

# AOAC INTERNATIONAL

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## **CH01 Hemp Proficiency Testing Program**

Cannabinoids, Terpenes, Moisture, and Heavy Metals

### **PT Round # - Pilot**

Shipment Date 05-02-22

Preliminary Report Issue Date: 07-27-22

AOAC INTERNATIONAL  
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Rockville, MD 20850



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This report has been authorized by  
Shane Flynn, Senior Director  
Proficiency Testing

*Shane P Flynn*

## 1.0 Introduction

Test materials for the CH01 Hemp Proficiency Testing Program were shipped to participants on May 2, 2022. Each laboratory was given a site identification number in order to maintain confidentiality. Instructions for Analysis and instructions on how to report results within the AOAC Proficiency Testing website were provided to the participants. Participants were instructed to analyze the test materials according to procedures routinely used in their laboratories. Results were to be submitted to AOAC by May 24, 2022. This is a preliminary report and is subject to change after feedback is received. A final Report will be issued once feedback has been received and addressed.

## 2.0 Test Design

The matrix selected for the CH01-Pilot round was a sativa-dominant hybrid and indoor grown hemp flower. The matrix was prepared according to SOPs which included the use of a clean stainless-steel grinder and medium-sized screen to create an “oregano”-sized ground hemp flower. After grinding, the material was homogenized thoroughly by mixing.

## 3.0 Homogeneity

Three samples were analyzed in duplicate to provide assurance that samples were homogeneous within and across the samples prepared. The criterion for assessing homogeneity was that no differences be identified among the homogeneity samples based on an Analysis of Variance (ANOVA) F test at a significance level of 0.01. All evaluated naturally occurring sample components met this criterion. In addition, within and across sample standard deviations were calculated along with other summary statistics. See Appendix B for homogeneity data.

Samples were prepared and shipped by the following Laboratory:



8329 North Mopac Expressway

Austin, TX 78759

#### 4.0 Preparation of Test Materials

Sample 1-Blue contains naturally occurring components and was evaluated for cannabinoids, terpenes, heavy metals, and moisture content. Sample 1-Blue samples were prepared to provide a naturally occurring set of compounds and contaminants within the matrix for analysis. No analytes were spiked onto the hemp flower matrix. Samples were created and stored within a 5 x 8 x 2.5" silver barrier bag. Each barrier bag was labeled prior to filling. For the Sample 1-Blue samples, 10 g +/- 0.1 g of homogenized ground hemp matrix was weighed into a tared weigh boat and added to the barrier bag before closing and heat sealing the bags with an impulse sealer. Once sealed, samples were kept in a secondary sealed plastic bag in the refrigerator (2-8°C) until shipment.

#### 5.0 Calculation and Interpretation of z-scores:

For each individual result, a z-score was calculated as follows:

$$z = \frac{(x - X)}{s}$$

where:

z = the z score (standard score)

x = the reported value of analyte

X = the assigned value, the best estimate of the "true" Concentration

s = the estimate of variation (standard deviation)

The robust procedure from *ISO 13528:2015 (E), Statistical methods for use in proficiency testing by interlaboratory comparisons* is used in processing the result data. Robust statistics relies on medians rather than means and uses more information from the central than from the outlying observations.

The assigned value used was based on the median of four expert laboratories that met specific criteria. The standard deviation used was 20% of the assigned value, the SD represents the use of the Horowitz equation. Measurement uncertainty (standard uncertainty of the assigned value) has also been provided.

The following interpretation of z-scores for each individual test result is provided in of ISO/ IEC Standard 17043:2010(E) Conformity Assessment - General requirements for proficiency testing schemes common examples of application of z-scores:

| <u>Result Obtained</u> | <u>Rating</u>  |
|------------------------|----------------|
| $ z  \leq 2$           | Satisfactory   |
| $2 <  z  < 3$          | Questionable   |
| $ z  \geq 3$           | Unsatisfactory |

Calculations for z scores based on the data presented in the results sheet might be slightly different from the z-scores assigned by AOAC. The z-scores assigned by AOAC are based on calculations that may use more significant figures than is possible to display on the results sheet.

## 6.0 General Discussion of Results

Confidentiality of results will be maintained by issuing site identification codes to the participating laboratories. Results in the reports will only be identified by the site identification code. Z-scores have been provided for the following groups of analytes in Sample 1-Blue: Cannabinoids, Terpenes, Moisture. Z-scores are not provided for Heavy Metals because the amount of heavy metals in the sample was < LOD of the method reported by the test material provider lab for Arsenic, Cadmium, Lead, and < LOQ for Mercury. In addition, some tests had fewer participants submitting results because some laboratories do not routinely perform all analyses.

Appendix A is included in this report to show participating laboratories' reported result, method used, assigned value, standard deviation, median, min, max, z-score, and measurement uncertainty. If a component was included in the analysis by the laboratory but it was < LOD it is represented as "Result Reported as < (or below LOD)". If there was not enough statistical data because that analyte was not found in the sample or there were not enough data points from expert labs to determine the assigned value or calculate z-scores, there is the Note "Not Used for Evaluation" for that analyte. Each laboratory should use the information in Appendix A to determine areas of improvement.

If a participant would like to appeal against the assessment of their performance in this proficiency testing scheme please contact staff at [Cannabis\\_PT@AOAC.org](mailto:Cannabis_PT@AOAC.org)

***Individual laboratory results are in Appendix A***

**Appendix A**  
**Cannabis-Hemp Testing Results 05/02/2022**  
**Display of All Reported Results and z-Scores (When Applicable)**  
**Site=XXXXXX**

| Site | Analyte              | Test                                 | Sample | Method       | Reported Result | Number of Reported Results | Min Result | Mean Result | Median Result | Max Result | Assigned Value | Target sd | Z-Score | Standard Uncertainty of the Assigned Value | Note                    |
|------|----------------------|--------------------------------------|--------|--------------|-----------------|----------------------------|------------|-------------|---------------|------------|----------------|-----------|---------|--|-------------------------|
|      | Cannabinoids Test-1  | % Cannabidiol (CBD)                  | Blue   | AOAC 2018.10 | 0.4270          | 17                         | 0.044      | 0.428       | 0.423         | 0.688      | 0.45033        | 0.09007   | -0.259  | 0.027                                      |                         |
|      | Cannabinoids Test-2  | % Cannabidiolic acid (CBDA)          | Blue   | AOAC 2018.10 | 10.6000         | 17                         | 9.500      | 11.118      | 11.157        | 12.570     | 10.85000       | 2.17000   | -0.115  | 0.658                                      |                         |
|      | Cannabinoids Test-3  | % Cannabinol (CBN)                   | Blue   | AOAC 2018.10 | 0.0030          | 17                         | 0.000      | 0.050       | 0.010         | 0.340      |                |           |         |  | Not Used for Evaluation |
|      | Cannabinoids Test-4  | % Cannabigerol (CBG)                 | Blue   | AOAC 2018.10 | 0.0450          | 17                         | 0.000      | 0.058       | 0.030         | 0.340      |                |           |         |  | Not Used for Evaluation |
|      | Cannabinoids Test-5  | % Δ9-tetrahydrocannabinol (Δ9-THC)   | Blue   | AOAC 2018.10 | 0.0550          | 18                         | 0.000      | 0.072       | 0.056         | 0.340      | 0.05520        | 0.01104   | -0.018  | 0.003                                      |                         |
|      | Cannabinoids Test-6  | % Tetrahydrocannabinolic acid (THCA) | Blue   | AOAC 2018.10 | 0.4190          | 18                         | 0.018      | 0.430       | 0.439         | 0.520      | 0.44440        | 0.08888   | -0.286  | 0.026                                      |                         |
|      | Cannabinoids Test-7  | % Cannabichromene (CBC)              | Blue   | AOAC 2018.10 | 0.0340          | 17                         | 0.000      | 0.064       | 0.044         | 0.340      | 0.04083        | 0.00817   | -0.836  | 0.002                                      |                         |
|      | Cannabinoids Test-10 | % Cannabigerolic acid (CBGA)         | Blue   | AOAC 2018.10 | 0.1170          | 17                         | 0.000      | 0.132       | 0.119         | 0.340      | 0.15588        | 0.03118   | -1.247  | 0.009                                      |                         |
|      | Cannabinoids Test-11 | % Cannabidivarin (CBDV)              | Blue   | AOAC 2018.10 | < 0.0002        | 16                         | 0.000      | 0.072       | 0.023         | 0.340      |                |           |         |  | Not Used for Evaluation |
|      | Cannabinoids Test-12 | % Δ8-tetrahydrocannabinol (Δ8-THC)   | Blue   | AOAC 2018.10 | < 0.0002        | 11                         | 0.000      | 0.055       | 0.010         | 0.340      |                |           |         |  | Not Used for Evaluation |
|      | Cannabinoids Test-13 | % Tetrahydrocannabivarin (THCV)      | Blue   | AOAC 2018.10 | < 0.0004        | 15                         | 0.000      | 0.082       | 0.013         | 0.510      |                |           |         |  | Not Used for Evaluation |
|      | Terpenes Test-1      | % 3-carene                           | Blue   |              | < 0.0050        | 12                         | 0.000      | 0.008       | 0.004         | 0.020      |                |           |         |  | Not Used for Evaluation |
|      | Terpenes Test-2      | % Alpha-bisabolol                    | Blue   |              | 0.0240          | 12                         | 0.000      | 0.016       | 0.016         | 0.032      | 0.02063        | 0.00413   | 0.817   | 0.001                                      |                         |
|      | Terpenes Test-3      | % Alpha cedrene                      | Blue   |              | < 0.0050        | 7                          | 0.002      | 0.012       | 0.010         | 0.020      |                |           |         |  | Not Used for Evaluation |
|      | Terpenes Test-4      | % Alpha-humulene                     | Blue   |              | 0.0140          | 13                         | 0.011      | 0.022       | 0.019         | 0.063      | 0.01650        | 0.00330   | -0.758  | 0.001                                      |                         |
|      | Terpenes Test-5      | % Alpha-phellandrene                 | Blue   |              | < 0.0050        | 5                          | 0.005      | 0.015       | 0.020         | 0.020      |                |           |         |  | Not Used for Evaluation |
|      | Terpenes Test-6      | % Alpha-pinene                       | Blue   |              | 0.0390          | 13                         | 0.020      | 0.039       | 0.036         | 0.063      | 0.03680        | 0.00736   | 0.299   | 0.003                                      |                         |

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| Site | Analyte          | Test              | Sample | Method | Reported Result | Number of Reported Results | Min Result | Mean Result | Median Result | Max Result | Assigned Value | Target sd | Z-Score | Standard Uncertainty of the Assigned Value | Note                    |
|------|------------------|-------------------|--------|--------|-----------------|----------------------------|------------|-------------|---------------|------------|----------------|-----------|---------|--|-------------------------|
|      | Terpenes Test-7  | % Beta-myrcene    | Blue   |        | 0.1320          | 13                         | 0.063      | 0.163       | 0.167         | 0.225      | 0.15895        | 0.03179   | -0.848  | 0.011                                      |                         |
|      | Terpenes Test-8  | % Beta-ocimene    | Blue   |        | < 0.0050        | 10                         | 0.000      | 0.009       | 0.008         | 0.020      |                |           |         |  | Not Used for Evaluation |
|      | Terpenes Test-9  | % Beta-pinene     | Blue   |        | 0.0120          | 13                         | 0.001      | 0.049       | 0.019         | 0.306      | 0.01357        | 0.00271   | -0.578  | 0.001                                      |                         |
|      | Terpenes Test-10 | % Borneol         | Blue   |        | < 0.0050        | 10                         | 0.000      | 0.027       | 0.011         | 0.154      |                |           |         |  | Not Used for Evaluation |
|      | Terpenes Test-11 | % Camphene        | Blue   |        | < 0.0050        | 12                         | 0.000      | 0.008       | 0.004         | 0.020      |                |           |         |  | Not Used for Evaluation |
|      | Terpenes Test-12 | % Camphor         | Blue   |        | < 0.0050        | 9                          | 0.000      | 0.011       | 0.005         | 0.040      |                |           |         |  | Not Used for Evaluation |
|      | Terpenes Test-13 | % Cedrol          | Blue   |        | < 0.0050        | 8                          | 0.000      | 0.010       | 0.008         | 0.020      |                |           |         |  | Not Used for Evaluation |
|      | Terpenes Test-14 | % Eucalyptol      | Blue   |        | < 0.0050        | 11                         | 0.000      | 0.009       | 0.006         | 0.020      |                |           |         |  | Not Used for Evaluation |
|      | Terpenes Test-15 | % Fenchone        | Blue   |        | < 0.0050        | 8                          | 0.000      | 0.013       | 0.013         | 0.020      |                |           |         |  | Not Used for Evaluation |
|      | Terpenes Test-16 | % Fenchyl alcohol | Blue   |        | 0.0080          | 8                          | 0.005      | 0.014       | 0.013         | 0.020      |                |           |         |  | Not Used for Evaluation |
|      | Terpenes Test-17 | % Guaiol          | Blue   |        | 0.0220          | 13                         | 0.000      | 0.034       | 0.034         | 0.063      | 0.02920        | 0.00584   | -1.233  | 0.002                                      |                         |
|      | Terpenes Test-18 | % Isoborneol      | Blue   |        | < 0.0050        | 8                          | 0.000      | 0.010       | 0.008         | 0.020      |                |           |         |  | Not Used for Evaluation |
|      | Terpenes Test-19 | % Limonene        | Blue   |        | 0.0180          | 13                         | 0.011      | 0.024       | 0.023         | 0.063      | 0.01915        | 0.00383   | -0.300  | 0.001                                      |                         |
|      | Terpenes Test-20 | % Linalool        | Blue   |        | 0.0170          | 13                         | 0.012      | 0.022       | 0.020         | 0.063      | 0.01928        | 0.00386   | -0.591  | 0.001                                      |                         |
|      | Terpenes Test-21 | % Menthol         | Blue   |        | < 0.0050        | 8                          | 0.000      | 0.008       | 0.006         | 0.020      |                |           |         |  | Not Used for Evaluation |
|      | Terpenes Test-23 | % Pulegone        | Blue   |        | < 0.0050        | 9                          | 0.000      | 0.009       | 0.005         | 0.020      |                |           |         |  | Not Used for Evaluation |
|      | Terpenes Test-24 | % Terpineol       | Blue   |        | 0.0080          | 10                         | 0.002      | 0.013       | 0.013         | 0.020      | 0.00795        | 0.00159   | 0.031   | 0.001                                      |                         |



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|------|---------------------|---------------------|--------|--------------|-----------------|----------------------------|------------|-------------|---------------|------------|----------------|-----------|---------|--|-------------------------|
|      | Terpenes Test-25    | % Valecene          | Blue   |              | < 0.0050        | 7                          | 0.002      | 0.012       | 0.011         | 0.020      |                |           |         |  | Not Used for Evaluation |
|      | Terpenes Test-26    | % Y-terpinene       | Blue   |              | < 0.0050        | 11                         | 0.000      | 0.009       | 0.005         | 0.020      |                |           |         |  | Not Used for Evaluation |
|      | Moisture            | % Moisture          | Blue   |              | 6.4300          | 19                         | 6.430      | 11.990      | 11.900        | 15.950     | 11.27380       | 2.25476   | -2.148  | 0.647                                      |                         |
|      | Heavy Metals Test-1 | ug/kg Total Arsenic | Blue   | AOAC 2021.03 | < 58.9000       | 15                         | 0.005      | 680.009     | 20.000        | 9760.000   |                |           |         |  | Not Used for Evaluation |
|      | Heavy Metals Test-2 | ug/kg Total Cadmium | Blue   | AOAC 2021.03 | 10.2000         | 15                         | 0.004      | 575.800     | 11.300        | 8310.000   |                |           |         |  | Not Used for Evaluation |
|      | Heavy Metals Test-3 | ug/kg Total Lead    | Blue   | AOAC 2021.03 | < 85.2000       | 15                         | 0.010      | 999.333     | 24.000        | 14105.000  |                |           |         |  | Not Used for Evaluation |
|      | Heavy Metals Test-4 | ug/kg Total Mercury | Blue   | AOAC 2021.03 | 4.5600          | 15                         | 0.003      | 331.660     | 10.000        | 4655.000   |                |           |         |  | Not Used for Evaluation |

## Cannabinoids

Sample 1-Blue homogeneity samples were extracted and analyzed for seven cannabinoids using SOP for Sample Preparation and Analysis: Cannabinoid Potency and Profile by HPLC-UV. Five of the seven cannabinoids were detected and evaluated for homogeneity. Two aliquots of each sample were weighed and extracted with high-purity methanol. Samples were then vortexed thoroughly, centrifuged, diluted, and filtered before being analyzed against a seven-point calibration curve.

| Homogeneity Testing Results    |           |                               |             |                |      |             |             |        |
|--------------------------------|-----------|-------------------------------|-------------|----------------|------|-------------|-------------|--------|
| Compound                       |           | CBD                           | CBG         | CBDa           | CBN* | d9THC       | THCa        | d8THC* |
| Sample                         | Replicate | Measured Concentration (w/w%) |             |                |      |             |             |        |
| 1149-H                         | 1         | 0.44                          | 0.041       | 12.51          | <LOQ | 0.084       | 0.41        | <LOQ   |
| 1149-H                         | 2         | 0.46                          | 0.037       | 13.01          | <LOQ | 0.083       | 0.43        | <LOQ   |
| 2851-H                         | 1         | 0.45                          | 0.034       | 12.72          | <LOQ | 0.083       | 0.42        | <LOQ   |
| 2851-H                         | 2         | 0.46                          | 0.033       | 12.35          | <LOQ | 0.081       | 0.41        | <LOQ   |
| 2815-H                         | 1         | 0.46                          | 0.038       | 12.30          | <LOQ | 0.080       | 0.41        | <LOQ   |
| 2815-H                         | 2         | 0.39                          | 0.039       | 10.96          | <LOQ | 0.083       | 0.36        | <LOQ   |
| Summary Statistics             |           |                               |             |                |      |             |             |        |
| Mean (w/w%)                    |           | 0.45                          | 0.037       | 12.31          | --   | 0.08        | 0.41        | --     |
| Mean (mg/g)                    |           | 4.5                           | 0.370       | 123.1          | --   | 0.8         | 4.1         | --     |
| Within-Sample Std Dev using    |           | 0.027                         | 0.002       | 0.60           | --   | 0.0014      | 0.021       | --     |
| Between-Sample Std Dev using   |           | 0.026                         | 0.004       | 0.77           | --   | 0.0012      | 0.024       | --     |
| Total Std Deviation using w/w% |           | 0.04                          | 0.00        | 0.98           | --   | 0.00        | 0.03        | --     |
| Total CV using w/w%            |           | 8%                            | 12%         | 8%             | --   | 2%          | 8%          | --     |
| Min Measurement w/w% (mg/g)    |           | 0.39% (3.9)                   | 0.03% (0.3) | 10.96% (109.6) | --   | 0.08% (0.8) | 0.36% (3.6) | --     |
| Max Measurement w/w% (mg/g)    |           | 0.46% (4.6)                   | 0.04% (0.4) | 13.01% (130.1) | --   | 0.08% (0.8) | 0.43% (4.3) | --     |
|                                |           |                               |             |                |      |             |             |        |
| F Test P Value                 |           | 0.0948                        | 0.0192      | 0.0545         | --   | 0.1120      | 0.0668      | --     |
| Conclusion                     |           | Pass                          | Pass        | Pass           | --   | Pass        | Pass        | --     |

\* LOQ for CBN is 0.006% and LOQ for d8THC is 0.005%.

## Terpenes

Sample 1-Blue homogeneity samples were extracted and analyzed for 26 terpenes using SOP for sample Preparation and Analysis: Terpene Profile by GC/MS. Five terpenes were evaluated for homogeneity. Two aliquots of each sample were weighed and extracted using high- purity ethyl acetate. Samples were vortexed thoroughly, centrifuged, and filtered before being analyzed against a five-point calibration curve.

| Homogeneity Testing Results      |           |                               |              |              |               |              |
|----------------------------------|-----------|-------------------------------|--------------|--------------|---------------|--------------|
| Terpene                          |           | b-Myrcene                     | linalool     | terpineol    | caryophyllene | guaiol       |
| Sample                           | Replicate | Measured Concentration (w/w%) |              |              |               |              |
| 3530-H                           | 1         | 0.23                          | 0.019        | 0.013        | 0.057         | 0.042        |
| 3530-H                           | 2         | 0.22                          | 0.019        | 0.014        | 0.055         | 0.038        |
| 4014-H                           | 1         | 0.21                          | 0.019        | 0.014        | 0.053         | 0.040        |
| 4014-H                           | 2         | 0.25                          | 0.022        | 0.015        | 0.063         | 0.045        |
| 6200-H                           | 1         | 0.25                          | 0.022        | 0.015        | 0.063         | 0.039        |
| 6200-H                           | 2         | 0.27                          | 0.022        | 0.016        | 0.064         | 0.043        |
| Summary Statistics               |           |                               |              |              |               |              |
| Mean (w/w%)                      |           | 0.24                          | 0.021        | 0.014        | 0.059         | 0.041        |
| Mean (mg/g)                      |           | 2.37                          | 0.21         | 0.14         | 0.59          | 0.41         |
| Within-Sample Std Dev using w/w% |           | 0.018                         | 0.001        | 0.001        | 0.004         | 0.003        |
| Between Sample Std Dev using     |           | 0.025                         | 0.002        | 0.001        | 0.005         | 0.002        |
| Total Std Deviation using w/w%   |           | 0.031                         | 0.002        | 0.001        | 0.007         | 0.004        |
| Total CV using w/w%              |           | 13%                           | 10%          | 10%          | 11%           | 9%           |
| Min Measurement w/w% (mg/g)      |           | 0.21% (2.1)                   | 0.019% (0.2) | 0.013% (0.1) | 0.053% (0.5)  | 0.038% (0.4) |
| Max Measurement w/w% (mg/g)      |           | 0.27% (2.7)                   | 0.022% (0.2) | 0.016% (0.2) | 0.064% (0.6)  | 0.045% (0.5) |
|                                  |           |                               |              |              |               |              |
| F Test P Value                   |           | 0.0487                        | 0.0465       | 0.0361       | 0.0573        | 0.1535       |
| Conclusion                       |           | Pass                          | Pass         | Pass         | Pass          | Pass         |

## Heavy Metals

Sample 1-Blue homogeneity samples were evaluated for arsenic, cadmium, lead, and mercury by a third-party ISO 17025 accredited laboratory. SC Labs used a SOP for Elemental Analysis by ICP-MS to analyze Sample 1-Blue samples for heavy metal content. The entire sample was homogenized first at the lab before two aliquots of each sample were taken for analysis.

| Homogeneity Testing Results        |           |                                     |                      |                   |                      |
|------------------------------------|-----------|-------------------------------------|----------------------|-------------------|----------------------|
| Heavy Metals                       |           | arsenic <sup>a</sup>                | cadmium <sup>b</sup> | lead <sup>c</sup> | mercury <sup>d</sup> |
| Sample                             | Replicate | Measured Concentration (ug/kg, ppb) |                      |                   |                      |
| 1430-H-HM                          | 1         | <LOD                                | <LOD                 | <LOD              | <LOQ                 |
| 1430-H-HM                          | 2         | <LOD                                | <LOD                 | <LOD              | <LOQ                 |
| 4110-H-HM                          | 1         | <LOD                                | <LOD                 | <LOD              | <LOQ                 |
| 4110-H-HM                          | 2         | <LOD                                | <LOD                 | <LOD              | <LOQ                 |
| 4214-H-HM                          | 1         | <LOD                                | <LOD                 | <LOD              | <LOQ                 |
| 4214-H-HM                          | 2         | <LOD                                | <LOD                 | <LOD              | <LOQ                 |
| Summary Statistics                 |           |                                     |                      |                   |                      |
| Mean (ug/kg)                       |           | --                                  | --                   | --                | --                   |
| Within-Sample Std Dev using ug/kg  |           | --                                  | --                   | --                | --                   |
| Between Sample Std Dev using ug/kg |           | --                                  | --                   | --                | --                   |
| Total Std Deviation using ug/kg    |           | --                                  | --                   | --                | --                   |
| Total CV using ug/kg               |           | --                                  | --                   | --                | --                   |
| Min Measurement (ug/kg)            |           | --                                  | --                   | --                | --                   |
| Max Measurement (ug/kg)            |           | --                                  | --                   | --                | --                   |
| F Test P Value                     |           | --                                  | --                   | --                | --                   |
| Conclusion                         |           | N/A                                 | N/A                  | N/A               | N/A                  |

<sup>a</sup> LOD for arsenic is 20 ug/kg. LOQ for arsenic is 100 ug/kg.

<sup>b</sup> LOD for cadmium is 20 ug/kg. LOQ for cadmium is 50 ug/kg.

<sup>c</sup> LOD for lead is 40 ug/kg. LOQ for lead is 100 ug/kg.

<sup>d</sup> LOD for mercury is 2 ug/kg. LOQ for mercury is 10 ug/kg.

## Moisture

SC Labs also provided the homogeneity analysis for moisture content. Each sample in its entirety was homogenized before two aliquots of each sample were taken for analysis.

| Homogeneity Testing Results       |           |                               |
|-----------------------------------|-----------|-------------------------------|
| Moisture Content                  |           |                               |
| Sample                            | Replicate | Measured Moisture Content (%) |
| 1062-H-PM                         | 1         | 12.8                          |
| 1062-H-PM                         | 2         | 13.0                          |
| 1113-H-PM                         | 1         | 12.9                          |
| 1113-H-PM                         | 2         | 13.1                          |
| 1730-H-PM                         | 1         | 12.7                          |
| 1730-H-PM                         | 2         | 13.1                          |
| Summary Statistics                |           |                               |
| Mean (w/w %)                      |           | 12.9                          |
| Within-Sample Std Dev using w/w%  |           | 0.20                          |
| Between-Sample Std Dev using w/w% |           | 0.13                          |
| Total Std Deviation using w/w%    |           | 0.24                          |
| Total CV using w/w%               |           | 2%                            |
| Min Measurement (w/w%)            |           | 12.7                          |
| Max Measurement (w/w%)            |           | 13.1                          |
| F Test P Value                    |           | 0.1643                        |
| Conclusion                        |           | Pass                          |

## *Cannabis/Hemp Proficiency Testing Program*

### *Instructions for Analysis*

Enclosed are two dried hemp samples which are color coded based on the analysis to be performed. **Sample 1-BLUE (cannabinoids, terpenes, moisture, and heavy metals)** and **Sample 2-RED (pesticides)**. Both samples are the same Matrix. If needed, an aliquot of **Sample 1-BLUE** can be used as a baseline or matrix blank when evaluating **Sample 2-RED**, results for pesticide residues.

Each sample has its own Instructions for Analysis page. This page contains information such as sample size, analytes, units, etc. Instructions on how to report methods and results on the PT Website, along with Instructions for Analysis for each sample, will be available to laboratories once they access their PT Website account. An email notification with a link to the secure AOAC PT website, and the labs login and password, was provided to the participating laboratory's contact on record. Proficiency testing samples should be handled like routine samples. Participants can test for as many, or as few, of the analytes as needed. Labs have three weeks to analyze samples and report results. **When reporting, participants are to calculate each analysis on an as-received basis.** Percent moisture should not be factored into the calculation and should be reported as a separate analysis.

**RESULT DUE DATE: MAY 24, 2022**

**Verify Temperature Upon receipt:**

**Sample 1-BLUE** is considered satisfactory if received at  $\leq 10^{\circ}\text{C}$

**Sample 2-RED** is considered satisfactory if received at  $\leq 10^{\circ}\text{C}$ .

**Storage Temperatures:**

**Sample 1-BLUE** should be stored refrigerated at  $\leq 8^{\circ}\text{C}$  until analysis.

**Sample 2-RED** should be stored frozen at  $\leq -15^{\circ}\text{C}$  until analysis.

**Instructions for Analysis: Sample 1-BLUE** contains approximately 10.0g of dried Hemp matrix. There is approximately 2.5g for analysis of each of the following groups of analytes: Cannabinoids, Terpenes, Moisture, and Heavy Metals. A lab can test and report for as many, or as few, of the analytes as needed:

**Cannabinoids** - Report values from the single barrier bag provided on an **as-received basis**, in units of **mass %** for any of the analytes listed below.

- |  |  |
|--|--|
| 1. Cannabidiol (CBD) (CAS No. 13956-21-1)                  | 8. Cannabidivarinic acid (CBDVA) (31932-13-5)          |
| 2. Cannabidiolic acid (CBDA) (CAS No. 1244-58-2)           | 9. Cannabigerol (CBG) (25654-31-3)                     |
| 3. Cannabinol (CBN) (CAS No. 521-35-7)                     | 10. Cannabigerolic acid (CBGA) (25555-57-1)            |
| 4. Δ9-tetrahydrocannabinol (Δ9-THC) (CAS No. 1972-08-3)    | 11. Cannabidivarin (CBDV) (24274-48-4)                 |
| 5. Tetrahydrocannabinolic acid (THCA) (CAS No. 23978-85-0) | 12. Δ8-tetrahydrocannabinol (Δ8-THC) (5957-75-5)       |
| 6. Cannabichromene (CBC) (CAS No. 20675-51-8)              | 13. Tetrahydrocannabivarin (THCV) (28172-17-0)         |
| 7. Cannabichromenic acid (CBCA) (CAS No. 20408-52-0)       | 14. Tetrahydrocannabivarinic acid (THCVA) (39986-26-0) |

**Terpenes** - Report values from the single barrier bag provided on an **as-received basis**, in units of **mass %** for any of the analytes listed below.

- |   |                                      |   |                                   |
|---|--------------------------------------|---|-----------------------------------|
| 1. 3-carene (CAS No. 13466-78-9)          | 7. Beta-myrcene (CAS No. 123-35-3)   | 13. cedrol (CAS No. 77-53-2)            | 20. linalool (CAS No. 78-70-6)    |
| 2. Alpha-bisabolol (CAS No. 23089-26-1)   | 8. Beta-ocimene (CAS No. 13877-91-3) | 14. eucalyptol (CAS No. 470-82-6)       | 21. menthol (CAS No. 2216-51-5)   |
| 3. Alpha cedrene (CAS No. 469-61-4)       | 9. Beta-pinene (CAS No. 19902-08-0)  | 15. fenchone (CAS No. 7787-20-4)        | 22. o-cymene (CAS No. 527-84-4)   |
| 4. Alpha-humulene (CAS No. 6753-98-6)     | 10. borneol (CAS No. 464-45-9)       | 16. fenchyl alcohol (CAS No. 1632-73-1) | 23. pulegone (CAS No. 89-82-7)    |
| 5. Alpha-phellandrene (CAS No. 4221-98-1) | 11. camphene (CAS No. 79-92-5)       | 17. guaial (CAS No. 489-86-1)           | 24. terpineol (CAS No. 8000-41-7) |
| 6. Alpha-pinene (CAS No. 80-56-8)         | 12. camphor (CAS No. 464-48-2)       | 18. isoborneol (CAS No. 124-76-5)       | 25. valencene (CAS No. 4630-07-3) |
|   |                                      | 19. limonene (CAS No. 5989-27-5)        | 26. γ-terpinene (CAS No. 99-85-4) |

**Moisture** - Report values from the single barrier bag provided on an **as-received basis**, in units of % moisture.

**Heavy Metals** - Report values from the single barrier bag provided on an **as-received basis**, in units of **ug/kg** for any of the analytes listed below.

- |                                      |                          |                          |
|--------------------------------------|--------------------------|--------------------------|
| 1. total arsenic (CAS No. 7440-38-2) | 5. Antimony (744-36-0)   | 9. Nickel (7440-02-0)    |
| 2. total cadmium (CAS No. 7440-43-9) | 6. Barium (744-39-3)     | 10. Silver (7440-22-4)   |
| 3. total lead (CAS No. 7439-92-1)    | 7. Chromium (18540-29-9) | 11. Selenium (7782-49-2) |
| 4. total mercury (CAS No. 7439-97-6) | 8. Copper (744-50-8)     | 12. Zinc (7440-66-6)     |