

## Standard Method Performance Requirements for Heavy Metals in a Variety of Foods and Beverages

Intended Use: Surveillance methods for routine monitoring

### 1 Applicability

Determination of any combination of total cadmium (CAS No. 7440-43-9), total arsenic (CAS No. 7440-38-2), total lead (CAS No. 7439-92-1), and/or total mercury (CAS No. 7439-97-6) with priority given to a variety of foods such as rice and/or rice products, chocolate products, fruit juice and/or fruit concentrates, and infant formula.

### 2 Analytical Technique

Inductively coupled plasma-mass spectrometry (ICP-MS).

### 3 Definitions

*Limit of quantitation (LOQ).*—The minimum concentration or mass of analyte in a given matrix that can be reported as a quantitative result.

*Repeatability.*—Variation arising when all efforts are made to keep conditions constant by using the same instrument and operator, and repeating during a short time period. Expressed as the repeatability standard deviation ( $SD_r$ ); or % repeatability relative standard deviation (%RSD<sub>r</sub>).

*Reproducibility.*—The standard deviation or relative standard deviation calculated from among-laboratory data. Expressed as the reproducibility standard deviation ( $SD_R$ ); or % reproducibility relative standard deviation (%RSD<sub>R</sub>).

*Recovery.*—The fraction or percentage of spiked analyte in the original unprocessed material test portion that is recovered when the test sample is analyzed using the entire method.

Limit of quantitation (LOQ)		≤10 ppb (µg/kg) for foods	
		≤8 ppb (µg/kg) for infant formula	
Range	Repeatability (RSD <sub>r</sub> ), %	Reproducibility (RSD <sub>R</sub> ), %	Recovery, %
≥8 ppb to 100 ppb	15	32	60–115
>100 ppb to 1 ppm	11	16	80–115
>1 ppm to 10 ppm	7.3	8	80–115

### 4 Method Performance Requirements

See Table 1.

### 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.

### 6 Reference Material(s)

A certified reference material should be used when available. Internally produced reference materials may be used for a variety of foods such as chocolate products, fruit juice and/or fruit concentrates, and infant formula 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).

### 7 Validation Guidance

Recommended level of validation: *Official Methods of Analysis*<sup>SM</sup>.

### 8 Maximum Time-to-Result

No maximum time.

*Approved by the AOAC Stakeholder Panel on Strategic Food Analytical Methods (SPSFAM) on September 29, 2012. Final Version Date: September 28, 2012.*