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Alaska Marijuana Control Board

Operating Plan Supplemental
Form MJ-06: Marijuana Testing Facility

What is this form?

This operating plan supplemental form is required for all applicants seeking a marijuana testing facility license and must accompany **Form MJ-01: Marijuana Establishment Operating Plan**, per 3 AAC 306.020(b)(11). Applicants should review **Chapter 306: Article 6** of the **Alaska Administrative Code.** This form will be used to document how an applicant intends to meet the requirements of the statutes and regulations.

If your business has a formal operating plan, you may include a copy of that operating plan with your application, but all fields of this form must still be completed per 3 AAC 306.020 and 3 AAC 306.615(2).

What additional information is required for cultivation facilities?

Applicants must identify how the proposed establishment will comply with applicable regulations regarding the following:

- Prohibitions
- Employee qualification and training
- Testing practices and procedures
- Reporting and records retention
- Waste Disposal

This form must be completed and submitted to AMCO's main office before any new or transfer application for a marijuana testing facility license will be considered complete.

Section 1 – Establishment Information

Enter information for the business seeking to be licensed, as identified on the license application.

Licensee:	Land & Seas Laboratory, LLC	**MJ License #:**		23634	
License Type:	Marijuana Testing Facility				
Doing Business As:	Land & Seas Laboratory				
Premises Address:	3516 W Coghlan Circle, Unit #3				
City:	Alaska	**State:**	Alaska	**ZIP:**	99623

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Section 2 – Overview of Operations

2.1. Provide an overview of your proposed facility's operations. Include information regarding the intake and flow of marijuana and marijuana product at your premises and reporting of test results:

Land & Seas Laboratory will accept numerous agricultural sample types for safety testing, to include cannabis, hemp and hemp products, seafood, dairy, poultry, and produce. All samples will arrive through the front door of the customer entrance and go through a check-in process at the front desk under video surveillance. Samples of cannabis will be passed through an 18"x18" sample one-way window and diverted to an AMCO weigh-in process before being logged into the METRC system. Cannabis samples will be processed for any number of state-required or optional tests as described below. Results will be provided in real time on each customer's individual portal and finally in electronic reports that will be emailed and are accessible through a customer's portal, which houses all current and previous test results and invoices for each cultivator/producer/manufacturer. All chemistry results for cannabis flower will be reported in dry weight per AMCO regulation.

Section 3 – Prohibitions

Review the requirements under 3 AAC 306.610.

3.1. I certify that the marijuana testing facility will not: Initials

a. **sell, deliver, distribute, or transfer any marijuana or marijuana product to a consumer, with or without compensation; or** JA

b. **allow any person, including a licensee, employee, or agent, to consume marijuana or marijuana product on the licensed premises.** JA

Section 4 – Employee Qualification and Training

Review the requirements under 3 AAC 306.625 and 3 AAC 306.630.

4.1. Name the facility's scientific director and describe how she/he meets the qualifications set forth in 3 AAC 306.630(b):

Jessica Alexander, AAS, BAAS, MPAS, MSCRM
Educational background:
--Associate's degree in Allied Health Science from Austin Community College
--Bachelor's degree in Allied Health Science with a minor in Chemistry from St. Edward's University in Austin, Texas
--Master's degree in Physician Assistant Studies from The University of North Texas Health Science Center in Fort Worth, Texas
--Master's degree in Clinical Research Management (Pharmaceutical Research) from the School of Biomedical Sciences at the University of North Texas Health Science Center in Fort Worth, Texas
--Additionally, all coursework was completed for a PhD in Molecular Cell Biology & Genetics and research was initiated, but the Department of Defense could not continue funding thesis/research on mitigation of nitric oxide species in blast injuries of tourniqueted limbs due to budget cuts associated with 9-11. Participated in graduate school research analyzing frozen porcine tissue samples collected during cardiac bypass surgery and another research project to analyze tissue samples from decubitus ulcers for angiogenic growth factor levels after pulse-pressured oxygen therapy.

Key qualifiers:
-- Current laboratory director for 2 ISO accredited laboratories-- licensed marijuana testing facility (The New Frontier Research) and food safety testing laboratory (Frontier Fare Testing) with 2 1/2 years of experience in position.
--Previous laboratory director in the state of Alaska for 2 medical laboratories with success in management of processes; development and implementation of QA/QI programs; experienced in personnel training and periodic competency testing, as well as meeting American Proficiency Institute standards for lab and personnel; and successfully passing a state audit without any citations or request for changes
--Experience and formal education in clinical research management (pharmaceutical research)
--More than 10 years of experience in laboratory testing— biological and analytical
--Experienced program coordinator for genetic research project involving multiple universities

4.2. Describe how the marijuana testing facility will ensure the scientific director and all testing analysts are proficient in utilizing testing equipment and analyzing samples:

We believe that all laboratories should demonstrate competency and adherence to internationally-accepted standards upon starting operations. Land & Seas Laboratory will immediately obtain accreditation to the International Organization for Standardization (ISO) 17025 standards for testing methods and quality assurance.

The Laboratory Director has developed policies and procedures to ensure:

1) Laboratory adherence to the ISO 17025 criteria and good lab practices (GLPs);
2) The laboratory will complete proficiency testing (PT) twice annually;
3) All personnel meet educational and experience requirements for the position;
4) All personnel are trained and complete competency testing with the Lab Director prior to being allowed to perform tasks independently and every six months afterward;
5) The laboratory will adhere to all state audit requirements detailed in the regulatory guidance document provided by DEC; and
6) The laboratory will follow the chain of custody regulations provided by AMCO for storage, management, and reporting of samples.

Section 5 – Testing Practices and Procedures

Review the requirements under 3 AAC 306.615, 3 AAC 306.635 – 3 AAC 306.650, and 3 AAC 306.660.

5.1. Describe each test the marijuana testing facility will offer:

See attached document. Form text box is not accepting more than one line of input.

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You must be able to certify each statement below. Read the following and then sign your initials in the corresponding box: Initials

5.2. I have attached the marijuana testing facility's written standard operating procedures manual that includes standard operating procedures for each test the facility will offer, as well as the acceptable range of results for each test.

5.3. The written standard operating procedures manual is available to each employee at all times.

5.4. Describe how the marijuana testing facility will meet the chain of custody requirements set forth in 3 AAC 306.650:

Samples must arrive at the laboratory in a lock box or tamper-proof container and accompanied by their unique METRC sticker(s) and a METRC manifest. If the METRC sticker(s) or manifest is missing, then the sample will not be accepted. Rejection of samples requires notification to the Lab Director or their designee immediately.

Required information will be recorded on the Sample Tracking & Results form and/or the L&S electronic Laboratory Information Management System to document sample condition, results, aliquot usage, and personnel handling samples. The unused portion of the sample will be kept in the locked sample storage closet inside the lab until all tests are completed, the results are reviewed, and the reports have been provided to customers. Processed sample material and unused leftover sample material will be disposed of in the manner detailed in the additional space section of this form and will be done under video surveillance and documented in METRC.

Land & Seas Laboratory will have ample surveillance in the form of video to be stored for 40 days at a secured location within the restricted access area on premises. All activities in the laboratory will be documented in this way and provided to AMCO upon request.

Section 6 – Reporting and Records Retention

Review the requirements under 3 AAC 306.670 and 3 AAC 306.675.

You must be able to certify the statement below. Read the following and then sign your initials in the box to the right: Initials

6.1. I have read, understand, and will comply with the timely reporting requirements set forth in 3 AAC 306.670(a).

6.2. I have read, understand, and will comply with the reporting and validation requirements set forth in 3 AAC 306.670(b).

6.3. I have read, understand, and will comply with the records retention requirements set forth in 3 AAC 306.675.

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Section 7 – Waste Disposal

Review the requirements under 3 AAC 306.740.

You must be able to certify the statement below. Read the following and then sign your initials in the box to the right: Initials

7.1. The marijuana testing facility shall give the board at least three days written notice required under 3 AAC 306.740(c) before making marijuana waste unusable and disposing of it.

7.2. Describe how you will store, manage, and dispose of any solid or liquid marijuana waste, in compliance with any applicable laws. Include details about the material(s) you will mix with ground marijuana waste and the processes that you will use to make the marijuana waste unusable for any purpose for which it was grown or produced:

Form text box not accepting more than one line of text. See attachment for details.

I declare under penalty of unsworn falsification that this form, including all accompanying schedules and statements, is true, correct, and complete.

Signature of licensee

Jessica Alexander

Printed name of licensee

Notary Public
Aliya Carver
State of Alaska
Commission expires 10/13/2020
Commission # 161013008

Notary Public in and for the State of Alaska

My commission expires: 10-13-2020

Subscribed and sworn to before me this 18 day of December, 2019.

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(Additional Space as Needed):

Hazardous waste will be generated by mixing organics solvents and cannabis in the course of sample preparation. Sample vials will be poured into a 5-gallon waste container in the lab, which will periodically be transferred to Rotavap to remove cannabinoids and purify solvents. The product of the Rotavap process will be added to the micro waste container and disposed of as described for that process below. The purified solvents will be trasferred to a 30-gallon container in the video-monitored storage room. Once full, the 30-gallon container will be transferred to the Mat-Su Central Landfill for disposal in accordance with the Mat-Su Landfills guidelines with input from their site manager.

Once microbial testing has been completed, the used cannabis material in its growth media will be taken from the incubator and go directly into a 30-gallon sealable drum that contains bleach water. At the end of the day, the ground cannabis samples used for testing moisture content will be poured directly into the drum as well. Once all testing has been completed and the samples have been "cleared" in METRC, any leftover cannabis from those samples will be poured directly into the drum. Materials from cannabis by-product from the Rotavap solvent purification process will also be addded to this bleach water/media mixture.

Periodically, cat litter will be added to the drum so that any cannabis, although already unusable due to being mixed in media and bleach water, will also be unrecognizable. Once the drum is full and a, MJ-25 has been submitted to AMCO, it will be taken to the Mat-Su Landfill and the contents of the drum will be disposed according to the Mat-Su Landfills guidelines. Any cannabis that is not actively being used for testing or being prepared for destruction will be stored in a locked storage closet inside the locked lab.

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Supplement to MJ-06
Describe each test the marijuana testing facility will offer:
5.1 Weighing Samples
All cannabis samples delivered to the laboratory will initially be weighed on a state registered scale in compliance with AS 45. 75.080 Weights and Measures Act. All agricultural samples, to include cannabis plant and cannabis-infused products presented to the laboratory will be weighed into aliquots on an ISO certified balance to provide accurate data for use in calculation of results. QC data for balances will consist of the initial registration and inspection reports for all analytic balances per AS 45. 75.080 and 17 AAC 90.920 - 17 AAC 90.935. LSL will have annual inspections with calibrations and a sticker will be affixed to balances with the date of last calibration. Between full inspections and calibrations, accuracy checks on all balances will be performed on a monthly basis.
5.2 Visual Inspection of Sample Materials
LSL will analyze all samples for filth and foreign material present by visualizing the sample under microscopy. Sample inspection is based on FDA Standards in The Defect Levels Handbook (FDA in 21 CFR 58 Good Lab Practice for Nonclinical Lab Studies) and OECD Principles of Good Lab Practice and Compliance Monitoring. "Filth and foreign material" includes, but is not limited to, hair, insects, feces, packaging contaminants, visible mold, and manufacturing waste and by-products. The laboratory will report that the sample "passed" filth and foreign material testing if the presence of filth and foreign material is at or below the following filth and foreign material action levels:

- Cannabis flower and trim (hemp or marijuana)—
  - Sand/dirt-- more than 5 particles per gram of sample
  - Visible mold or excrement—None present
  - Hairs, fibers, or other contaminant—More than 1 per gram of sample
- Foods and Concentrates—
  - Dirt, mold, or excrement—None present
  - Hairs, fibers, or other contaminant—More than 1 per gram of sample

The laboratory will report in the certificate of analysis whether the sample "passed" or "failed" filth and foreign-material testing. If a commercial cannabis sample fails filth and foreign-material testing, the batch fails laboratory testing, which will be reported in METRC for commercial cannabis customers. Presence of contaminants below the action level will be documented in the *Comments* section of the certificate of analysis. If a sample fails visual inspection, a picture will be taken under microscopy and retained in the customer's folder on the LSL NAS in a file folder designated by the date of service.
5.3 Moisture Analysis and Water Activity
Water activity of plant material and food products is important because high content of free water fosters microbial growth of bacteria and mold/yeast/fungus. Land & Seas Laboratory (LSL) will analyze agricultural samples for water activity per customer request and for all cannabis plant material and baked goods to determine shelf stability. Moisture content will be determined as a factor for calculating dry weight percentages and concentrations of cannabinoids, terpenes, pesticides, and heavy metals per state regulation.
5.4 Homogenization
Once laboratory samples are received, they may require further preparation. i.e., subdivision and/or homogenization by vortexing, stomaching, crushing, sonication and/or milling and grinding prior to analysis. Seeds and large stems should be removed prior to grinding. If a sample is large enough it may be necessary to subdivide it prior to cryomilling or genogrinding it. Portions must then be added back together and mixed thoroughly before aliquots may be weighed out. For laboratory samples of cannabis

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plant greater than 6 grams in size, a sub-sample may be removed for microbiological processes prior to homogenization.

5.6.2 PCR Identification of STEC

LSL will test for and report the presence of STEC in any agricultural product by method of polymerase chain reaction using the BioRad iQ Check STEC VirX kit, which allows the detection of the *stx* and *eae* virulence genes in one well after microbiological enrichment. Specific probes are used to detect DNA during the amplification, by hybridizing to the amplicons. These probes are linked to fluorophores that fluoresce only when hybridized to the target sequences. In the absence of target DNA, no fluorescence will be detected. As the amount of amplicons increases with each round of amplification, fluorescence intensity also increases. During each PCR cycle, at the annealing step, the detector measures this fluorescence, whereas the associated software plots the fluorescence intensity versus number of cycles. Presence of 1 or more CFU per gram constitutes failure of any sample. AOAC Certificate #: 121203.

5.6.3 PCR Identification of Salmonella

LSL will test for and report the presence of Salmonella in any agricultural product by method of real-time polymerase chain reaction (rtPCR) using the Bio-Rad iQ-Check *Salmonella* II. This is a simple and rapid qualitative test, allowing the detection of specific DNA sequences unique to *Salmonella* found in food products, animal feed and environmental samples. Using real-time PCR, *Salmonella*-specific DNA sequences are amplified and detected simultaneously by means of fluorescent probes by the same mechanism as detailed above. Presence of 1 or more CFU per gram constitutes failure of any sample. AOAC Certificate #: 010803.

5.6.4 PCR Identification of Listeria

Land & Seas Laboratory (LSL) will test for and report the presence of *Listeria monocytogenes* in food products by methods of real-time polymerase chain reaction (PCR) using the Bio-Rad iQ-Check *Listeria monocytogenes* II. Listeria DNA sequences are amplified and detected simultaneously by means of fluorescent probes by the same mechanism as detailed above. Presence of 1 or more CFU per gram constitutes failure of any sample. AOAC Certificate #: 010802.

5.6.5 PCR Identification of Aspergillus

LSL will test for and report the presence of (at minimum) 4 specific strains of Aspergillus in agricultural samples through the use of real-time polymerase chain reaction (rtPCR) using either the Bio-Rad iQ-Check Aspergillus PCR kit for detection of Terreus, Niger, Flavus, and Fumigatus or by the Genesig Aspergillus kit, which detects all species. Enriched through incubation, samples will have microbial DNA that can anneal to specific primers with fluorescent probes on them. When hybridized to the target sequences of DNA, these probes fluoresce. If present, fluorescence intensity increases with each round of DNA amplificationas the number of probes increases. In the absence of the target Aspergillus DNA, no fluorescence will be detected. Cannabis samples that are positive will be further speciated and confirmed through confirmatory rtPCR by Genesig kit for the presence of Aspergillus *flavus, niger, and/or fumigatus.* Positive hemp samples will be speciated and confirmed through rtPCR by Genesig for the presence of A. *flavus, niger, fumigatus, and/or terreus*. Presence of 1 or more CFU per gram constitutes failure of any sample.

5.6.6 Bioluminescent Enumeration of Aerobic Bacteria

Aerobic bacterial counts may be performed for any type of agricultural sample using the Hygiena *MicroSnap Total kit, which is a* rapid bioluminogenic detection method. This is a two-step process with an enrichment device containing biomarker-rich media and a detection device that contains bioluminogenic reagents in which biomarkers produced by bacteria are measured using a small portable luminometer. Bacteria numbers increase during incubation in enrichment media and they generate biomarkers as they use up a special enrichment media for incubation. The greater the number

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of bacteria in the sample, the higher the biomarker concentration and the more light that is emitted. Therefore, light output is directly proportional to concentration of bacteria present and quantifiable. Samples are read by a luminometer and total aerobic bacteria are reported based upon the relative fluorescent units (RFUs) generated. Pass or fail criteria are based on the client's predetermined action level and will be reported as such on the certificate of analysis. AOAC Certificate #: 031501

5.6.7 and 5.6.8 Bioluminescent Enumeration of Escherichia Coli and Coliforms

General *E. Coli* and Coliform bacteria counts may be performed for any type of agricultural sample using the Hygiena *MicroSnap E Coli*/Coliform *kit, which is a r*apid bioluminogenic detection method. This is a two-step process with an enrichment device containing biomarker-rich media and a detection device that contains bioluminogenic reagents in which biomarkers produced by bacteria are measured using a small portable luminometer. Bacteria numbers increase during incubation in enrichment media and they generate biomarkers as they use up a special enrichment media for incubation. The greater the number of bacteria in the sample, the higher the biomarker concentration and the more light that is emitted. Therefore, light output is directly proportional to concentration of bacteria present and quantifiable. Samples are read by a luminometer and total number of e. coli or coliform bacteria are reported based upon the relative fluorescent units (RFUs) generated by their specific MicroSnap *e. coli* or *MicroSnap Coliform* step 2 devices. Pass or fail criteria are based on the client's predetermined action level and will be reported as such on the certificate of analysis. AOAC Certificate #: 071302

5.6.9 Colorimetric Identification of Listeria

Environmental samples from production facilities may be tested for the presence of the Listeria species in general using the Hygiena InSite *Listeria* self-contained colorimetric detection device. The sample swabs will be collected from food contact surfaces and food processing equipment after cleaning to detect the presence or absence of *Listeria species*. The swab collection device contains chromogenic liquid media that is formulated with antibiotics, growth enhancers, and color-changing compounds specific to *Listeria spp*. After incubation, the colorimetric liquid changes from yellow to black in the presence of any Listeria species. Color change is presumptive positive and may be confirmed by other means of identification upon request. AOAC Certificate #: 061802

5.6.10 Chromogenic Media Identification of E. Coli

General *e. coli* may be identified in agricultural samples using the RAPID' e. *coli* 2 (REC2) agar kit. This is a type of chromogenic media used for direct enumeration of coliforms and *E. coli* in food used for the detection of *E. Coli and other coliform spp.* using a selective media. The principle of the medium relies on simultaneous detection of 2 enzymatic activities: β-D-Glucuronidase (GLUC) and β-D-Galactosidase (GAL). The medium contains 2 chromogenic substrates. One substrate, specific to GAL, leads to blue coloration of colonies positive for this enzyme. The other substrate, specific to GLUC, leads to pink coloration of colonies positive for this enzyme. Coliforms (GAL+/GLUC-) form blue to green colonies, E. coli (GAL+/GLUC+) form violet to pink colonies. After incubation, colonies may be identified based on color and are counted by direct visualization. Pass or fail criteria are based on the client's predetermined action level and will be reported as such on the certificate of analysis. AOAC Certificate #: 050601

5.6.11 Chromogenic Media Identification of Salmonella

Salmonella may be identified in agricultural samples using the Bio-Rad RAPID' *Salmonella* agar kit. This is a type of chromogenic media used for the detection and direct enumeration of *salmonella spp.* by selective media differentiation of the target organisms-*Salmonella spp.* (including *lactose-positive Salmonella, S. typhi and S. partyphi* serotypes) from other members of the *family Enterobacteriaceae.* The RAPID' Salmonella capsule and RAPID' Salmonella supplement are a selective supplement for addition to Buffered Peptone Water for carrying out selective *Salmonella* enrichment. The formulation enables highly effective *Salmonella* growth, even

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when stressed, while limiting the growth of interfering flora. After incubation, colonies may be identified based on color and can be counted by direct visualization. Identification of these species of Salmonella will be reported as presumptive positive for this method on the certificate of analysis. Presence will be confirmed by PCR detection using colonies from the chromogenic plate. AOAC Certificate #: 050701

5.6.12 Chromogenic Media Identification of Listeria

Listeria spp. and Listeria monocytogenes may be identified in food products and in environmental samples by chromogenic media method. The principle of RAPID' L. mono agar relies on the specific detection of phosphatidylinositol phospholipase C (PIPLC) activity of L mono. and the inability of this species to metabolize xylose. The only species of Listeria to demonstrate PIPLC activity are L. monocytogenes and L. ivanovii. L monocytogenes forms characteristic blue (pale blue, grey-blue to dark blue) colonies without a yellow halo. The addition of xylose to the media allows for differentiation of these two species since L monocytogenes does not metabolize xylose. L ivanovii will produce blue-green colonies with a distinct yellow halo based on its ability to metabolize xylose where L monocytogenes colonies will lack this halo. The other non-pathogenic species of Listeria, namely L innocua, L welshimeri, L seeligeri and L grayi do not exhibit PIPLC activity and produce white colonies on RAPID' L. Mono agar. L welshimeri will metabolize xylose and will therefore produce a white colony with a yellow halo. The selective solution contained in the medium permits more or less complete inhibition of the majority of the interfering flora, including, gram positive and gram-negative bacteria, yeasts, and molds. Identification of these species of Listeria will be reported as presumptive positive for this method on the certificate of analysis. Presence will be confirmed by PCR detection using colonies from the chromogenic plate. AOAC Certificate #: 030406

5.6.13 Total Yeast and Mold Detection and Enumeration by Culture

L&S Laboratory tests for mold and yeast in agricultural samples and foods using the 3M™ Petrifilm Rapid Yeast and Mold Count (RYM) Plate, which is a sample-ready-culture-medium system that contains nutrients supplemented with antibiotics, a cold-water-soluble gelling agent, and an indicator system that facilitates yeast and mold enumeration. The plates are incubated for 48 hours and are then read automatically using a 3M Petrifilm Plate Reader or manually with touch pressure and a digital counter. Plates containing greater than 150 colonies will be recorded as too numerous to count (TNTC). The action level is recommended to be set at >10,000 colony forming units (CFUs) per gram, but customers may set appropriate action levels by sample type. The certificate of analysis will either reflect the pass/fail status based on preset criteria or will be reported as their numerical value with no pass/fail if no preset criteria have been set. AOAC Certificate #121301

5.6.14 Total Aerobic Bacterial Counts by Culture

L&S Laboratory may test agricultural samples and foods for total aerobic bacteria using the 3M™ Petrifilm Rapid Aerobic Count (RAC) Plate, which is a sample-ready-culture-medium system that contains nutrients supplemented with antibiotics, a cold-water-soluble gelling agent, and an indicator system that facilitates aerobic bacteria enumeration. The plates are incubated for 24 hours and are then read automatically using a 3M Petrifilm Plate Reader or manually with touch pressure and a digital counter. Plates containing greater than 300 colonies will be recorded as too numerous to count (TNTC) colony forming units (CFUs) per gram. Customers may set appropriate action levels by sample type. The certificate of analysis will either reflect the pass/fail status based on preset criteria or will be reported as their numerical value with no pass/fail if no preset criteria have been set. AOAC Certificate #121403

5.6.15 *e. coli* Count by Culture

General *e. coli* may be identified in agricultural samples using the 3M™ Petrifilm Rapid e. coli Count (REC) Plate, which is a sample-ready-culture-medium system that contains nutrients supplemented with antibiotics, a cold-water-soluble gelling agent, and an indicator system that facilitates *e. coli* enumeration. The plates are incubated for 24 hours and are then read automatically using a 3M Petrifilm Plate Reader or manually with touch pressure and a digital counter. Plates containing greater

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than 100 colonies will be recorded as too numerous to count (TNTC). Customers may set appropriate action levels by sample type. The certificate of analysis will either reflect the pass/fail status based on preset criteria or will be reported as their numerical value with no pass/fail if no preset criteria have been set. AOAC Certificate #: 051801

5.6.16 Mycotoxin Analysis

L&S Laboratory will analyze agricultural and food samples for mycotoxins upon request using the AgraQuant® Total Mycotoxin and Ochratoxin ELISA testing kits. This is a direct competitive enzyme-linked immunosorbent assays (ELISA). Sample extract is added to antibody coated wells and incubated. Samples are washed and incubated a second time with a substrate that creates color change. The color intensity is inversely proportionate to the mycotoxin concentration, which is read by a microwell reader. The laboratory will report that the sample "passed" mycotoxins testing if the concentration of mycotoxins is below the following action levels:

- The total of aflatoxin B1, B2, G1, and G2: < 20 µg/kg of substance; and
- Ochratoxin A: < 20 µg/kg of substance.

AOAC Certificate#: 110701

5.7 Chemistry Sample Preparation

For complex food matrices, topical products, and so forth, extra sample preparation may be necessary. Flash chromatography will be utilized in complicated sample preparation. Flash chromatography enables the use of a higher separation column, so fractionation with high purity can be achieved even for small quantities of target compounds, such as impurities in the sample. Samples may then be analyzed using traditional liquid chromatography.

5.7.1 Cannabinoid Analysis

The Alaska Marijuana Control Board requires potency testing of all marijuana and marijuana-infused products for five required cannabinoids at minimum—CBDA, CBD, CBN, THCA, and d9-THC. Additionally, the Department of Agriculture Hemp Program requires identification and quantitation of d9-THC, CBD, CBDA, CBC, CBGA, CBG, CBDV, and THCA. Therefore, Land & Seas Laboratory will provide cannabinoid profiling and potency for multiple cannabinoids, to include, but not limited to, the following:

CBGA, CBG, CDBA, CBDV, CBD, CBC, THCA, d9-THC, d8-THC, THCV, THCVA, and CBN

Cannabinoids will be extracted with solvents and/or flash chromatography, and then analyzed by high-performance liquid chromatography with photodiode array or ultraviolet detection. Results for flower samples will be reported as a percentage of weight and as a concentration (mg/g) at dry weight using the moisture content of the sample at the time of analysis. Topical products will be reported as total potential THC per unit with the concentration of CBDA, CBD, and CBN. Edible products will be reported as total potential THC per unit and total potential THC per package, as well as concentration of CBDA, CBD, and CBN. Edible products will also be evaluated for homogeneity by testing every piece of a retail package and no piece may vary more than +/-20% of the target concentration per unit for either THC or CBD without failing acceptance criteria.

5.7.2 Determination of Residual Solvent Contamination

Residual solvents from processes designed to concentrate cannabinoids will be identified and quantified using gas chromatograph for separation and then quantified by mass spectrometer detection for levels of solvent which exceed the state of Alaska's current action levels. The full evaporation technique (FET) is utilized to optimize the analysis. FET sample preparation involves the use of a very small sample amount, which effectively creates a single-phase gas system in the headspace vial by heating it to release volatiles in the sample and then sampling the resultant gas from the vial. Acceptance criteria will be based on the type of sample. In marijuana samples being analyzed to satisfy AMCO requirements for retail products, the following constitutes failure criteria:

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≥800 Parts Per Million (PPM) for Butanes, ≥500 PPM for Heptanes, ≥1 PPM for Benzene, ≥1 PPM for Toluene, ≥10 PPM for Hexane, and ≥1 PPM for Total Xylenes (m,p,o, xylenes)

For hemp samples being analyzed to satisfy Dept. Of Agriculture requirements for retail products, the following levels constitute failure criteria:

Acetone ≥500 ppm, Benzene ≥0 ppm, Butanes ≥500 ppm, Chloroform ≥1 ppm, Cyclohexane ≥500 ppm, Heptane ≥500 ppm, Hexane ≥0 ppm, Isopropanol ≥500 ppm, Methanol ≥500 ppm, Pentanes ≥500 ppm, Propane ≥500 ppm, Toluene ≥0 ppm, Xylenes (m, p, o-xylenes) ≥ 217 ppm

Analysis for solvents not required by regulation will be reported in terms of concentration only, rather than being given a pass/fail designation.

5.7.3 Terpene Analysis

Flower and concentrate samples may be analyzed for terpene content and concentration. The following terepenes will be qualified and quantified:

Caryophyllene oxide, 1,8-Cineole (Eucalyptol), alpha-Bisabolol, Camphene, delta-3-Carene, beta-Caryophyllene, Geraniol, Guaiol, alpha-Humulene, p-Isopropyltoluene (p-cymene), Isopulegol, d-Limonene, Linalool, beta-Myrcene, Nerolidol, Nerolidol 2, Ocimene isomers, Beta-ocymene, alpha-Pinene, beta-Pinene, alpha-Terpinene, gamma-Terpinene, and Terpinolene

Samples will be extracted using a liquid solvent, injected via autosampler to a gas chromatograph for separation, and then quantified and further identified by a mass spectrometer detector. Terpene concentration by weight or percentage by weight for flower samples will be reported on dry weight basis using the moisture content of the sample at the time of analysis.

5.7.4 Detection of Pesticide Contamination

Agricultural or food samples will be tested for pesticides upon request. Samples will be analyzed by using liquid chromatography for separation and then quantified by mass spectrometry (LC-MS). In LCMS components in a mixture are ionized and separated on the basis of their mass/charge ratio. The separated ions are then directed to an electron multiplier detector, which identifies and quantifies each ion. The following pesticides will be identified:

Abamectin, Azoxystrobin, Bifenazate, Bifenthrin, Daminozide, DDVP (Dichlorvos), Etoxazole, Imazalil, Imidacloprid, Malathion, Myclobutanil, Paclobutrazol, Permethrin, Spinosad, Spiromesifen, Tebuconazole, and Thiacloprid.

Customers may determine action levels that constitute pass/fail. If no criteria have been preset, concentration of analytes will be reported in concentration per dry weight for flower using the moisture content at the time of analysis or in concentration in ppm for cannabinoid concentrates and foods.

Pass/fail criteria for hemp samples is as follows:

Abamectin < 0.07ppm
Azoxystrobin < 0.02 ppm
Bifenazate < 0.02 ppm
Etoxazole < 0.01 ppm
Imazalil < 0.04 ppm
Imidacloprid < 0.02 ppm
Malathion < 0.05 ppm
Myclobutanil < 0.04 ppm
Permethrin < 0.04 ppm
Spinosad < 0.06 ppm

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Spiromesifen < 0.03 ppm
Tebuconazole < 0.01 ppm

5.7.5 Detection of Heavy Metals Contamination

Agricultural samples, foods, and water may be tested for their contamination of heavy metals, such as Cadmium, Arsenic, Lead, and Mercury, both upon request and per regulation for the state of Alaska's Department of Agriculture hemp program. Analyses are done by atomic absorption spectroscopy (AAS), which is a spectroanalytical method for the quantitative determination of chemical elements using the absorption of optical radiation (light) by free atoms in the gaseous state. Failure criteria for hemp is outlined in 11 AAC 40.640 as follows:

Flower/Products for Inhalation
Cadmium – Max Limit: ¸0.02 ppm
Arsenic – Max Limit: < 0.02 ppm
Lead – Max Limit: < 0.5 ppm
Mercury – Max Limit: <0.1 ppm)

Topical and/or Transdermal
Cadmium – Max Limit < 3 ppm
Arsenic – Max Limit: < 3 ppm
Mercury – Max Limit < 1 ppm
Lead – Max Limit: < 10 ppm

Oral, rectal, or vaginal administration
Cadmium – Max Limit: < 0.5 ppm
Arsenic – Max Limit: < 1.5 ppm
Lead- Max Limit: < 1 ppm
Mercury – Max Limit: < 1.5 ppm

Jessica Alexander, Lab Director

DEC 1, 2019
Date

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