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3 **Method Name:**

4 **Determination of Heavy Metals in Cannabis Containing**
5 **Beverages**

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7 **Approved by:**

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9 **Final version date:**

10 **Effective date:**

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12 **Intended Use:** Surveillance methods for routine monitoring

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14 **1. Applicability:**

15 Determination of total cadmium (CAS No. 7440-43-9), total arsenic (CAS No. 7440-
16 38-2), total lead (CAS No. 7439-92-1), and total mercury (CAS No. 7439-97-6) in
17 cannabis containing beverages. Additional elements in Table 1 may be included.
18 Beverage categories are listed in Table 2.

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21 **2. Analytical Technique:**

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23 Inductively Coupled Plasma based instrumentation or alternative methodology that
24 meets the performance requirements

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26 **3. Definitions:**

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28 **Limit of Quantitation (LOQ)**

29 The minimum concentration or mass of analyte in a given matrix that can be reported
30 as a quantitative result.

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32 **Repeatability**

33 Variation arising when all efforts are made to keep conditions constant by using the
34 same instrument and operator, and repeating during a short time period. Expressed
35 as the repeatability standard deviation (SD_r); or % repeatability relative standard
36 deviation (% RSD_r).

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38 **Reproducibility**

39 The standard deviation or relative standard deviation calculated from among-
40 laboratory data. Expressed as the reproducibility relative standard deviation (SD_R); or
41 % reproducibility relative standard deviation (% RSD_R).

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43 **Recovery**

44 The fraction or percentage of spiked analyte that is recovered when the test sample
45 is analyzed using the entire method.

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4. Method Performance Requirements:

Limit of Quantitation (LOQ)	≤ 10 µg/kg*		
Range	Repeatability (RSD _r)	Reproducibility (RSD _R)	Recovery
≥ 10 to 100 µg/kg	15%	32%	60% - 115%
>100 to 1000 µg/kg	11%	16%	80% - 115%
> 1 to 10 mg/kg	7.3%	8%	80% - 115%

*LOQ applies to product as consumed

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5. System suitability tests and/or analytical quality control:

Suitable methods will include blank check samples, and check standards at the lowest point and midrange point of the analytical range.

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6. Reference Material(s):

A certified reference material should be used when available. Internally produced reference materials may be used for a variety of cannabis containing beverages until reference material is made available by an internationally-recognized organization such as Institute for Reference Materials and Measurements (IRMM) or United States National Institute of Standards and Technology (NIST).

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7. Validation Guidance & References:

Detailed and complete procedures for reproducible preparation of test samples of each beverage matrix category must be addressed during method validation and those data must be included in the method validation submission. Required matrix categories are listed in Table 2; method developers must include validation data and detailed sample preparation procedures for at least one sample from each matrix category.

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LOQ applies to product as consumed.

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AOAC has guidance on Single Lab Validations:

https://members.aoc.org/AOAC_Docs/StandardsDevelopment/SLV_Guidelines_Dietary_Supplements.pdf

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FDA guidance: <https://www.fda.gov/food/laboratory-methods-food/elemental-analysis-manual-eam-food-and-related-products>

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USP <233>

<https://www.usp.org/sites/default/files/usp/document/our-work/chemical-medicines/key-issues/c233.pdf>

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8. Maximum Time-To-Result: No maximum time.

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Table 1: Optional Elements Not Frequently Required

- Antimony CAS No. 744-36-0
- Barium CAS No. 744-39-3
- Chromium CAS No. 18540-29-9
- Copper CAS No. 744-50-8
- Nickel CAS No. 7440-02-0
- Silver CAS No. 7440-22-4
- Selenium CAS No. 7782-49-2
- Zinc CAS No. 7440-66-6

Table 2: Cannabis Containing Beverage Matrix Categories

1. Carbonated beverages:
Sodas, sparkling water
2. Coffees:
with & without dairy/fats
3. Teas & multi-herb blends:
Kombucha, green tea, ginger-turmeric
4. Other
Fruit juices, smoothies/shakes, sports drinks, dry powder mixes, wine, beer

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Note: Manufactured as cannabis containing or manufacturer containing or commercially available cannabis beverages.