



Hemp Industry Interlaboratory Program

Summary Report #5-Summer 2024

Introduction to the Hemp Program

Key for Web Summary Report

Analysis Analysis Name

Hemp: Cannabinoids

9601	Δ 9-Tetrahydrocannabinol (THC)
9602	Δ 9-Tetrahydrocannabinolic Acid (THCA)
9603	Cannabidiol (CBD)
9604	Cannabidiolic Acid (CBDA)
9605	Total Δ 9-Tetrahydrocannabinol (THC)
9606	Total Cannabidiol (CBD)
9607	Cannabichromene (CBC)
9612	Cannabichromenic (CBCA)

Hemp: Heavy Metals

9631	Arsenic (As)
9632	Cadmium (Cd)
9633	Lead (Pb)
9634	Mercury (Hg)

Hemp: Terpenes

9661	Myrcene or β -Myrcene
9662	Limonene
9663	α -Pinene
9664	Humulene
9665	β -Caryophyllene
9666	Caryophyllene Oxide
9667	α -Bisabolol

Hemp: Moisture Content

9691	Moisture Content
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About the Hemp Interlaboratory Program

This interlaboratory testing program is administered and operated by Collaborative Testing Services, Inc. (CTS). The purpose of the program was to evaluate laboratory performance and assess the performance of the industry. Participants can expect to receive results that are clear, concise, and easy to understand and act upon. This program allows laboratories to compare periodically the level and uniformity of their testing with that of other laboratories in the Hemp industry.

A two-sample set of ground hemp plant material of differing THC concentration were provided to the participants. Sample materials used in this program adhere to the legal requirement of having THC concentration of 0.3% or below. In each report, there is a summary of the statistics for the analysis and a graphical representation of the data for each test. Also shown are notes concerning specific laboratory results, as well as significant findings related to other testing variation. Please refer to the section *Key for Web Summary Report* for an explanation of terms and guidelines to interpreting the results.

About CTS

Founded in 1971, Collaborative Testing Services, Inc. (CTS) is a privately - owned company that specializes in interlaboratory tests for a variety of industries including ALP, rubber, plastics, fasteners and metals, containerboard, paper, hemp, wine, and color, as well as proficiency tests for forensic laboratories. All of the tests are designed to assist organizations in achieving and maintaining quality assurance objectives. Labs from the U.S., as well as more than 100 countries, currently participate in the CTS programs.

For further information concerning this report contact:

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Key for Web Summary Report (Page 1 of 2)

WebCode	Assigned laboratory identification number (temporary) used to ensure lab confidentiality while permitting a lab to locate its data in the Hemp Web Summary Report published on the CTS web site. The WebCode for each analysis can be found in the Performance Analysis Report mailed to each participant.
Lab Mean	The average of the test results obtained by the participant.
Grand Mean	The average of the LAB MEANS for all included participants. Laboratories flagged with an X or an M (see DATA FLAG column) are excluded from the GRAND MEAN.
Difference from Grand Mean	The difference of the LAB MEAN from the GRAND MEAN.
Between-Lab Standard Deviation	An indication of the precision of measurement between the laboratories. The greater the spread of the LAB MEANS about the GRAND MEAN, the larger the BETWEEN-LAB STANDARD DEVIATION (and vice versa).
Comparative Performance Value	An indication of how well a laboratory's results agree with the other participants. The CPV is a ratio indicating the number of standard deviations from the GRAND MEAN. The closer a laboratory's COMPARATIVE PERFORMANCE VALUE is to zero, the more consistent its results are with the other participants' data (and vice versa). The critical value for each CPV will vary depending on the number of labs participating in a test.
Data Flag	DATA FLAGS are assigned based on the simultaneous analysis of both samples tested. Refer to the following chart for an explanation of each symbol:

<u>DATA FLAG</u>	<u>STATISTICALLY INCLUDED/EXCLUDED</u>	<u>ACTION REQUIRED</u>
*	INCLUDED	CAUTION - Review testing procedure and monitor future results. Results fall outside 95% ellipse but within a 99% ellipse that is calculated but not drawn.
X	EXCLUDED	STOP - Immediate review of data and/or testing procedure is required. Results fall outside the 99% ellipse. See specific notes following each table for more information on why the data is excluded.
M	EXCLUDED	PROCEED - Lab was unable to report data for one sample. Or lab was unable to report numeric data for both samples.

Graph - For each laboratory, the LAB MEAN for the first sample (x-axis) is plotted against the LAB MEAN for the second sample (y-axis) with each point representing a laboratory. The horizontal and vertical cross-hairs are the GRAND MEANS for each sample. When 20 or more laboratories are in the statistics, an ellipse is also drawn so that 95% of the time a randomly selected laboratory will be included inside the ellipse. Plotted data flags are explained above.

Common Problems Highlighted in Footnotes

1. **Extreme data** - The laboratory's results for one or both samples are so inconsistent with those of the other participants that the lab mean(s) fall outside the plot. The participant is advised to immediately review his data and/or testing procedure.
2. **Systematic bias** - The laboratory's results are either consistently high or low for both samples when compared to the other participants (the plotted point falls near the top or bottom of the ellipse). This indicates that the participant is performing the test with a constant bias. Causes of systematic errors include improper calibration, the particular make/model of equipment or a modification to the testing procedure.
3. **Inconsistency in testing between samples/sample sets** - The laboratory's results indicate that there are differences in the way the two samples tested (the plotted point falls to the side of the ellipse). This type of error may be attributed to the analyst deviating from the procedure when testing one of the samples or a material interaction occurrence with the instrument or room conditions. The inconsistency is reflected in the CPVs for the two samples, such as a +1.5 CPV for sample A and a -2.2 CPV for sample B. CTS also will specify if the laboratory's data for one sample are high/low compared to the other participants. If this inconsistency is slight, the lab's plotted point will be an * that falls on the edge of the ellipse.
4. **Inconsistency in testing within a sample** - The laboratory's within-lab standard deviation for a specified sample is high when compared to the other participants, often causing the lab's plotted point to fall outside of the ellipse.

Labs flagged with an * are not typically included in the footnotes of a data table. These labs may locate their position in the control ellipse and use the definitions above to help identify the type of testing error. An * should serve as a caution flag, a "yellow light", to a lab. If this error is repeated in future rounds, a lab may need to stop and review its testing procedures. The initial data flag is not cause for alarm. Interlaboratory tests conducted at regular intervals permit a lab to recognize trends in testing.



CTS Hemp Industry Interlaboratory Testing Program

Report #5
Summer 2024

Analysis 9601

Δ9-Tetrahydrocannabinol (THC)

Percent (%)

WebCode	Data Flag	Sample CB09			Sample CB10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
39RCNK		0.0850	-0.0172	-0.47	0.0400	0.0072	1.21
4U7JDJ		0.0750	-0.0272	-0.75	0.0300	-0.0028	-0.47
9XTRNF		0.0950	-0.0072	-0.20	0.0300	-0.0028	-0.47
EFNB6A		0.0903	-0.0119	-0.33	0.0259	-0.0069	-1.15
XKYWXQ		0.1655	0.0633	1.75	0.0380	0.0052	0.88

		Summary Statistics	
Grand Means	0.1022 Percent (%)	0.0328	Percent (%)
Std Dev Btwn Labs	0.0362 Percent (%)	0.0060	Percent (%)
Statistics based on 5 of 5 reporting participants			

Hemp tested: CB09: The Grand

CB10: Oregon White

Reporting Limit

No labs reported data indicating the Detection or Quantification limit

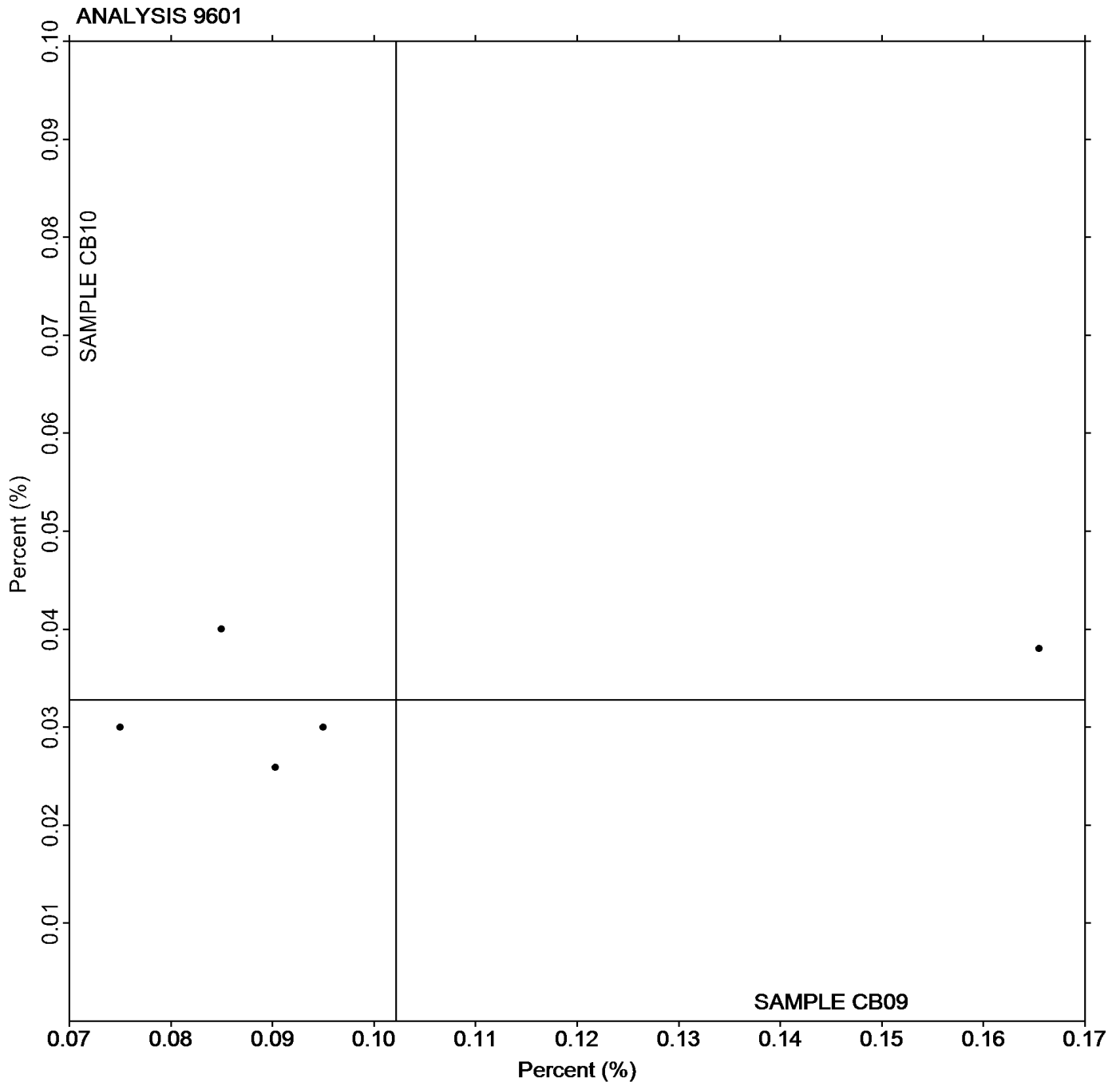


Analysis 9601

$\Delta 9$ -Tetrahydrocannabinol (THC)

Percent (%)

Grand Mean Sample CB09: 0.10 Percent (%) Grand Mean Sample CB10: 0.03 Percent (%)



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



CTS Hemp Industry Interlaboratory Testing Program

Report #5
Summer 2024

Analysis 9602

Δ9-Tetrahydrocannabinolic Acid (THCA)

Percent (%)

WebCode	Data Flag	Sample CB09			Sample CB10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A		Numeric data not provided, see Reporting Limit section			Numeric data not provided, see Reporting Limit section		
XKYWXQ		0.4235			0.1160		

Reporting Limit

EFNB6A <0.0033

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.



No graph is available due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program
Analysis 9603
Cannabidiol (CBD)
mg/g

Report #5
Summer 2024

WebCode	Data Flag	Sample CB09			Sample CB10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A		12.0000			12.6000		
JK9RM4		10.9000			8.4500		

Reporting Limit

No labs reported data indicating the Detection or Quantification limit

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.



**Analysis 9603
Cannabidiol (CBD)
mg/g**

No graph is available due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program

Report #5
Summer 2024

Analysis 9604

Cannabidiolic Acid (CBDA)

mg/g

WebCode	Data Flag	Sample CB09			Sample CB10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A		43.0000			3.0800		
JK9RM4		40.8500			1.7000		

Reporting Limit

No labs reported data indicating the Detection or Quantification limit

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.



No graph is available due to the low population of participants reporting numeric data.



Analysis 9605

**Total Δ9-Tetrahydrocannabinol (THC)
Percent (%)**

Total THC values were within acceptable levels on a certificate of analysis reviewed by CTS for the materials distributed in this cycle.

WebCode	Data Flag	Sample CB09			Sample CB10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A		0.0903	-0.1742	-0.73	0.0329	-0.0377	-0.64
GXWCR8		0.1668	-0.0977	-0.41	0.0400	-0.0307	-0.52
LC6PB3	M	0.1274	-0.1371	-0.57	Numeric data not provided, see Reporting Limit section		
XKYWXQ		0.5365	0.2720	1.14	0.1390	0.0684	1.15

Summary Statistics			
Grand Means	0.2645	Percent (%)	0.0706 Percent (%)
Std Dev Btwn Labs	0.2386	Percent (%)	0.0593 Percent (%)
Statistics based on 3 of 4 reporting participants			

Hemp tested: CB09: The Grand

CB10: Oregon White

Reporting Limit

No labs reported data indicating the Detection or Quantification limit

Comments on Assigned Data Flags for Test #9605

LC6PB3 (M) - Participant did not submit data for sample .

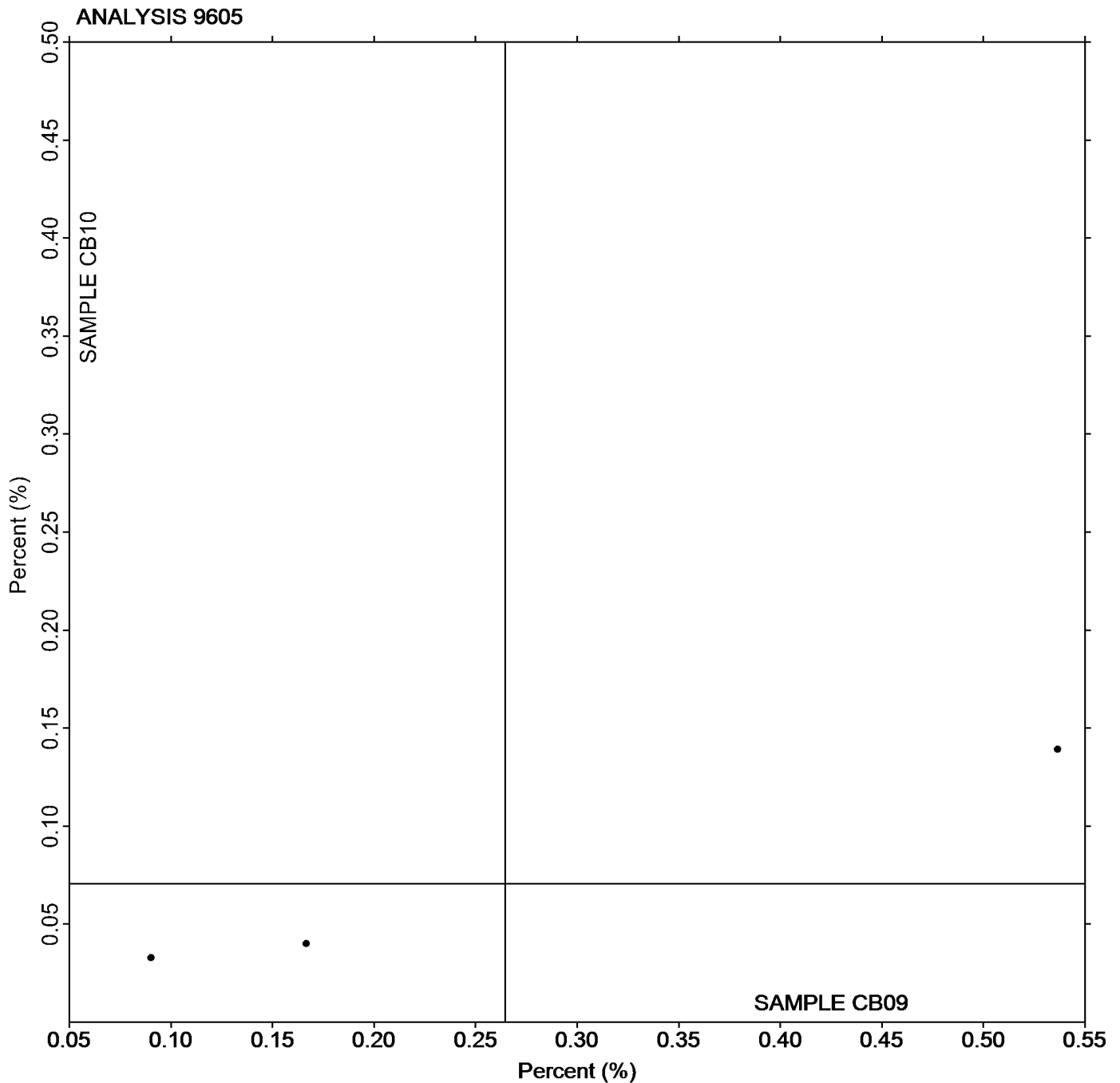


Analysis 9605

Total Δ9-Tetrahydrocannabinol (THC)
Percent (%)

Total THC values were within acceptable levels on a certificate of analysis reviewed by CTS for the materials distributed in this cycle.

Grand Mean Sample CB09: 0.26 Percent (%) Grand Mean Sample CB10: 0.07 Percent (%)



If fewer than 20 laboratories are included in an analysis, a control ellipse will not be drawn on the two-sample plot.



CTS Hemp Industry Interlaboratory Testing Program

Report #5
Summer 2024

Analysis 9606

Total Cannabidiol (CBD)

mg/g

WebCode	Data Flag	Sample CB09			Sample CB10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A		12.0000			12.6000		
JK9RM4		46.6000			9.9000		

Reporting Limit

No labs reported data indicating the Detection or Quantification limit

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program

**Report #5
Summer 2024**

Analysis 9606

Total Cannabidiol (CBD)

mg/g

No graph is available due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program
Analysis 9607
Cannabichromene (CBC)
Percent (%)

Report #5
Summer 2024

WebCode	Data Flag	Sample CB09			Sample CB10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A		0.0759			0.1950		

Reporting Limit

No labs reported data indicating the Detection or Quantification limit

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.



No graph is available due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program
Analysis 9612
Cannabichromenic (CBCA)
Percent (%)

Report #5
Summer 2024

WebCode	Data Flag	Sample CB09			Sample CB10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A		0.2120			0.0267		

Reporting Limit

No labs reported data indicating the Detection or Quantification limit

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.



No graph is available due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program
Analysis 9631
Arsenic (As)
ug/g

Report #5
Summer 2024

WebCode	Data Flag	Sample HM09			Sample HM10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
E8DAJ9		0.7596			0.7239		
EFNB6A		0.1020			0.0851		

Reporting Limit

No labs reported data indicating the Detection or Quantification limit

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.



No graph is available due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program
Analysis 9632
Cadmium (Cd)
ug/g

Report #5
Summer 2024

WebCode	Data Flag	Sample HM09			Sample HM10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A		0.3050			0.2870		

Reporting Limit

No labs reported data indicating the Detection or Quantification limit

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program

**Report #5
Summer 2024**

Analysis 9632

Cadmium (Cd)

ug/g

No graph is available due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program

Report #5
Summer 2024

Analysis 9633

Lead (Pb)

ug/g

WebCode	Data Flag	Sample HM09			Sample HM10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
E8DAJ9		1.9389			1.6175		
EFNB6A		0.5880			0.5410		

Reporting Limit

No labs reported data indicating the Detection or Quantification limit

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.



No graph is available due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program
Analysis 9634
Mercury (Hg)
ug/g

Report #5
Summer 2024

WebCode	Data Flag	Sample HM09			Sample HM10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A		0.0135			0.0115		

Reporting Limit

No labs reported data indicating the Detection or Quantification limit

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program

**Report #5
Summer 2024**

Analysis 9634

Mercury (Hg)

ug/g

No graph is available due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program

Report #5
Summer 2024

Analysis 9661

Myrcene or β -Myrcene

mg/g

WebCode	Data Flag	Sample TP09			Sample TP10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A	M	0.1900			Numeric data not provided, see Reporting Limit section		

Reporting Limit

EFNB6A <100

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.

Comments on Assigned Data Flags for Test #9661

EFNB6A (M) - Participant did not submit data for sample TP09.



No graph is available due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program

Report #5
Summer 2024

Analysis 9662

Limonene

mg/g

WebCode	Data Flag	Sample TP09			Sample TP10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A		Numeric data not provided, see Reporting Limit section			Numeric data not provided, see Reporting Limit section		

Reporting Limit

EFNB6A <100

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.



No graph is available due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program

Report #5
Summer 2024

Analysis 9663

α-Pinene

mg/g

WebCode	Data Flag	Sample TP09			Sample TP10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A		Numeric data not provided, see Reporting Limit section			Numeric data not provided, see Reporting Limit section		

Reporting Limit

EFNB6A <100

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.



No graph is available due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program

Report #5
Summer 2024

Analysis 9664

Humulene

mg/g

WebCode	Data Flag	Sample TP09			Sample TP10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A	M	Numeric data not provided, see Reporting Limit section			0.3100		

Reporting Limit

EFNB6A <100

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.

Comments on Assigned Data Flags for Test #9664

EFNB6A (M) - Participant did not submit data for sample .



No graph is available due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program

Report #5
Summer 2024

Analysis 9665 β-Caryophyllene mg/g

WebCode	Data Flag	Sample TP09			Sample TP10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A		0.1100			0.8600		

Reporting Limit

No labs reported data indicating the Detection or Quantification limit

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.



**Analysis 9665
β-Caryophyllene
mg/g**

No graph is available due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program

Report #5
Summer 2024

Analysis 9666

Caryophyllene Oxide

mg/g

WebCode	Data Flag	Sample TP09			Sample TP10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A	M	Numeric data not provided, see Reporting Limit section			0.2300		

Reporting Limit

EFNB6A <100

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.

Comments on Assigned Data Flags for Test #9666

EFNB6A (M) - Participant did not submit data for sample .



No graph is available due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program
Analysis 9667
α-Bisabolol
mg/g

Report #5
Summer 2024

WebCode	Data Flag	Sample TP09			Sample TP10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A		0.4800			0.5200		

Reporting Limit

No labs reported data indicating the Detection or Quantification limit

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.



No graph is available due to the low population of participants reporting numeric data.



CTS Hemp Industry Interlaboratory Testing Program
Analysis 9691
Moisture Content
Percent (%)

Report #5
Summer 2024

WebCode	Data Flag	Sample MC09			Sample MC10		
		Lab Mean	Diff from Grand Mean	CPV	Lab Mean	Diff from Grand Mean	CPV
EFNB6A		12.0000			10.3000		

Reporting Limit

No labs reported data indicating the Detection or Quantification limit

Please note: Statistical Analysis has not been provided due to the low population of participants reporting numeric data.



**Analysis 9691
Moisture Content
Percent (%)**

No graph is available due to the low population of participants reporting numeric data.

-End of Report-