methanol for approximately 5 minutes at approximately 500 rpm using the Digital Pulse Mixer. Document on Hemp Weight Tracking Form (Qualtrx ID # 27265). May also be documented on Cannabinoid in Hemp Sample Activity Sheet (Qualtrx ID # 16563) in addition.

2. Matrix Spike, Laboratory Control Spike, and duplicates (MS, MSD, LCS, and LCSD): Weigh out approximately 0.2 grams of a previously analyzed hemp sample found to be < 0.3% THC. Weigh out approximately 0.2 grams of oregano in duplicate. Add 0.5 mL of the SSS (1000 µg/mL) to each sample. The resulting analyte concentrations is 0.25% based on a nominal 0.2 g sample. Extract with 40 mL of methanol for approximately 5 minutes at approximately 500 rpm using the Digital Pulse Mixer. Document on Cannabinoid in Hemp Sample Activity Sheet (Qualtrx ID # 16563).

\[
(0.5 \text{ mL} \times 1000 \mu g/mL)/40\text{mL} = 12.5 \mu g/mL
\]

\[
(12.5 \mu g/mL \times 40 \text{ ml})/0.2 \text{ g} \times (1%/10,000 \mu g/g) = 0.25 \%
\]

3. The samples are then allowed to settle for approximately 1 hour.

4. 1ml of each extract is transferred to a GC vial for analysis.

5. The extract is analyzed on a Gas Chromatograph (GC) equipped with a Flame Ionization Detector (FID).
6. Set GC conditions to values in the Instrument Components and typical set points shown in Appendix 1 and analyze the samples. Use the LIMS V10 sample number for the sample file name in the data system sequence table.

7. After analysis, print the chromatograms and calibration curves.

XII. DATA ANALYSIS AND CALCULATIONS:

A. QC Analysis Assessment

1. Process Sample Result Folder in OpenLab using the most recent CAL Curve. Print Initial Chromatograms.

2. Examine the data in OpenLab, review the peak ID’s and integration for each sample data file and QC. Assess the ICV, CCCs, method control, matrix control, MS, MSD, LCS1, and LCSD (if run) recoveries using the acceptance criteria listed in Table 1.

3. When peak corrections are made, print a hardcopy before and after the changes.

4. If there are any problems with identifying or integrating peaks, consult with the Senior Scientist, Principal Scientist or Manager.

5. If quantitative results exceed the range of the calibration standard, re-analyze a smaller sample aliquot while retaining the original analysis.

6. Print all Cannabinoids in Hemp Results Reports for the ICV Results (2nd Source) and CCC Check Report – Primary Source Continuing Calibration Check as seen in Attachment 2 and Attachment 3, respectively.

7. Evaluate the Relative Percent Difference of the replicate samples against the QC acceptance criteria in Table 1. Manually calculate and write the RPD on the report of the initial injection.

8. Evaluate and Print the CCC Check Report for the beginning and ending CCC. Manually calculate and write the percent recovery on each of the reports.

9. Enter QC results on the Cannabinoids in Hemp Review Sheet (Qualtrax ID # 16564). Take any required corrective actions. Document these on the Cannabinoids in Hemp Review Sheet (Qualtrax ID # 16564) for the set.

It is the responsibility of the analyst to ensure that chromatographic data is appropriately integrated while processing data using instrument software. To ensure accurate integration, closely examine the standard and sample chromatograms. Evaluate peak resolution, baseline drops, peak start, maxima, end points, and integration threshold.

If manual integration is necessary to ensure accurate peak area, print out the peak integration before and after the change. Make necessary notations on the printouts to document the change, initial and date. Include this documentation with the data report for Peer and/or Senior Scientist review.
B. Analyte Identification

1. Identify CBD, THC, and CBN by comparing the retention times to the retention times in the standard.

C. Analyte Quantitation

1. The instrument calibration formula is incorporated into the GC quantitation method. The integration report gives a Target Analyte (TA) concentration in ppm (µg/ml) based on a 2 µl sample injection.

2. Final sample concentration is calculated automatically in LIMS V10 as % after entering the instrument concentration, sample weight and final volume. Example below shows sample concentration with a 15 µg/ml instrument value, a 0.2 gram sample weight and a final volume of 40ml:

\[(15 \text{ µg/ml} \times 40 \text{ ml})/0.2 \text{ g} \times (1%/10,000 \text{ µg/g}) = 0.3 \%\]

3. As a check of the LIMS calculated value, a manual calculation is performed on at least one ug/mL conversion to %THC. This is written on the sample method report date and initialed.

4. Apply the same set of integration parameters to every analysis within a batch.
   a. If automated integration cannot be adjusted to accurately integrate a peak, manual integration is permissible. Refer to Manual Integrations (Qualtrax ID # 6545) for guidance.
   b. If quantitative results exceed the calibration range, dilute and re-analyze the extract. Do not extrapolate beyond the calibration range.

D. Data Handling, Review, and Reporting

1. Samples are submitted by VDACS under chain of custody using their "INDUSTRIAL HEMP INSPECTION AND CHAIN OF CUSTODY FORM" (Attachment 4). Sample custody is maintained by signing and dating the second page of the VDACS chain of custody form. The samples are then logged into LIMS by SSS for the specific service Cannabinoids in Hemp.

2. In LIMS
   a. "Receive in Lab", Select samples to be received.
   b. "My Teams Pending Tests" Assign samples to a run then "Create Run".

3. In OpenLab
   a. Acquire data in OpenLab and save final .txt file to the network folder (\Openlab-prod\share\Form GC1).
   b. Create a sub-folder in Form GC1 with a unique name.
   c. Evaluate peak resolution, baseline drops, peak start, maxima and end points and integration threshold.
d. Print a report of each QC analysis and sample analysis. Values for THC in μg/mL will be put into LIMS and converted to %THC.

4. In LIMS

a. Open the Sample Run in "My Teams Pending Tests" tab.

b. Select sample to be reported and input the THC value in μg/mL. LIMS will convert this THC value to %THC.

c. Repeat for each sample.

d. Review the transferred data and add any qualifiers needed. As a check of the LIMS calculated value, a manual calculation is performed on one μg/mL conversion to %THC.

e. Select "Finish Run."

f. For samples that have been identified as failures, THC >0.3%, immediately refer to Section VIII.C.2 for sample storage guidelines and documentation procedures.

E. Data Review and Release

1. Data Review Packet includes the following in a manila folder labelled "THC in Hemp":

a. Cannabinoids in Hemp Review Sheet (Qualtrax ID # 16564).

b. Calibration Reports (Attachment 1)

c. ICV Results Report (2nd Source Calibration Verification) (Attachment 2).

d. Initial CCC and Ending CCC Check Report – Primary Source Continuing Calibration Check (Attachment 3).

e. The VDACS Sample Submission and Chain of Custody Form (Attachment 4)

f. LIMS Results Report, if desired (Attachment 5)

g. Original and any re-integrated Cannabinoids in Hemp Results Reports for all QC, Blanks and Samples.

2. Give Data Review Packet to either the QA Senior Scientist, Peer Scientist, Principal Scientist or Group Manager for review.

a. Verify that all QC meets acceptance criteria or appropriate remedial actions have been taken and/or data are properly qualified.
b. Examine chromatograms to ensure accurate measurement of both the standard and sample components. Evaluate peak resolution, integration, identification and quantitation.

c. Verify that TA identifications are correct.

d. Verify that quantitative results are within the calibration range of the analyte.

e. In LIMS

(1) Review each Sample, either via a preliminary print out or directly from LIMS; verify data accuracy, any transposition errors, and qualifiers.

(2) Perform a "Run Approval" on the Cannabinoids in Hemp set.

(3) Perform a "Release by Team" on the Cannabinoids in Hemp set.

(4) If desired, a LIMS Results Report (Attachment 5) may be printed and included in the data packet.

(5) Sign and date the Cannabinoids in Hemp_Review Sheet (Qualtrax ID # 16564) sheet and return the folder to the analyst for recordkeeping.

3. Electronic Data Transfer - After results have been released, VDACS will receive the results automatically.

a. All sample results that are ≤ 0.3 % are automatically sent as a Report of Analysis (ROA) to the VDACS e-mail account -
thc.test@vdacs.virginia.gov.

b. If the sample result exceeds the regulatory limit of 0.3 %, a Certificate of Analysis (COA) is generated, signed and mailed to VDACS.

i. For samples that are above the regulatory limit, a case file will be created and stored with the evidence custodian. The case file will consist of the original chain of custody form, original chromatograms associated with the sample, a copy of the "Cannabinoids in Hemp Review Sheet" (Qualtrax ID # 16564), a copy of the "Hemp Weight Tracking Form" (Qualtrax ID # 27265), and a copy of the "Cannabinoids in Hemp Sample Activity Sheet" (Qualtrax ID # 16563). The case file will reference original QC data.

XIII. METHOD PERFORMANCE:

A. Determine MDLs for initial method validation, annually and when the method or instrumentation is modified. Current MDL data is located on the T:\COMPO\MDL\1 IDC’s and MDL’s.
MDL = S t_{(n-1,1-alpha = 0.99)}

Where:

\( t_{(n-1,1-alpha = 0.99)} \) = Student's t value for the 99\% confidence level with 
n-1 degrees of freedom. (3.143 for 7 replicates)
\( n \) = number of replicates
\( S \) = standard deviation of replicate analyses.

B. Linearity – This method is linear over an instrument concentration range of 2.5 to 100 
\( \mu g/ml \). The corresponding sample range, based upon a 40 \( ml \) extract volume and a 0.2 
gram sample dry weight, is 0.05\% to 2\%. Enter the analysis results into “TEMPLATE 
MDL Cannabinoids in Hemp” (Qualtrax ID # 16551). Print a copy and give it to the senior 
scientist or group manager for review. Print a copy and give it to the senior scientist or 
group manager for review.

C. Accuracy and Precision - DCLS laboratory precision and accuracy results for IDCs are 
entered into form Template IDC (Qualtrax ID # 16550).

XIV. WASTE MANAGEMENT:

DCLS manages all waste streams in compliance with local, state, and federal regulations.

A. Pollution Prevention

1. As part of DCLS’ Pollution Prevention efforts, procedures are aimed at the elimination 
or reduction of hazardous waste discharge at the point of generation.

2. Procedural decisions are based on the use of the least hazardous substance, 
limitations on the quantity ordered, the appropriate usage of the safety equipment, 
staff training, and competency assessment.

3. Training on waste management is provided to staff on an annual basis.

B. Biological, Chemical, Radiological Waste Handling

The safety office provides assistance in the development of waste handling and storage 
procedures and coordinates hazardous waste pick-ups.

A Waste Profile that is SOP-specific has been developed and approved. This information is 
listed on the DCLS Waste Profile Form (Qualtrax ID # 1846) which is attached to this SOP 
as Appendix 2.

This method does not generate any biological or radiological waste.

This method generates the following hazardous chemical waste streams:

1. 40-\( mL \) of methanol for each sample and QC analysis.

2. Non-chlorinated liquids (unused extraction solvent, unused mobile phase) – to be 
accumulated in a sealed plastic bin marked “Hazardous Waste” in a chemical fume 
hood.
3. Expired reference materials (solids) – to be accumulated in satellite accumulation area.

Refer to the DCLS Safety Manual (Qualtrax ID # 1805) for general DCLS safety information.

C. Solid Waste

Solid waste items that are associated with this procedure are placed in trash cans for pick-up by BFM staff. The following items are considered solid waste: paper, paper towels, bench coat, empty sample containers, and gloves.

Hemp samples that are found to be below the Federal THC limit of 0.3% can be returned to VDACS. Hemp samples that are found to be over the Federal THC limit of 0.3% will be stored in a locked refrigerator, pooled together over time, and submitted to AWS for destruction after VDACS releases COC.

D. Hazardous Waste Disposal

A hazardous waste disposal form (Qualtrax ID # 2224) is filled out and kept with each waste container and also with expired standard material. Hazardous Waste is picked up weekly by Spill Response Certified Technicians.

XIV. REFERENCES

Hemp Sample Preparation, Biochemistry Laboratory SOP No.: PT-LBOP-014, Colorado Department of Agriculture, eff. Date 09/05/2014.

Determination of Delta-9-THC in Hemp by Gas Chromatography with Flame Ionization Detection (GC/FID), SOP No.: PT-METH-031, Colorado Department of Agriculture, eff. Date 09/23/2014.


XV. TABLES, DIAGRAMS, FLOWCHARTS, AND VALIDATION DATA:

Appendix 1: Instrument Components and Typical Set points

Attachment 1: Calibration Reports of the Three Cannabinoid Compounds in Hemp

Figure 1: Method Analyte Chromatogram

Table 1: Quality Control

Attachment 2: ICV Results Report (2nd Source Calibration Verification)

Attachment 3: CCC Check Report – Primary Source Continuing Calibration Check
Appendix 1: Instrument Components and Typical Set points

- **Heater:** Set point: 300°C, Actual: 30°C
- **H2 flow:** Set point: 30 mL/min, Actual: 30 mL/min
- **Air flow:** Set point: 350 mL/min, Actual: 30 mL/min
- **Makeup flow:**
  - Helium: 30 mL/min
  - Constant column + makeup: 30 mL/min
- **Flame on**
- **Electrometer on**
Title: The Determination of Delta-9-THC and Related Compounds in Hemp Using Gas Chromatography
Document #: 16812
Revision: 4
Date Published: 09/20/19
Issuing Authority: Laboratory Director
Attachment 1: Calibration Reports of the Three Cannabinoid Compounds in Hemp

A. Cannabidiol (CBD)

<table>
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<tr>
<th>Level</th>
<th>Amount</th>
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<th>Last Area</th>
<th>Residual</th>
<th>Reg.S/Dev</th>
<th>Reg</th>
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<td>0.66245</td>
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<td></td>
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Title: The Determination of Delta-9-THC and Related Compounds in Hemp Using Gas Chromatography
Document #:16612
Revision: 4
Date Published: 09/20/19
Issuing Authority: Laboratory Director
B. Tetrahydrocannabinol (THC)

C. Cannabinol (CBN)
Figure 1: Method Analyte Chromatogram

Table 1: Quality Control

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Frequency</th>
<th>Acceptance Criteria</th>
<th>Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC</td>
<td>Linear Curve: Minimum 5 calibration standards are required spanning the regulatory limit of 0.3%.</td>
<td>1. After a CCC not meeting acceptance criteria.</td>
<td>( r^2 &gt; 0.99 )</td>
<td>1. Halt analysis and correct the problem 2. Re-analyze curve</td>
</tr>
<tr>
<td>ICV</td>
<td>Initial Calibration Verification from a Second Source</td>
<td>After the IC</td>
<td>THC must be ± 20% of true value. Other analytes must be ± 30% of true value.</td>
<td>1. Re-analyze the ICV. 2. If ICV still fails, re-calibrate.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
<td>Frequency</td>
<td>Acceptance Criteria</td>
<td>Correction</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>CCC</td>
<td>Analysis of low to midlevel curve point. (Typically 15ug/mL = 0.3%)</td>
<td>At the start and end of each analytical batch. Maximum batch size is 20 samples</td>
<td>Each reported analytes must be +/- 20% of the true value. TA retention time in the sample must be within 0.03 minutes of the last CCC.</td>
<td>1. Halt analysis, correct the problem, re-analyze the CCC. 2. If the CCC still fails, re-calibrate</td>
</tr>
<tr>
<td>IDC</td>
<td>Set of at least 4 LCS's @ 15ug/mL. (600μL of 1000 μg/mL spiked in 0.2g control)</td>
<td>Prior to the analyst processing samples. When the method or instrumentation is modified.</td>
<td>Mean recovery of each analyte between +/- 30% Recovery. RSD &lt;20%.</td>
<td>Documents capability to perform method as part of competency; trainer &amp; trainee complete an IDC report; Group Manager reviews &amp; retains record.</td>
</tr>
<tr>
<td>MDL</td>
<td>Set of 7 replicates of matrix spiked @ 0.125% THC</td>
<td>Annually or when there are significant changes to the method or instrument.</td>
<td>MDL &lt; R. L. of 0.1%</td>
<td>Perform instrument maintenance, re-analyze the MDL set. If it fails again, re-extract and run the new MDLs.</td>
</tr>
<tr>
<td>Method Control (Method Blank)</td>
<td>Method Blank is an aliquot of the methanol solvent used for sample extraction.</td>
<td>Before each analysis batch. One set of QC with each batch of 20 samples</td>
<td>No TAs &gt; MDL.</td>
<td>Halt analysis and determine source of contamination.</td>
</tr>
<tr>
<td>Matrix Control (Matrix Blank)</td>
<td>Previously analyzed clean hemp or oregano.</td>
<td>Before each analysis batch.</td>
<td>No TAs &gt; MDL.</td>
<td>Halt analysis and determine source of contamination.</td>
</tr>
<tr>
<td>LCS</td>
<td>Previously analyzed clean hemp or oregano spiked at 0.3% or less.</td>
<td>One set of QC with each batch of 20 samples. Historical results tracked in Northwest Analytical.</td>
<td>Until historical limits established, percent recovery w/in ± 30% of expected value.</td>
<td>Analyze a 2nd aliquot of all samples &amp; QC for the batch.</td>
</tr>
<tr>
<td>LCSD (only necessary if MS/MSD not available).</td>
<td>Duplicate spike of previously analyzed clean hemp or oregano spiked at 0.3% or less.</td>
<td>One set of QC with each batch of 20 samples. (only analyze if MS/MSD not available).</td>
<td>Percent Recovery w/in ± 30% of expected value.</td>
<td>Analyze a 2nd aliquot of all samples &amp; QC for the batch.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
<td>Frequency</td>
<td>Acceptance Criteria</td>
<td>Correction</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------------------------</td>
<td>-----------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>MS</td>
<td>Matrix Spike shall be spiked at 0.2%.</td>
<td>One set of QC with each batch of 20 samples.</td>
<td>Recovery shall fall within the current limits established by control chart data. Until at least 20 pts are generated, the percent recovery should be w/in ± 30% of expected value.</td>
<td>Any failures should be evaluated and possibly re-injected. Continued failure should be investigated by the Group Manager or Senior and a corrective action initiated.</td>
</tr>
<tr>
<td>MSD</td>
<td>Matrix Spike Duplicate shall be spiked at 0.2%.</td>
<td>One set of QC with each batch of 20 samples.</td>
<td>Recovery shall fall within the current limits established by control chart data. Until at least 20 pts are generated, the percent recovery should be w/in ± 30% of expected value.</td>
<td>Any failures should be evaluated and possibly re-injected. Continued failure should be investigated by the Group Manager or Senior and a corrective action initiated.</td>
</tr>
<tr>
<td>Duplicate</td>
<td>A second sample chosen at random</td>
<td>One set of QC with each batch of 20 samples</td>
<td>RPD between samples should be within 15% at 0.1% or higher. 30% if lower than 0.1%.</td>
<td>Re-analyze sample or qualify failures.</td>
</tr>
</tbody>
</table>

Attachment 2: ICV Results Report (2nd Source Calibration Verification)
Cannabinoids by GC/FID - External Standard Report

Method Name: Pesticide Formulations\FORM GC\Results\081616 Cannabinoid_BFB Int Stnd_THC
2nd.ol.szip\080816 Cannabinoids_b.snel
Sample ID: THC_2nd Source_25ug/mL
Vis#:
User: Scott Winars (BUILT-IN) winars)
Acquired: 8/16/2016 3:17:34 PM (GMT -04:00)
Printed: 8/23/2016 9:41:51 AM (GMT -04:00)

Front FID Results

<table>
<thead>
<tr>
<th>Pk #</th>
<th>Name</th>
<th>Retention Time</th>
<th>Area</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Cannabidiol (CBD)</td>
<td>7.313</td>
<td>546</td>
<td>0.392</td>
</tr>
<tr>
<td>5</td>
<td>Tetrahydrocannabinol (THC)</td>
<td>7.715</td>
<td>31352</td>
<td>24.897</td>
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<tr>
<td>6</td>
<td>Cannabinol (CBN)</td>
<td>8.149</td>
<td>1190</td>
<td>3.712</td>
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</tbody>
</table>

| Totals |                | 33094          | 28.504 |

Attachment 3: CCC Check Report – Primary Source Continuing Calibration Check
**Cannabinoids by GC/FID - External Standard Report**

**Method Name:** Cannabidiol (CBD)

**Sample ID:** CCC @ start_25ug/mL @ end

**Vial #:** 3

**User:** Scott Winters (BUILT IN/users)

**Acquired:** 8/18/2016 8:47:03 PM (CMT -04:00)

**Printed:** 8/18/2016 9:44:37 AM (CMT -04:00)

---

**Front FID Results**

<table>
<thead>
<tr>
<th>Pk</th>
<th>Name</th>
<th>Retention Time</th>
<th>Area</th>
<th>Concentration</th>
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</thead>
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<td>Cannabidiol (CBD)</td>
<td>7.102</td>
<td>36209</td>
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</tr>
<tr>
<td>8</td>
<td>Tetrahydrocannabinol (THC)</td>
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<tr>
<td>10</td>
<td>Cannabinol (CEN)</td>
<td>8.155</td>
<td>37377</td>
<td>28.678</td>
</tr>
</tbody>
</table>

**Total**

|       | 107890 | 81.642 |

---

Title: The Determination of Delta-9-THC and Related Compounds in Hemp Using Gas Chromatography

Document #: 16612

Revision: 4

Date Published: 09/20/19

Issuing Authority: Laboratory Director
INDUSTRIAL HEMP INSPECTION AND CHAIN OF CUSTODY FORM

<table>
<thead>
<tr>
<th>Registration Number:</th>
<th>Business Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Number:</td>
<td>Mailing Address:</td>
</tr>
<tr>
<td>Collection Date:</td>
<td>Crop Address:</td>
</tr>
<tr>
<td>Approximate Area:</td>
<td></td>
</tr>
<tr>
<td>(AC or Square Feet)</td>
<td></td>
</tr>
<tr>
<td>Sample Weight:</td>
<td></td>
</tr>
<tr>
<td>Applicant Name:</td>
<td>Business Phone:</td>
</tr>
<tr>
<td>Print Name</td>
<td>Date:</td>
</tr>
<tr>
<td>Applicant Signature:</td>
<td></td>
</tr>
</tbody>
</table>

Variety Sampled: | Development Stage: Flowering/not Flowering

Sample Location: (GPS, Greenhouse, Range/Bench#)
From Permit:
From Inspection:

Additional Comments:

Sample Collected By: 
Print Name Inspectors Signature:

CONDITION OF PLANT
Include height, appearance, approximate density, and degree of inflorescence maturity

SUBMITTER DESCRIPTION
Include the number of containers, identification number(s) and a physical description of each sample submitted for testing

Seal Number: (if present)

Attachment 4 (cont): VDACS Sample Submission Form and Chain of Custody

LABORATORY CHAIN OF CUSTODY FORM
Chain of Custody: Persons relinquishing and receiving evidence must provide their signature, organization and date/time to document evidence transfers. Submitter, start with box number 1.

<table>
<thead>
<tr>
<th>Relinquished By (Submitter)</th>
<th>Organization</th>
<th>Date/Time</th>
<th>Received by</th>
<th>Organization</th>
<th>Date/Time</th>
<th>Sealed: [ ] Yes [ ] No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signature:</td>
<td></td>
<td></td>
<td>Signature:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Print Name:</td>
<td></td>
<td></td>
<td>Print Name:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sealed:</td>
<td></td>
<td></td>
<td>[ ] Yes [ ] No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relinquished By (Submitter)</th>
<th>Organization</th>
<th>Date/Time</th>
<th>Received by</th>
<th>Organization</th>
<th>Date/Time</th>
<th>Sealed: [ ] Yes [ ] No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signature:</td>
<td></td>
<td></td>
<td>Signature:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Print Name:</td>
<td></td>
<td></td>
<td>Print Name:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sealed:</td>
<td></td>
<td></td>
<td>[ ] Yes [ ] No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relinquished By (Submitter)</th>
<th>Organization</th>
<th>Date/Time</th>
<th>Received by</th>
<th>Organization</th>
<th>Date/Time</th>
<th>Sealed: [ ] Yes [ ] No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signature:</td>
<td></td>
<td></td>
<td>Signature:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Print Name:</td>
<td></td>
<td></td>
<td>Print Name:</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sealed:</td>
<td></td>
<td></td>
<td>[ ] Yes [ ] No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relinquished By (Submitter)</th>
<th>Organization</th>
<th>Date/Time</th>
<th>Received by</th>
<th>Organization</th>
<th>Date/Time</th>
<th>Sealed: [ ] Yes [ ] No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signature:</td>
<td></td>
<td></td>
<td>Signature:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Print Name:</td>
<td></td>
<td></td>
<td>Print Name:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sealed:</td>
<td></td>
<td></td>
<td>[ ] Yes [ ] No</td>
</tr>
</tbody>
</table>

**DCLS USE ONLY**

**Laboratory Description of Sample**

Include the number of containers, identification number(s) and a physical description of each sample submitted for testing

<table>
<thead>
<tr>
<th>Signature:</th>
<th>Date:</th>
</tr>
</thead>
</table>

**Evidence Disposal**

To be completed by Laboratory Evidence Custodian

<table>
<thead>
<tr>
<th>Disposition Site:</th>
<th>Disposition No:</th>
<th>Method of Disposition:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performed By:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Witnessed By:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Attachment 5: LIMS Results Report

Title: The Determination of Delta-9-THC and Related Compounds in Hemp Using Gas Chromatography
Document #: 16612
Revision: 4
Date Published: 09/20/19
Issuing Authority: Laboratory Director

Uncontrolled Copy
**Commonwealth of Virginia**  
**Division of Consolidated Laboratory Services**  
505 North 5th St.  
Richmond, Virginia 23219  
804-648-4480  

**REPORT OF ANALYSIS**

**Mail To**  
VDACS - OFFICE OF PLANT INDUSTRY SERVICE  
102 GOVERNOR ST RM 156  
RICHMOND, VA 23219

**Sample Information**

<table>
<thead>
<tr>
<th>CUST SAMPLE ID:</th>
<th>SAMPLE MATRIX</th>
<th>DATE RECEIVED</th>
<th>SAMPLING DATE</th>
<th>INSPECTOR #</th>
<th>INSPECTOR NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEMP-32-001</td>
<td>HEMP</td>
<td>09/15/2016 15:47</td>
<td>09/06/2016 11:30</td>
<td>JOHN DOE</td>
<td></td>
</tr>
</tbody>
</table>

**Test Results**

<table>
<thead>
<tr>
<th>METHOD</th>
<th>PARAMETER</th>
<th>RESULT</th>
<th>ANALYSIS DATE</th>
<th>ANALYST</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC/MS</td>
<td>THC</td>
<td>0.25 %</td>
<td>09/15/2016</td>
<td></td>
</tr>
</tbody>
</table>

**Explanation of Terms and Disclaimers**

The results included on this report relate only to this specific sample and not to other samples tested from this sampling location.

CONFIDENTIALITY NOTICE: This report contains PRIVILEGED and CONFIDENTIAL INFORMATION. This report should not be reproduced, except in full, without the written approval of DCLS. If you have received this report in error, please notify DCLS immediately at (804) 648-4480 Ext. 142.

---

**Appendix 2: DCLS Waste Profile Form**

Title: The Determination of Delta-9-THC and Related Compounds in Hemp Using Gas Chromatography

Document #: 16612  
Revision: 4  
Date Published: 09/20/19  
Issuing Authority: Laboratory Director
<table>
<thead>
<tr>
<th>Waste Type (choose only one)</th>
<th>Waste Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological</td>
<td>Sink Trash</td>
</tr>
<tr>
<td>Chemical</td>
<td>Trash</td>
</tr>
<tr>
<td>Radiological</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Target Cannabinoids in Hemp Standards</td>
</tr>
<tr>
<td>Biological</td>
<td>Sink Trash</td>
</tr>
<tr>
<td>Chemical</td>
<td>Trash</td>
</tr>
<tr>
<td>Radiological</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Methanol used for standards and rising</td>
</tr>
<tr>
<td>Biological</td>
<td>Sink Trash</td>
</tr>
<tr>
<td>Chemical</td>
<td>Trash</td>
</tr>
<tr>
<td>Radiological</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acetone used for ink removal and rising glassware</td>
</tr>
<tr>
<td>Biological</td>
<td>Sink Trash</td>
</tr>
<tr>
<td>Chemical</td>
<td>Trash</td>
</tr>
<tr>
<td>Radiological</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GC vials</td>
</tr>
<tr>
<td>Biological</td>
<td>Sink Trash</td>
</tr>
<tr>
<td>Chemical</td>
<td>Trash</td>
</tr>
<tr>
<td>Radiological</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gloves</td>
</tr>
<tr>
<td>Biological</td>
<td>Sink Trash</td>
</tr>
<tr>
<td>Chemical</td>
<td>Trash</td>
</tr>
<tr>
<td>Radiological</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hemp samples found to be below the Federal limit of 0.3% can be disposed of in the trash, unless VDACS requests them to be returned.</td>
</tr>
<tr>
<td>Biological</td>
<td>Sink Trash</td>
</tr>
<tr>
<td>Chemical</td>
<td>Trash</td>
</tr>
<tr>
<td>Radiological</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Failing hemp samples above the Federal limit of 0.3% THC will be stored in a locked refrigerator, pooled together over time, and submitted to Assured Waste Solutions, LLC for destruction.</td>
</tr>
</tbody>
</table>

Comments:

*Sink = non-hazardous aqueous solution or water soluble acid/base; Trash = solid waste*

Directions for completing the DCLS Waste Profile Form:
- List waste composition per step that generates waste (if multi-step process)
- Example: "sample X might be on first line; sample in diluent (methanol) might be on next line; diluted sample + reagent y might be on next line"
- Check any waste stream designation for each line (if waste is created at this point)
- Include any disposal for disposal of expired lab/agent working solution at end
INDUSTRIAL HEMP DESTRUCTION PLAN

Please send your destruction plan to Jasmine Harwell using the mailing address above.

SECTION ONE
GROWER IDENTIFICATION

Name of Registered Industrial Hemp Grower: ________________________________

Industrial Hemp Grower Registration Number: ______________________________

SECTION TWO
DESCRIPTION OF INDUSTRIAL HEMP WITH A DELTA-9 TETRAHYDROCANNABINOL CONCENTRATION GREATER THAN THAT ALLOWED BY FEDERAL LAW

Name of Industrial Hemp Variety: ________________________________

Coordinates of Production Field in which this Industrial Hemp Variety was Grown: ________________________________

Volume of this Industrial Hemp Variety Grown: ________________________________
( acres, square feet, or number of plants)

SECTION THREE
PROPOSED METHOD OF DESTRUCTION

Destruction must render all subject plants or parts thereof non-retrievable. The method utilized to render the crop non-retrievable shall comply with applicable U.S. Drug Enforcement Administration regulations and be approved of by the Commissioner.
Please describe your proposed method of destruction below.

By initialing and signing below, you acknowledge that you have read the following notices:

- Registered Industrial Hemp Growers shall complete destruction within five calendar days of the date of the Commissioner’s approval.
- Upon completion of the approved destruction, Registered Industrial Hemp Growers shall submit to VDACS an Industrial Hemp Destruction Report.

__________________________  __________________________
Signature                                           Date

______________
Print Name

The destruction plan described in Section Three of this document is hereby approved. Destruction must be completed within five calendar days of the date of approval recorded below.

__________________________  __________________________
Jewel H. Bronaugh, Ph.D.                                           Date of Approval
Commissioner of Agriculture and Consumer Services