

# Elemental Analysis Manual (EAM): History and Access to Archived Material

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Since its inception in 1982, the Elemental Analysis Manual (EAM) has evolved dramatically. Initially, it was designed to serve as a reference for FDA's elemental analysis procedures and methods and existed in hard copy. It had several topics on laboratory practices and techniques relevant in that analytical era plus 18 one-page synopses of published methods. (Available via "[EAM archive - 1984 \(/media/94972/download\)](/media/94972/download)"; Zip, 2.4MB).

In the 1990's, efforts were underway to develop a more comprehensive, web-based version of the EAM that would be relevant for new and emerging analytical techniques but would also be expandable, modifiable, and readily available world-wide on the internet. The EAM was to have four core subject areas - regulatory references, discussions on laboratory procedures and equipment, general analytical information, and formal methods.

The effort to develop a web-based EAM, however, was subject to three major hurdles. First, a much more comprehensive assembly of element analysis details had to be prepared. Second, the work was disrupted during this time while FDA moved its CFSAN operations (including its element analysis operations) to a new facility. And third, new challenges associated with publishing on the web had to be overcome. As a result, production of the new EAM was characterized by lengthy delays and staggered launch dates.

In January, 2000, at the turn of the century, the beginnings of the new web-based EAM launched. It essentially served only as a forerunner to the web-based EAM because it had very little actual content. From the lead-in table of contents page, the only active links were for two atomic absorption methods. This EAM offering remained unchanged, except for an update for one of the methods, until June, 2009, when it disappeared from the web. The evolution of the EAM can be seen by comparing the 1984 and 2000 tables of contents (Available via "[EAM archive - 1984 \(/media/94972/download\)](/media/94972/download)"; Zip, 2.4MB).

As the agency was reformatting its web offerings, instead of bringing this draft outline forward, a completely new web-based EAM launch was being prepared. Development work was completed in June, 2008, and the official first version of the new web-based EAM launched on September 23, 2010. As envisioned, it had links to comprehensive elemental analysis details and several methods. The organization of this newly-developed EAM was slightly different from the initial draft outline that was shown on the web prior to 2010.

In September, 2014, another major update occurred, which included a shift in web format from all HTML to an HTML lead in page with links to sections in pdf. Also, sections 2 (Sample Preparation) and 3 (General Analytical Operations and Information) were expanded and re-arranged. The introductory information from section 4 (Analytical Methods) was also moved into section 3 to align with other general topics.

The history for the EAM in its current form (2010 through the present) is presented below with links to archived content.

*Note: Version numbers are assigned to chapter sections (i.e., not chapters or the manual as a whole). Version number 1.0 identifies the first version of a section as it appeared on the web. Increments of the units digit (2.0, 3.0, 4.0, etc.) designate major revisions while increments of the tenths digit (e.g., 1.1, 1.2, 1.3, etc.) designate minor revisions. Zero versions (0.x) designate draft status. Two methods have appeared on the web while in draft status.*

## EAM History: 2010 - Present

SECTION	VERSION, DATE	COMMENTS [a]
<b>1. Regulatory Considerations</b>		
1.1 Program Areas	n/a	Under development
1.2 Regulatory Operations	v1.0 June 2008	Was not posted; available with v1.1
1.2 Regulatory Operations	v1.1 June 2010	Posted Sept 2010. Minor changes. (v1.0 and v1.1 available via <a href="#">"EAM archive - Supporting Information (/media/94977/download)"</a> Zip, 1.8MB)
1.2 Regulatory Operations	v2.0 Sept 2014	Posted Nov 2014. CPG examples deleted; phrasing modified; converted to pdf ( <a href="#">current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products))</a> )
<b>2. Sample Preparation</b>		
2.1 Laboratory sample to analytical sample	v1.0 June 2008	Posted Sept 2010 (Available via <a href="#">"EAM archive - Supporting Information (/media/94977/download)"</a> Zip, 1.8MB)

SECTION	VERSION, DATE	COMMENTS [a]
2.1 New name "Food Edible Portion"	v2.0 Sept 2014	Posted Nov 2014. Former 2.1.1 ( <i>Food Edible Portion</i> ) reorganized and renamed to 2.1 <i>General Procedures</i> ; former 2.1.2 ( <i>Candy Preparation</i> ) reorganized to 2.2.2.2 (in 2.2 <i>Food Homogenization</i> ); former 2.1.3 ( <i>Carbonated Beverage Degasification</i> ) reorganized and renamed to 2.2.2 ( <i>Degasification of Carbonated Beverages</i> ); converted to pdf ( <u>current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products)</u> )
2.2 Analytical sample to analytical portion	v1.0 June 2008	Posted Sept 2010 (Available via " <u>EAM archive - Supporting Information (/media/94977/download)</u> ") Zip, 1.8MB)
2.2 New name " Food Homogenization"	v2.0 Sept 2014	Posted Nov 2014. Renamed; cryogenic discussion expanded; candy and degasification information brought in (from 2.1.2 and 2.2.2); added subsection on pills, etc., (2.2.2.3); converted to pdf ( <u>current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products)</u> )
2.3 Analytical Portion to Analytical Solution	v1.0 June 2008	Posted Sept 2010 (Available via " <u>EAM archive - Supporting Information (/media/94977/download)</u> ") Zip, 1.8MB)
2.3 New name " Digestion and Separation"	v2.0 Sept 2014	Posted Nov 2014. Renamed; subsection 2.3.2 added with links to sample preparation procedures in various methods; converted to pdf ( <u>current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products)</u> )
2.4 Contamination Control	v2.0 Sept 2014	Posted Nov 2014. New to this location (was 3.1); converted to pdf ( <u>current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products)</u> )
<b>3.General Analytical Operations and Information</b>		
3.1 Contamination Control	v1.0 June 2008	Posted Sept 2010 (Available via " <u>EAM archive - Supporting Information (/media/94977/download)</u> ") Zip, 1.8MB)
3.1 Renamed to " Safety"	v2.0 Sept 2014	Posted Nov 2014. Section 3.1 ( <i>Contamination Control</i> ) reorganized to 2.4 and Safety (formerly 4.0.3) reorganized to 3.1 (this location); converted to pdf ( <u>current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products)</u> )
3.2 Analytical figures of merit	v1.0 June 2008	Posted Sept 2010 (Available via " <u>EAM archive - Supporting Information (/media/94977/download)</u> ") Zip, 1.8MB)

SECTION	VERSION, DATE	COMMENTS [a]
3.2 Renamed to " Terminology"	v2.0 Sept 2014	Posted Nov 2014. <i>Analytical Figures of Merit</i> re-written and made into 3.2.1, a subsection of this more comprehensive <i>Terminology</i> section; former subsection 4.0.1.1 ( <i>Samples and Solutions</i> ) became 3.2.2, 4.0.1.2 ( <i>Standard Solutions</i> ) became 3.2.3, and 4.0.1.3 ( <i>Method Performance</i> ) became 3.2.4 and renamed ( <i>QC/QA Materials and Solutions</i> ); converted to pdf ( <a href="#">current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products))</a> )
3.3 Uncertainty	v1.0 June 2008	Posted Sept 2010 (Available via " <a href="#">EAM archive - Supporting Information (/media/94977/download)</a> ") Zip, 1.8MB)
3.3 Uncertainty	v2.0 Sept, 2014	Posted Nov 2014. Major re-write to expand on concepts and be more general in nature instead of having strong focus on AA and ICPAES methodology; converted to pdf ( <a href="#">current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products))</a> )
3.4 Special Calculations	v1.0 June 2008	Posted Sept 2010; available with v1.1
3.4 Special Calculations	v2.0 Sept, 2014	Posted Nov 2014. Converted to pdf (v1.0 and 2.0 available via " <a href="#">EAM archive - Supporting Information (/media/94977/download)</a> ") Zip, 1.8MB)
3.4 Special Calculations	v3.0 Aug, 2015	Major update. Modified many equations and added others to fill gaps associated with differences between gravimetric and volumetric units and mixed measurements (i.e., measurements in one format and calculations in the other). With an expanded scope, the name of subsection 3.4.4 ( <i>Gravimetric Standard Solution Preparation</i> ) changed to <i>Converting Units</i> . ( <a href="#">current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products))</a> )
3.5 Reference Materials	v1.0 June 2008	Posted Sept 2010; available with v1.1
3.5 Reference Materials	v1.1 Dec 1012	Posted Aug 2013; Subsection 3.5.6 ( <i>In-House Reference Material Certificates</i> ) added December 2012 but appeared on-line only in the <i>Table of Contents</i> ; the actual content for 3.5.6 did not publish until August 2013; an RM certificate update occurred in 2013 but this did not warrant any EAM version number change (v1.0 and v1.1 available via " <a href="#">EAM archive - Supporting Information (/media/94977/download)</a> ") Zip, 1.8MB)

SECTION	VERSION, DATE	COMMENTS [a]
3.5 <i>Reference Materials</i>	v2.0 Sept, 2014	Posted Nov 2014. Merged <i>RM Organizations</i> (3.5.5) with <i>RM Sources</i> (3.5.4) and the subsection number for <i>RM Certificates</i> (3.5.6) became 3.5.5; converted to pdf ( <a href="#">current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products))</a> )
3.6 <i>Instrument Performance</i>	v1.0 June 2008	Posted Sept 2010 (Archived in four subsections; available via " <a href="#">EAM archive - Supporting Information (/media/94977/download)</a> ") Zip, 1.8MB)
3.6 Renamed to " <i>Performance</i> "	v2.0 Sept, 2014	Posted Nov 2014. A general <i>Performance</i> section was created with <i>Instrument Performance</i> becoming a subsection along with <i>Method Performance Checks</i> (formerly 4.0.2) which was renamed to <i>Method Performance</i> . Converted to pdf ( <a href="#">current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products))</a> )
3.7 <i>Typical Element Concentrations</i>	v1.0 June 2008	Posted Sept 2010 (Available via " <a href="#">EAM archive - Supporting Information (/media/94977/download)</a> ") Zip, 1.8MB)
3.7 <i>Typical Element Concentrations</i>	v2.0 Sept 2014	Posted Nov 2014. Major update to simplify into a list of active web links for current listings of element concentrations. Converted to pdf ( <a href="#">current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products))</a> )
<b>4. Analytical Methods</b>		
4.0 (no section title) [b]	v1.0 June 2008	Posted Sept 2010. Contents moved into chapter 3. (Archived in three subsections; available via " <a href="#">EAM archive - Supporting Information (/media/94977/download)</a> ") Zip, 1.8MB)
4.1 <i>Flame Atomic Absorption Spectrometric Determination of Lead and Cadmium Extracted from Ceramic Foodware</i>	v1.0 Jan 2000	Not posted (Available via " <a href="#">EAM archive - Methods (past) (/media/94986/download)</a> ") Zip, 2.5MB)
4.1 <i>Flame Atomic Absorption Spectrometric Determination of Lead and Cadmium Extracted from Ceramic Foodware</i>	v1.1 Sept 2010	Primarily a format change prior to the EAM launch in September 2010 (No longer used at FDA but still an acceptable method; Available via " <a href="#">EAM archive - Methods (current) (/media/94996/download)</a> ") Zip, 1.4MB)
4.2 <i>Graphite Furnace Atomic Absorption Spectrometric Determination of Lead and Cadmium Extracted from Ceramic Foodware</i>	v1.0 Jan 2000	Available with v1.1

SECTION	VERSION, DATE	COMMENTS [a]
4.2 <i>Graphite Furnace Atomic Absorption Spectrometric Determination of Lead and Cadmium Extracted from Ceramic Foodware</i>	v1.1 Apr 2000	Deleted reference to Smith-Hieftje background correction in working range (in <i>Definitions</i> ); corrected instructions for preparation of optional matrix modifier solution (in <i>Reagents</i> ); corrected matrix modifier values (in <i>Table 1</i> ) (v1.0 and v1.1 available via " <a href="#">EAM archive - Methods (past)</a> ( <a href="#">/media/94986/download</a> )" Zip, 2.5MB)
4.2 <i>Graphite Furnace Atomic Absorption Spectrometric Determination of Lead and Cadmium Extracted from Ceramic Foodware</i>	v1.2 Sept 2010	Primarily a format change prior to the EAM launch in September 2010 (No longer used at FDA but still an acceptable method; Available via " <a href="#">EAM archive - Methods (current)</a> ( <a href="#">/media/94996/download</a> )" Zip, 1.4MB)
4.3 <i>Graphite Furnace Atomic Absorption Spectrometric Determination of Cadmium and Lead in Food Using Microwave Assisted Digestion</i>	v1.0 June 2008	Not posted (Available via " <a href="#">EAM archive - Methods (past)</a> ( <a href="#">/media/94986/download</a> )" Zip, 2.5MB)
4.3 <i>Graphite Furnace Atomic Absorption Spectrometric Determination of Cadmium and Lead in Food Using Microwave Assisted Digestion</i>	v1.1 Jul 2010	Not posted. Technical editing (Available via " <a href="#">EAM archive - Methods (past)</a> ( <a href="#">/media/94986/download</a> )" Zip, 2.5MB)
4.3 <i>Graphite Furnace Atomic Absorption Spectrometric Determination of Cadmium and Lead in Food Using Microwave Assisted Digestion</i>	v1.2 Aug 2010	Posted Sept 2010. Additional technical editing prior to the EAM launch in September 2010 (No longer used at FDA but still an acceptable method; Available via " <a href="#">EAM archive - Methods (current)</a> ( <a href="#">/media/94996/download</a> )" Zip, 1.4MB)
4.3A <i>Appendix A - Supplemental Information on In-house Method Validation</i>	v1.0 June 2008	Posted Sept 2010 (Included with Method 4.3)
4.3B <i>Appendix B - Supplemental Information on Interlaboratory Trial</i>	v1.0 June 2008	Posted Sept 2010 (Included with Method 4.3)
4.4 <i>Inductively Coupled Plasma-Atomic Emission Spectrometric Determination of Elements in Food Using Microwave Assisted Digestion</i>	v1.0 June 2008	Not posted (Available via " <a href="#">EAM archive - Methods (past)</a> ( <a href="#">/media/94986/download</a> )" Zip, 2.5MB)

SECTION	VERSION, DATE	COMMENTS [a]
4.4 <i>Inductively Coupled Plasma-Atomic Emission Spectrometric Determination of Elements in Food Using Microwave Assisted Digestion</i>	v1.1 Aug 2010	Posted Sept 2010. Modified digestion procedure ( <a href="#">current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products))</a> )
4.4A <i>Appendix A - Supplemental Information on In-house Method Validation</i>	v1.0 June 2008	Posted Sept 2010 ( <a href="#">current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products))</a> )
4.5 <i>Cold Vapor Atomic Absorption Spectrometric Determination of Total Mercury in Seafood Using Microwave Assisted Digestion</i>	v1.0 June 2008	Posted Sept 2010 (No longer used at FDA but still an acceptable method; Available via "EAM archive - Methods ( <a href="#">current</a> ). ( <a href="#">/media/94996/download</a> )" Zip, 1.4MB)
4.5A <i>Appendix A - Supplemental Information on In-house Method Validation</i>	v1.0 June 2008	Posted Sept 2010 (Included with Method 4.3)
4.5B <i>Appendix B - Supplemental Information on Method Performance</i>	v1.0 June 2008	Posted Sept 2010 (Included with Method 4.3)
4.6 <i>Inductively Coupled Plasma-Atomic Emission Spectrometric Determination of Cadmium and Lead Extracted from Ceramic Foodware</i>	v0.2 Aug 2010	Draft version posted Sept 2010 ( <a href="#">current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products))</a> )
4.7 <i>Inductively Coupled Plasma-Mass Spectrometric Determination of Arsenic, Cadmium, Chromium, Lead, Mercury, and Other Elements in Food Using Microwave Assisted Digestion</i>	v1.0 Nov 2013	Posted December, 2013 (Available via "EAM archive - Methods ( <a href="#">past</a> ). ( <a href="#">/media/94986/download</a> )" Zip, 2.5MB)
4.7 <i>Inductively Coupled Plasma-Mass Spectrometric Determination of Arsenic, Cadmium, Chromium, Lead, Mercury, and Other Elements in Food Using Microwave Assisted Digestion</i>	v1.1 Feb 2015	Posted March, 2015. Enhanced discussions and made many general formatting and editing changes, revised LOD/LOQ table, added selenium, weighted calibration allowed, expanded allowable fortification levels, lowered recommended ISTD concentrations ( <a href="#">current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products))</a> )

SECTION	VERSION, DATE	COMMENTS <sup>[a]</sup>
4.8 <i>High Pressure Liquid Chromatographic-Inductively Coupled Plasma-Mass Spectrometric Determination of Methylmercury and Total Mercury in Seafood</i>	v1.0 June 2008	Posted Sept 2010 ( <a href="#">current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products))</a> )
4.9 <i>Portable Hand Held X-Ray Fluorescence Determination of Toxic Elements</i>	n/a	(under development)
4.10 <i>High Performance Liquid Chromatography-Inductively Coupled Plasma-Mass Spectrometric Determination of Four Arsenic Species in Fruit Juice</i>	v0.82 Aug 2010	Posted Sept 2010 (Available via " <a href="#">EAM archive - Methods (past) (/media/94986/download)</a> ," Zip, 2.5MB)
4.10 <i>High Performance Liquid Chromatography-Inductively Coupled Plasma-Mass Spectrometric Determination of Four Arsenic Species in Fruit Juice</i>	v1.0 Jul 2013	( <a href="#">current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products))</a> )
4.11 <i>Arsenic Speciation in Rice and Rice Products Using High Performance Liquid Chromatography-Inductively Coupled Plasma-Mass Spectrometric Determination</i>	v1.0 Apr 2012	Not posted; (Available via " <a href="#">EAM archive - Methods (past) (/media/94986/download)</a> ," Zip, 2.5MB)
4.11 <i>Arsenic Speciation in Rice and Rice Products Using High Performance Liquid Chromatography-Inductively Coupled Plasma-Mass Spectrometric Determination</i>	v1.1 Nov 2012	( <a href="#">current in the EAM (/food/laboratory-methods/elemental-analysis-manual-eam-food-and-related-products))</a> )

**a** Web post date is given when it differs from the version development date. Major changes since the previous version are provided. Minor changes are not noted (e.g., edits to improve readability, grammar, or consistency in terminology throughout the manual).

**b** Section 4.0 subsections (4.0.1, 4.0.2, and 4.0.3) appeared without a section title just prior to the methods in chapter 4. These had general laboratory information that was moved into chapter 3 during the EAM update in September 2014.



Was this helpful?

Yes

No