

Analytical Test Report

Client: Mayflower Medicinals 89 October Hill Road Holliston, MA 01746	Final Report MCR-S20-08238 Rev.01.00	Laboratory: MCR Labs 85 Speen St. Lower Level Framingham, MA 01701 508-872-6666
	Report Date: 19 FEBRUARY 2020	
	METRC Tag: 1A40A010000A94000002696	

Sample ID #	Sample Name	Batch	Matrix	Date Received	Date Tested	Sample Weight
MCR-S20-08238	SA-CO2-.5G-H-53-B-1	CO2-.5G-H-53-PK-1	Concentrate	13 February 2020	14-18 February 2020	6 g

The test results presented in this report are accurate, complete, and compliant with the MCR Labs quality control criteria.

Authorization



Jonathan Wani
 Director, Client
 Relations and Reporting



This test is accredited under the laboratory's ISO/IEC 17025 accreditation issued by ANSI-ASQ National Accreditation Board. Refer to certificate and scope of accreditation AT-1853

Case Narrative:

This sample was received by MCR Labs from a RMD agent in a sealed container. For cannabinoids, the sample was extracted using organic solvents and analyzed via High Performance Liquid Chromatography (HPLC-UV). For microbiological contaminants, the sample was prepared using cultured enrichments, was incubated for set periods of time, and analyzed via an automated Most Probable Number (MPN) methodology. For pathogenic bacterial contaminants, the sample was analyzed via a quantitative Polymerase Chain Reaction (qPCR). Pathogenic screen includes all six STEC stains, including O157. For mycotoxin contaminants, the sample was extracted using organic solvents and analyzed via enzyme-linked immunosorbent assay (ELISA). For heavy metals, the sample was extracted using nitric acid and microwave digestion, and analyzed via Inductively Coupled Plasma Mass Spectrometry (ICP-MS). For volatile organic compounds, the sample was analyzed via Gas Chromatography – Flame Ionization Detection with Headspace Autosampler (GC-FID) using full evaporative technique. For vitamin E acetate, the sample was extracted using organic solvents and analyzed via High Performance Liquid Chromatography (HPLC-UV). The collected data was compared to data collected from analytical reference standards at known concentrations. Values reported below quantitation limits are for informational purposes.

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Requested Testing:

Test	Code	Procedure	Analytes Tested	Disposition
Cannabinoid Profile	CN	MCR-TM-0011	CBDVA, CBDV, CBDA, CBGA, CBG, CBD, THCV, THCVA, CBCV, CBN, CBNA, D9-THC, D8-THC, CBL, THCA, CBC, CBCA, CBLA, CBT	N/A
Microbiological Screen	MB	MCR-TM-0006 MCR-TM-0012	Bacterial (Total Aerobic, Total Coliform, Bile-Tolerant Gram Negative), Yeast and Mold, Pathogenic (E. coli, Salmonella)	Pass
Mycotoxin Screen	MY	MCR-TM-0015	Aflatoxin B1, Aflatoxin B2, Aflatoxin G1, Aflatoxin G2, Ochratoxin A	Pass
Heavy Metals Screen	HM	MCR-TM-0008	Arsenic (As), Cadmium (Cd), Lead (Pb), Mercury (Hg)	Pass
Volatile Organics Screen	VC	MCR-TM-0007	Ethanol	Pass
Vitamin E Acetate	VEA	MCR-TM-0014	Vitamin E Acetate	N/A

Cannabinoid Profile [MCR-TM-0011] Analyst: VM/DW/TB/GF Test Date: 17 Feb 20
 The sample was analyzed for cannabinoids via High Performance Liquid Chromatography (HPLC-UV). The collected data was compared to data collected from certified analytical reference standards at known concentrations.

Table 1 - S20-08238 SA-CO2-.5G-H-53-B-1 CO2-.5G-H-53-PK-1 Concentrate Cannabinoid Testing

Analyte	Cannabinoid	Conc. (weight %)	Conc. (mg/g)	LOQ (weight %)	LOD (weight %)
CBDVA	Cannabidivarinic acid	ND	ND	0.10%	0.01%
CBDV	Cannabidivarin	ND	ND	0.10%	0.02%
CBDA	Cannabidiolic acid	ND	ND	0.10%	0.02%
CBGA	Cannabigerolic acid	ND	ND	0.10%	0.02%
CBG	Cannabigerol	1.7%	17.0	0.10%	0.04%
CBD	Cannabidiol	0.2%	2.0	0.10%	0.03%
THCV	Tetrahydrocannabivarin	0.5%	5.0	0.10%	0.01%
THCVA	Tetrahydrocannabivarinic acid	ND	ND	0.10%	0.03%
CBCV	Cannabichromevarin	ND	ND	0.10%	0.01%
CBN	Cannabinol	0.5%	5.0	0.10%	0.01%
CBNA	Cannabinolic acid	ND	ND	0.10%	0.01%
Δ9-THC	Δ9-Tetrahydrocannabinol	83.5%	835.0	0.10%	0.02%
Δ8-THC	Δ8-Tetrahydrocannabinol	ND	ND	0.10%	0.02%
CBL	Cannabicyclol	ND	ND	0.10%	0.02%
THCA	Tetrahydrocannabinolic acid	0.9%	9.0	0.10%	0.01%
CBC	Cannabichromene	1.7%	17.0	0.10%	0.01%
CBCA	Cannabichromenic acid	ND	ND	0.50%	0.05%
CBLA	Cannabicyclolic acid	ND	ND	0.10%	0.01%
CBT	Cannabicitran	ND	ND	0.10%	0.02%

Note: There are no limits established by the Massachusetts Department of Public Health for cannabinoid concentrations. ND = Not Detected. LOQ = Limit of Quantitation. LOD = Limit of Detection.

Microbiological Screen [MCR-TM-0006] Analyst: RA/DW Test Date: 14-17 Feb 20
 The sample was analyzed for microbiological contaminants via an automated Most Probable Number (MPN) methodology with cultured enrichments.

Table 2 - S20-08238 SA-CO2-.5G-H-53-B-1 CO2-.5G-H-53-PK-1 Concentrate Microbiological Testing

Test ID	Test Analysis	Results	Unit	Limits	Disposition
20-08238-AC	Total Viable Aerobic Bacteria	<100	CFU/g	10 ⁴ CFU/g	Pass
20-08238-YM	Total Yeast and Mold	<100	CFU/g	10 ³ CFU/g	Pass
20-08238-CC	Total Coliforms	<100	CFU/g	10 ² CFU/g	Pass
20-08238-EB	Total Bile-Tolerant Gram Negative Bacteria	<100	CFU/g	10 ² CFU/g	Pass

Note: CFU = colony forming unit. Testing limits established by the Massachusetts Department of Public Health, Protocol for Sampling and Analysis of Finished Medical Marijuana Products and Marijuana-Infused Products for Massachusetts Registered Medical Marijuana Dispensaries, Exhibit 6.

Pathogenic Bacterial Screen [MCR-TM-0012] Analyst: DW Test Date: 17 Feb 20
 The sample was analyzed for pathogenic bacterial contamination via a quantitative Polymerase Chain Reaction (qPCR).

Table 3 - S20-08238 SA-CO2-.5G-H-53-B-1 CO2-.5G-H-53-PK-1 Concentrate Pathogen Testing

Test ID	Test Analysis	Result	Units	Limits	Disposition
S20-08238-ECPT	STEC	Not Detected	N/A	Not Detected in 1g	Pass
S20-08238-SPT	Salmonella	Not Detected	N/A	Not Detected in 1g	Pass

Note: Testing limits established by the Massachusetts Department of Public Health, Protocol for Sampling and Analysis of Finished Medical Marijuana Products and Marijuana-Infused Products for Massachusetts Registered Medical Marijuana Dispensaries, Exhibit 6. NT = Not tested. STEC = Shiga Toxin producing E. coli

Mycotoxin Screen [MCR-TM-0015] Analyst: RA Test Date: 15 Feb 20

The sample was extracted using organic solvents and analyzed via enzyme-linked immunosorbent assay (ELISA). The collected data was compared to data collected from analytical reference standard at known concentrations.

Table 4 - S20-08238 SA-CO2-.5G-H-53-B-1 CO2-.5G-H-53-PK-1 Concentrate Mycotoxin Testing

Test ID	Test Analysis	Result	LOD (ppb)	LOQ (ppb)	Limits (ppb)	Disposition
S20-08238-MY	Mycotoxin	Not Detected	10	10	20	Pass

Note: ND = Not Detected; LOD = Limit of Detection; LOQ = Limit of Quantitation; ppb = part per billion. Testing limits established by the Massachusetts Department of Public Health, Protocol for Sampling and Analysis of Finished Medical Marijuana Products and Marijuana-Infused Products for Massachusetts Registered Medical Marijuana Dispensaries, Exhibit 6.

Heavy Metals Screen [MCR-TM-0008] Analyst: VM Test Date: 17 Feb 20

The sample was analyzed via Inductively Coupled Plasma Mass Spectrometry. The collected data was compared to data collected from certified analytical reference standards at known concentrations.

Table 5 - S20-08238 SA-CO2-.5G-H-53-B-1 CO2-.5G-H-53-PK-1 Concentrate Heavy Metal Testing

Test ID	Test Analysis	Result, ppb	LOD ppb	LOQ ppb	Limits ppb	Disposition	Limits (ingestion) ppb	Disposition (ingestion)
S20-08238-HM	Arsenic	ND	40.4	122.3	200	Pass	1500	Pass
S20-08238-HM	Cadmium	ND	37.5	113.7	200	Pass	500	Pass
S20-08238-HM	Mercury	ND	29.0	87.9	100	Pass	1500	Pass
S20-08238-HM	Lead	ND	32.1	97.2	500	Pass	1000	Pass

Note: ND = Not Detected; LOD = Limit of Detection; LOQ = Limit of Quantitation; BQL = Below Quantitation Limit; ppb = part per billion. Testing limits established by the Massachusetts Department of Public Health, Protocol for Sampling and Analysis of Finished Medical Marijuana Products and Marijuana-Infused Products for Massachusetts Registered Medical Marijuana Dispensaries, Exhibit 4.

VC Screen [PCR-TM-0004] *Analyst: TP/VB/JW/RA/TB/DO* *Test Date: 16 Feb 20*

The sample was analyzed via Gas Chromatography – Flame Ionization Detection with Headspace Autosampler. The collected data was compared to data collected from certified analytical reference standards at known concentrations.

Table 6 - S20-08238 SA-CO2-.5G-H-53-B-1 CO2-.5G-H-53-PK-1 Concentrate Residual Solvent Testing

Test ID	Analyte	Result (ppm)	LOD (ppm)	LOQ (ppm)	Limits (ppm)	*USP Result (ppm)	Disposition
S20-08238-VC	Ethanol	ND	703	2343	5000	ND	Pass

Note: ND = Not Detected; LOD = Limit of Detection; LOQ = Limit of Quantitation; BQL = Below Quantitation Limit; ppm = part per million. Testing limits established by the Massachusetts Department of Public Health, Protocol for Sampling and Analysis of Finished Medical Marijuana Products and Marijuana-Infused Products for Massachusetts Registered Medical Marijuana Dispensaries, Exhibit 7. The uncertainty budget for propane is 0.12 ppm; n-Butane - 0.10 ppm; Ethanol - 0.15 ppm. *USP 34 General Notices 7.20.

Vitamin E Acetate Screen [MCR-TM-0014] *Analyst: TC/AL* *Test Date: 18 Feb 20*

The sample was analyzed via High Performance Liquid Chromatography (HPLC-UV).

Table 7 - S20-08238 SA-CO2-.5G-H-53-B-1 CO2-.5G-H-53-PK-1 Concentrate Vitamin E Acetate Testing

Test ID	Test Analysis	Result (weight %)	LOD (weight %)	LOQ (weight %)
S20-08238-VEA	Vitamin E Acetate	ND	0.1	0.2

Note: There are no limits established by the Massachusetts Department of Public Health for Vitamin E Acetate concentrations. ND = Not Detected. LOQ = Limit of Quantitation. LOD = Limit of Detection.

QA/QC

Cannabinoid Profile [MCR-TM-0011] Analyst: RF/AL Test Date: 17 Feb 20

The sample data for certified reference standards was collected at known concentrations of cannabinoids in solution.

QC-0.025 mg/mL 19 cannabinoid multi-component 1/15/2020

ID	Cannabinoid	Nominal Prep Conc (mg/mL)	Measured Conc. (mg/mL)	Recovery (%)
CBDVA	Cannabidivarinic acid	0.025	0.025	100%
CBDV	Cannabidivarin	0.025	0.025	98%
CBDA	Cannabidiolic acid	0.025	0.026	102%
CBGA	Cannabigerolic acid	0.025	0.025	100%
CBG	Cannabigerol	0.025	0.024	94%
CBD	Cannabidiol	0.025	0.025	98%
THCV	Tetrahydrocannabivarin	0.025	0.024	96%
THCVA	Tetrahydrocannabivarinic acid	0.025	0.025	100%
CBCV	Cannabichromevarin	0.025	0.024	96%
CBN	Cannabinol	0.025	0.024	96%
CBNA	Cannabinolic acid	0.025	0.026	104%
Δ9-THC	Δ9-Tetrahydrocannabinol	0.025	0.024	94%
Δ8-THC	Δ8-Tetrahydrocannabinol	0.025	0.025	98%
CBL	Cannabicyclol	0.025	0.026	104%
THCA	Tetrahydrocannabinolic acid	0.025	0.026	102%
CBC	Cannabichromene	0.025	0.024	96%
CBCA	Cannabichromenic acid	0.025	0.025	100%
CBLA	Cannabicyclic acid	0.025	0.027	108%
CBT	Cannabicitran	0.025	0.025	100%

Criteria for successful analysis is QC recovery to be ≤20% above or below nominal.

Microbiological Screen [MCR-TM-0006] Analyst: TJS Test Date: 11 Feb 20

Quality control checks are performed to confirm that the equipment used for reading incubated microbiological cultures, which are done at various concentrations, are working correctly and that the fluorescence readings are accurate. QC checks are performed within 30 days of the recorded measurements.

Date of most recent QC check: Tempo QC 02/11/2020
 Status: Pass

Pathogenic Bacterial Screen [MCR-TM-0012]

Analyst: DW

Test Date: 17 Feb 20

Quality control checks are performed to validate the equipment used for reading incubated pathogenic bacterial cultures. QC checks are run with every analysis.

Date	QC Check	Pathogen	Result	Disposition
2/17/2020	Control (+)	STEC	Positive	Pass
2/17/2020	Control (-)	STEC	Negative	Pass
2/17/2020	Control (+)	Salmonella	Positive	Pass
2/17/2020	Control (-)	Salmonella	Negative	Pass

Mycotoxin Screen [MCR-TM-0015]

Analyst: RA

Test Date: 15 Feb 20

Solutions were spiked with toxin reference materials at given concentrations and tested for toxin presence.

QC Sample	Result	Disposition
Negative Control	Negative	Pass
Positive Control	Positive	Pass

Heavy Metals Screen [MCR-TM-0008]

Analyst: VM

Test Date: 17 Feb 20

QC samples were prepared at target concentrations and injected at the end of the sequence.

Analyte	Prepared analyte concentration, ppb	Analyte measured, ppb	QC recovery (%)
Arsenic (As)	1.00	0.94	94%
Cadmium (Cd)	1.00	0.99	99%
Mercury (Hg)	0.50	0.45	90%
Lead (Pb)	3.00	3.16	105%

Criteria for successful analysis is QC recovery to be ≤20% above or below nominal.

VC Screen [MCR-TM-0007]

Analyst: JW

Test Date: 14 Feb 20

A QC sample was prepared at a known concentration and injected.

Analyte	µg analyte detected	Nominal analyte, µg	Recovery
Ethanol	224	199	113%

Criteria for successful analysis is QC recovery to be ≤30% above or below nominal.

Vitamin E Acetate Screen [MCR-TM-0014]

Analyst: RF

Test Date: 18 Feb 20

The sample data for reference standards was collected for a known concentration of Vitamin E Acetate in solution.

Analyte	Nominal Prep Conc (mg/mL)	Measured Conc. (mg/mL)	QC recovery (%)
Vitamin E Acetate	0.125	0.117	94%

Criteria for successful analysis is QC recovery to be ≤20% above or below nominal.

END OF REPORT