

September 23<sup>rd</sup>, 2019

Nicholas Warrrender 12715 210<sup>th</sup> Ave Bristol, WI 53104

### **RE: Product stability study after temperature challenge**

Dear Mr. Warrender:

As requested, ProVerde Laboratories has performed a temperature based stability study, with samples being tested for cannabinoid concentrations before and after a 24 hour temperature challenge at either 41°F or 95°F.

### **Methods**

Sample aliquots were collected from two sample bottles, and tested for cannabinoid concentrations. The bottles with the remainder of the sample were placed in a temperature controlled environment, one at 41°F and one at 95°F. After storage for 24 hours under those temperatures, samples were again collected and tested for cannabinoid concentrations.

Cannabinoid analysis was performed using UPLC, with a photodiode array detector. Cannabinoid signals were verified by retention time in addition to UV spectral matching against a spectral library for reference compounds. Quantitation was performed against a calibration curve prepared from certified cannabinoid reference materials.

### Analysis Specific Comments

The concentrations of cannabinoids were compared between samples before and after each temperature challenge (Table 1 below). No significant variability of cannabinoid concentrations were observed.

Tuble 1 - Calification percentage before and after temperature challenge										
SampleNO	ReferenceNo	D9-THC	CBD	CBDA	CBDV	CBG	CBC	CBN	THCA	CBGA
65478	Lifted Liquids WS Sample 1: Initial	0	21.51	0	0.07	0.14	0	0	0	0
65479	Lifted Liquids WS Sample 1: After 41F hold, 24 hours	0	21.29	0	0.07	0.15	0	0	0	0
65480	Lifted Liquids WS Sample 2: Initial	0	21.41	0	0.08	0.15	0	0	0	0
65481	Lifted Liquids WS Sample 2: After 95F hold, 24 hours	0	21.99	0	0.08	0.15	0	0	0	0

Table 1 – Cannabinoid percentage before and after temperature challenge



# **ANALYTICAL DATA REPORT**

### **Conclusion**

No evidence of degradation for the samples was observed. Standard deviation for CBD across all samples was less than 1.5% In addition to this study, a longer accelerated study has been initiated, which will include the monitoring of cannabinoid signals over the course of 6 weeks, evaluating at multiple time points, while the sample is submitted to accelerated aging conditions at 40°C.

Please contact me at 617-221-3358 or chris.hudalla@proverdelabs.com if you have any questions regarding the results or would like ProVerde Laboratories to conduct any analyses.

Sincerely,

stopken Hudalla

Dr. Christopher Hudalla Founder, Chief Science Officer



The client sample was analyzed for plant-based cannabinoids by Liquid Chromatography (LC). The collected data was compared to data collected for certified reference standards at known concentrations.

#### 65478-CN

ID	Weight %	Concentration (mg/mL)			
D9-THC	ND	ND			
THCV	ND	ND			
CBD	21.51	210.13			
CBDV	0.07	0.72			
CBG	0.14	1.33			
CBC	ND	ND			
CBN	ND	ND			
THCA	ND	ND			
CBDA	ND	ND			
CBGA	ND	ND			
D8-THC	ND	ND			
exo-THC	ND	ND			
Total	21.72	212.19	0%	Cannabinoids (wt%)	21.5%
Max THC	ND	ND			
Max CBD	21.51	210.13			

#### Limit of Quantitation (LOQ) = 0.01 wt%

Max THC (and Max CBD) are calculated values for total cannabinoids after heating, assuming complete decarboxylation of the acid to the neutral form. It is calculated based on the weight loss of the acid group during decarboxylation: Max THC =  $(0.877 \times THCA) + THC$ . This calculation does not include other cannabinoid isomers (eg. D8-THC and exo-THC). ND = None detected above the limits of detection (LOD), which is half of LOQ.

# **END OF REPORT**



The client sample was analyzed for plant-based cannabinoids by Liquid Chromatography (LC). The collected data was compared to data collected for certified reference standards at known concentrations. Data collected after 24 hour storage at  $41^{\circ}F(5^{\circ}C)$ .

#### 65479-CN

ID	Weight %	Concentration (mg/mL)			
D9-THC	ND	ND			
THCV	ND	ND			
CBD	21.29	207.77			
CBDV	0.07	0.73			
CBG	0.15	1.46			
CBC	ND	ND			
CBN	ND	ND			
THCA	ND	ND			
CBDA	ND	ND			
CBGA	ND	ND			
D8-THC	ND	ND			
exo-THC	ND	ND			
Total	21.51	209.95	0%	Cannabinoids (wt%)	21.3%
Max THC	ND	ND			
Max CBD	21.29	207.77			

#### Limit of Quantitation (LOQ) = 0.01 wt%

Max THC (and Max CBD) are calculated values for total cannabinoids after heating, assuming complete decarboxylation of the acid to the neutral form. It is calculated based on the weight loss of the acid group during decarboxylation: Max THC =  $(0.877 \times THCA) + THC$ . This calculation does not include other cannabinoid isomers (eg. D8-THC and exo-THC). ND = None detected above the limits of detection (LOD), which is half of LOQ.

# **END OF REPORT**



The client sample was analyzed for plant-based cannabinoids by Liquid Chromatography (LC). The collected data was compared to data collected for certified reference standards at known concentrations.

#### 65480-CN

ID	Weight %	Concentration (mg/mL)			
D9-THC	ND	ND			
THCV	ND	ND			
CBD	21.41	209.84			
CBDV	0.08	0.74			
CBG	0.15	1.44			
CBC	ND	ND			
CBN	ND	ND			
THCA	ND	ND			
CBDA	ND	ND			
CBGA	ND	ND			
D8-THC	ND	ND			
exo-THC	ND	ND			
Total	21.63	212.02	0%	Cannabinoids (wt%)	21.4%
Max THC	ND	ND			
Max CBD	21.41	209.84			

#### Limit of Quantitation (LOQ) = 0.01 wt%

Max THC (and Max CBD) are calculated values for total cannabinoids after heating, assuming complete decarboxylation of the acid to the neutral form. It is calculated based on the weight loss of the acid group during decarboxylation: Max THC =  $(0.877 \times THCA) + THC$ . This calculation does not include other cannabinoid isomers (eg. D8-THC and exo-THC). ND = None detected above the limits of detection (LOD), which is half of LOQ.

# **END OF REPORT**



The client sample was analyzed for plant-based cannabinoids by Liquid Chromatography (LC). The collected data was compared to data collected for certified reference standards at known concentrations. Data collected after 24 hour storage at 95°F (35°C).

#### 65481-CN

ID	Weight %	Concentration (mg/mL)			
D9-THC	ND	ND			
THCV	ND	ND			
CBD	21.99	215.24			
CBDV	0.08	0.74			
CBG	0.15	1.44			
CBC	ND	ND			
CBN	ND	ND			
THCA	ND	ND			
CBDA	ND	ND			
CBGA	ND	ND			
D8-THC	ND	ND			
exo-THC	ND	ND			
Total	22.21	217.42	0%	Cannabinoids (wt%)	22.0%
Max THC	ND	ND			
Max CBD	21.99	215.24			

#### Limit of Quantitation (LOQ) = 0.01 wt%

Max THC (and Max CBD) are calculated values for total cannabinoids after heating, assuming complete decarboxylation of the acid to the neutral form. It is calculated based on the weight loss of the acid group during decarboxylation: Max THC =  $(0.877 \times THCA) + THC$ . This calculation does not include other cannabinoid isomers (eg. D8-THC and exo-THC). ND = None detected above the limits of detection (LOD), which is half of LOQ.

# **END OF REPORT**