



SW-846 Methods Program: 2023 Updates

Troy Strock

Office of Resource Conservation and Recovery

2023 TNI Environmental Measurements Symposium





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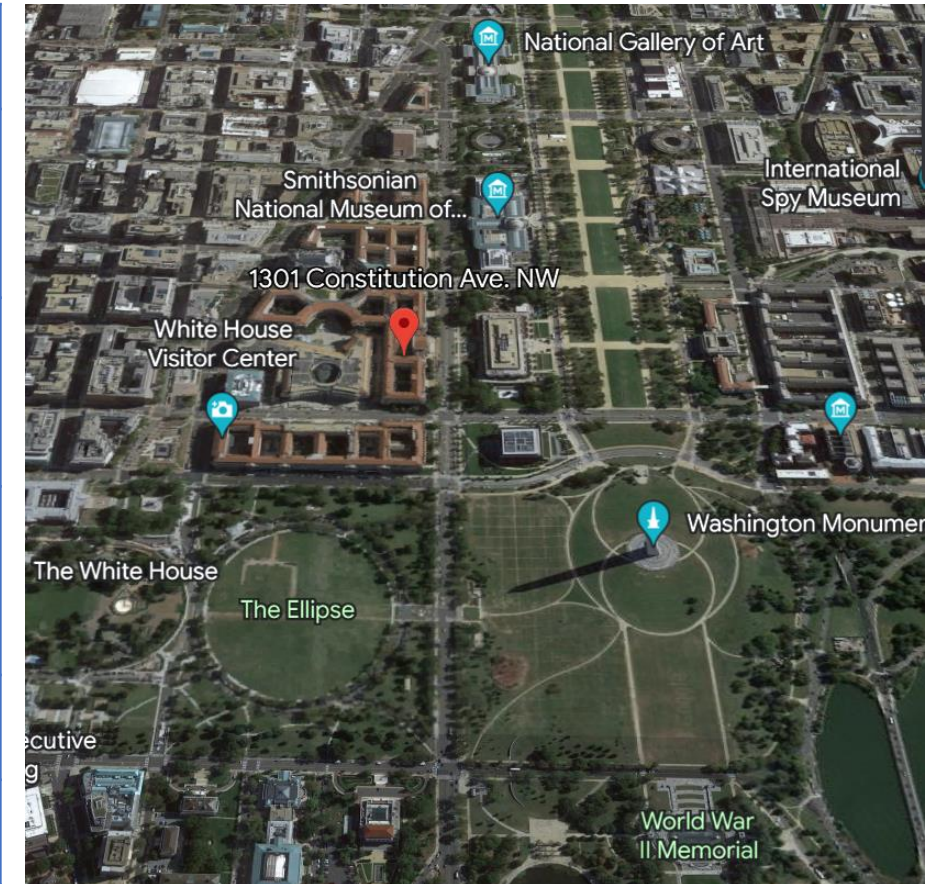
Presentation topics:

- RCRA background, rulemakings of interest
- The SW-846 Compendium
- 2023 updates
 - Inorganic methods
 - Organic methods
 - Leaching methods



Waste Characterization Branch, Office of Resource Conservation and Recovery

Hazardous waste listings, §261	Narendra Chaudhari
Hazardous waste characteristics, §261	Dan Lowrey
Land disposal restrictions, §268	Sharon Oxendine, Bethany Russell
Homeland security, disaster debris	Anna Tschursin, Melissa Kaps
SW-846 Compendium	Troy Strock
Branch Chief	Jocelyn Hospital





OLEM rulemakings, some actions of note

- RCRA:

- §261 Appendix VIII adding select PFAS as RCRA hazardous constituents
- Statutory definition of hazardous waste applicable to RCRA corrective action

- CERCLA:

- Notice of Proposed Rulemaking designating PFOS and PFOA as CERCLA hazardous substances
- 2023 updates to PFAS Destruction and Disposal Interim Guidance

- TSCA:

- §761 PCB extraction methods

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Reginfo.gov

Search: Agenda Reg Review IC

Home | Unified Agenda | Regulatory Review | Information Collection Review | FAQs / Resources | Contact Us

Unified Agenda And Regulatory Plan Search Results

Unified Agenda and Regulatory Plan Search Criteria: Publication ID=ALL; Agency=Office of Land and Emergency Management; Agenda Stage of Rulemaking=Prerule Stage, Proposed Rule Stage, Final Rule Stage

Number Of Records Found: 1082 View by Page View All RIN Data (Max 350) Download All RIN Data in XML

Agency	Agenda Stage of Rulemaking	Title	Publication	RIN
EPA/OLEM	Final Rule Stage	Revisions to the National Oil and Hazardous Substances Pollution Contingency Plan; Subpart J Product Schedule Listing and Authorization of Use Requirements	Spring 2023	2050-AE87
EPA/OLEM	Final Rule Stage	Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals From Electric Utilities; Federal CCR Permit Program	Spring 2023	2050-AH07
EPA/OLEM	Final Rule Stage	Alternate PCB Extraction Methods and Amendments to PCB Cleanup and Disposal Regulations	Spring 2023	2050-AH08
EPA/OLEM	Final Rule Stage	Designating PFOA and PFOS as CERCLA Hazardous Substances	Spring 2023	2050-AH09
EPA/OLEM	Final Rule Stage	Response to Petition to Revise the Non-Hazardous Secondary Material Standards Under Part 241	Spring 2023	2050-AH13
EPA/OLEM	Proposed Rule Stage	Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities; Legacy Surface Impoundments	Spring 2023	2050-AH14
EPA/OLEM	Final Rule Stage	Accidental Release Prevention Requirements: Risk Management Program Under the Clean Air Act; Safer Communities by Chemical Accident Prevention	Spring 2023	2050-AH22
EPA/OLEM	Proposed Rule Stage	Technical Corrections to the Hazardous Waste Generator Improvements Rule, the Hazardous Waste Pharmaceuticals Rule, and the Definition of Solid Waste Rule	Spring 2023	2050-AH23
EPA/OLEM	Proposed Rule Stage	Revisions to Standards for the Open Burning/Open Detonation of Waste Explosives	Spring 2023	2050-AH24
EPA/OLEM	Prerule Stage	Addressing PFAS in the Environment	Spring 2023	2050-AH25
EPA/OLEM	Proposed Rule Stage	Listing of PFOA, PFOS, PFBS, and GenX as Resource Conservation and Recovery Act (RCRA) Hazardous Constituents	Spring 2023	2050-AH26
EPA/OLEM	Proposed Rule Stage	Definition of Hazardous Waste Applicable to Corrective Action for Solid Waste Management Units	Spring 2023	2050-AH27
EPA/OLEM	Proposed Rule Stage	Reporting Requirements for Emissions From Animal Waste Under the Emergency Planning and Community Right-to-Know Act	Spring 2023	2050-AH28
EPA/OLEM	Prerule Stage	Used Drum Management and Reconditioning Advanced Notice of Proposed Rulemaking	Spring 2023	2050-AH29
EPA/OLEM	Proposed Rule Stage	Updates to the RCRA Hazardous Waste Permitting Regulations and Other Technical Corrections	Spring 2023	2050-AH30
EPA/OLEM	Prerule Stage	Potential Future Regulation for Addressing Small Farms Reporting of Animal Waste Under the Emergency Planning and Community Right-to-Know Act (EPCRA)	Spring 2023	2050-AH31
EPA/OLEM	Final Rule Stage	Revisions to the National Oil and Hazardous Substances Pollution Contingency Plan; Subpart J Product Schedule Listing and Authorization of Use Requirements	Fall 2022	2050-AE87
EPA/OLEM	Final Rule Stage	Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals From Electric Utilities; Federal CCR Permit Program	Fall 2022	2050-AH07
EPA/OLEM	Final Rule Stage	Alternate PCB Extraction Methods and Amendments to PCB Cleanup and Disposal Regulations	Fall 2022	2050-AH08

<https://www.reginfo.gov/public/do/eoAdvancedSearch>

RCRA: Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs)

RCRA permits for TSDFs under §264 include:

- Waste Analysis Plans
 - Ensure treated wastes comply with treatment standards for Land Disposal Restriction under §268
- Corrective action
 - Investigate and clean up hazardous releases into soil, ground water, surface water and air.
 - §261 Appendix VIII includes a list of hazardous constituents that might be included in corrective action permits



Hazardous Waste

CONTACT US

Learn about Corrective Action

On this page:

- [Map of Cleanup Progress at Corrective Action Facilities](#)
- [What is Corrective Action?](#)
- [What are Corrective Action Facilities?](#)
- [The Corrective Action Process](#)
- [Corrective Action Program Vision and Goals](#)
- [Program Oversight](#)
- [Redevelopment Economics](#)
- [General Resources](#)
- [Training](#)

Additional Resources

- [Corrective Action Programs Around the Nation](#)
- [Cleanups in My Community](#)

<https://www.epa.gov/hw/learn-about-corrective-action>



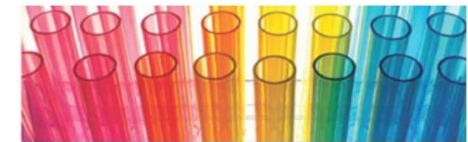
The SW-846 Compendium

- Official compendium of test methods for compliance with RCRA regulations published by EPA's Office of Resource Conservation and Recovery (ORCR)
- Collection of 220+ methods and associated guidance
 - Methods organized in series
 - Many methods are modular, may be used in different combinations
- Used by a variety of stakeholders
- Updates incorporate new technologies, analytical techniques, target analytes, improved QA practices



Hazardous Waste Test Methods / SW-846

What's New with SW-846



- [Update VII to SW-846](#)
- [Update VI to SW-846](#)
- [Validated Methods](#)
- [SW-846 FAQs](#)

<https://www.epa.gov/hw-sw846>



RCRA: Methods Innovation Rule (2005)

- Removed most required uses of SW-846 methods from RCRA
 - Provide flexibility, encourage innovation
- Identified some SW-846 methods, ASTM standards as Method Defined Parameters (MDPs)
 - Must be followed as written
 - Incorporated by reference at 40 CFR Part 260.11
- Identified most SW-846 methods as performance-based; tools *generally* appropriate for RCRA testing
 - Appropriate modifications allowed
 - Other published, reliable methods may be used
 - Focus: Meet project-specific data quality objectives



MENU

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Related Topics: [Hazardous Waste Test Methods / SW-846](#)

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Final Rule: Methods Innovation Rule (MIR)

Basic Information

Legal Authority [EXIT](#)

42 U.S.C. §7412 and 7414

42 U.S.C. §6905, 6921(a), 6921-6927, 6930, 6934-6939, and 6974

Federal Register Citation

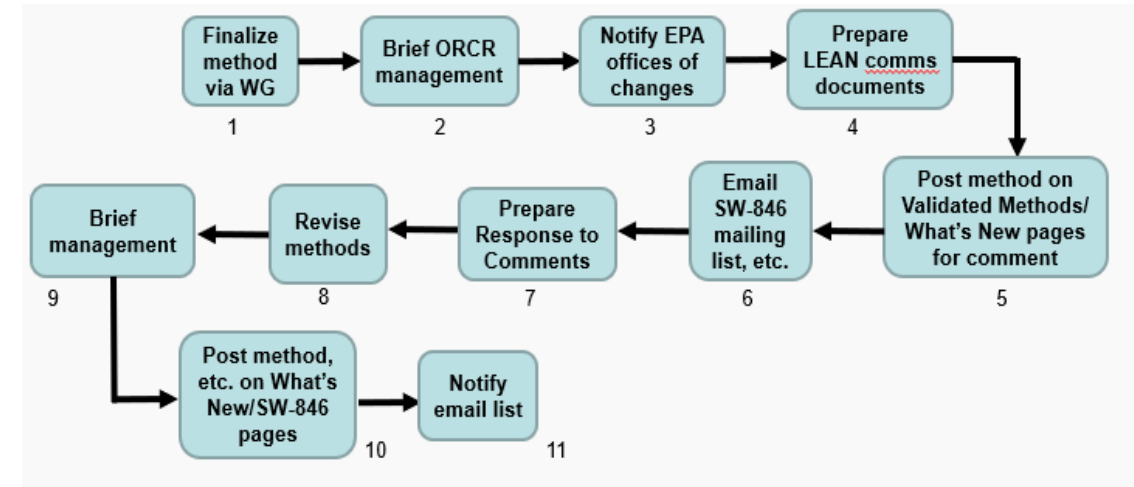
[67 FR 66252-66301 \(PDF\)](#) [EXIT](#) (50 pp, 380 K)

[70 FR 34538-34592 \(PDF\)](#) [EXIT](#) (55 pp, 411 K)

<https://www.epa.gov/hw-sw846/final-rule-methods-innovation-rule-mir>

SW-846: Streamlined publication process for non-regulatory methods

- SW-846 methods workgroup review, approval
- Methods posted on SW-846 “validated methods” page
- **Comments solicited through SW-846 mailing list**
- EPA docket used for supporting docs, response to comments
- Revise to address public comments, brief management
- Publish final version, notify mailing list

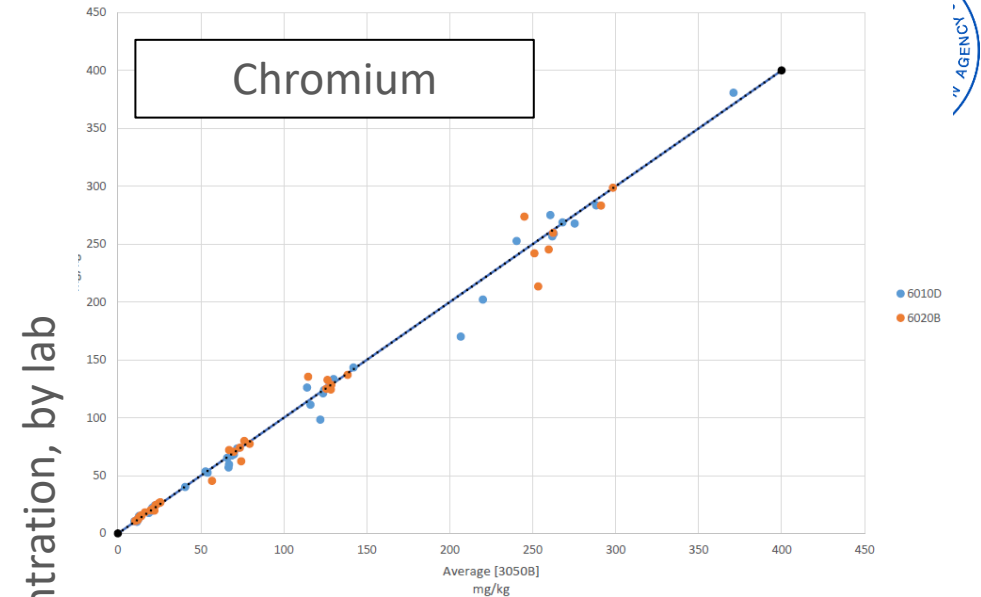


<https://www.govinfo.gov/content/pkg/FR-2016-09-27/pdf/2016-23299.pdf>

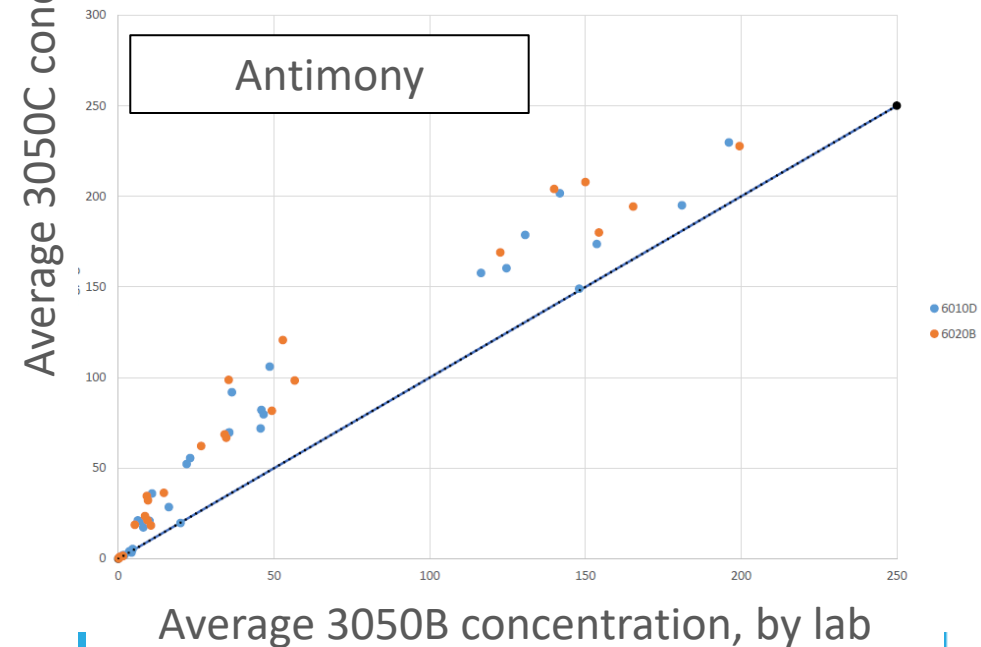
Inorganic methods updates: Post 3050C for public comm

- Updating 3050B, “Acid Digestion of Sediments, Sludges and Soils”
- Single digestion for ICP-OES and ICP-MS
 - Add HCl early in digestion process
 - Take advantage of ICP-MS polyatomic interference reduction technology
 - Observed improved recovery of antimony in solid reference materials
 - More efficient, less waste
- **Anticipated release: Fall 2023**

Correlation of Method 3050B vs. 3050C, Analyzed by Method 6010D and 6020B
Chromium, All SRMs



Correlation of Method 3050B vs. 3050C, Analyzed with Method 6010D and 6020B
Antimony, All SRMs





Inorganic methods updates: Include Arsenic in Method 1340A

- SW-846 Method 1340, “In Vitro Bioaccessibility Assay for Lead in Soil” published in 2017
- Used to estimate relative bioavailability in ingested soil
- Validation study for lead and arsenic is complete, round-robin study report written
- Next steps:
 - Collecting reference material data EPA labs have generated since validation study
 - Management review
 - Propose for public comment
- **Anticipated release: Early 2024**



Superfund

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Soil Bioavailability at Superfund Sites: Guidance

This page contains context and links to soil bioavailability guidance documents. **On this page:**

- [Metals](#)
- [Lead](#)
- [Arsenic](#)
- [Dioxin](#)

Related Soil Bioavailability Pages

- [Basic Information](#)
- [Human Health](#)
- [Guidance](#)
- [Technical Assistance](#)
- [Related Links](#)

Metals

Guidance for Evaluating the Bioavailability of Metals in Soils for Use in Human Health Risk Assessment

This guidance document provides: 1) a recommended process for deciding when to collect site-specific information on the oral bioavailability of metals in soils for use in human health risk assessments; 2) a recommended process for documenting the data collection, analysis and implementation of a validated method that would support site-specific estimates of oral bioavailability; and 3) general criteria for EPA to use in evaluating whether a specific bioavailability method has been validated for regulatory risk assessment purposes.

- [Transmittal Memo from James E. Woolford to the Regions, dated July 3, 2007 \(PDF\)](#) (4 pp, 1 MB)
- [Guidance for Evaluating the Bioavailability of Metals in Soils for Use in Human Health Risk Assessment \(PDF\)](#) (20 pp, 133 K)

<https://www.epa.gov/superfund/soil-bioavailability-superfund-sites-guidance#arsenic>



Organic methods updates: PFAS Analytical Methods

- Ongoing validation studies:
 - The US Department of Defense is collaborating with EPA Office of Water to validate Method 1633
 - ASTM International collaborating with EPA Region 5 lab on interlaboratory study for D8421-22
- ORCR plans to incorporate data, references into SW-846 updates

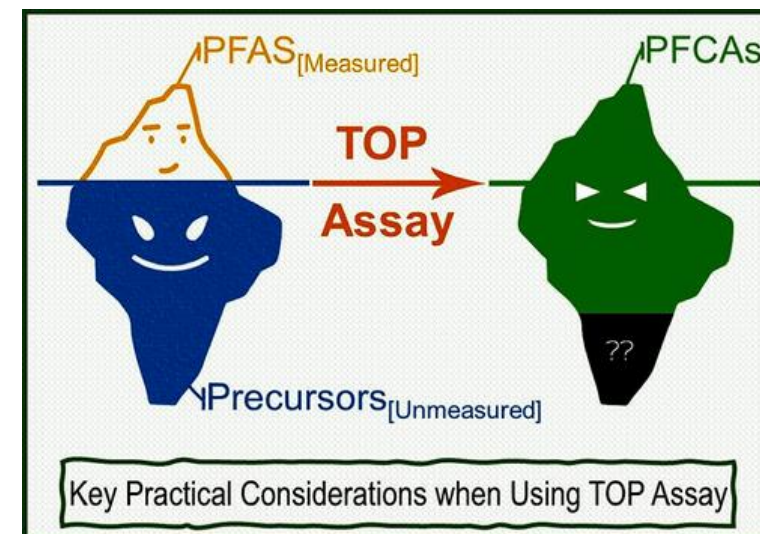


Organic methods updates: PFAS Analytical Methods

- Next steps:
 - Revise 3512A, 8327A:
 - Add target analytes, performance data
 - Include extracted internal standard/ isotope dilution calibration
 - New sample preparation and cleanup methods:
 - 3536: Weak anion exchange solid phase extraction - aqueous
 - 3551: Equilibrium basic solvent extraction - solids
 - 3670: Graphitized carbon cleanup
 - **Anticipated release: Early 2024**

Organic methods updates: PFAS Analytical Methods

- Method Development: Total Oxidizable Precursors (TOP) Assay
 - Warm alkaline persulfate oxidation pretreatment
 - Convert PFAS precursors to perfluoroalkyl acids
 - Goal: Publish standardized SW-846 method
 - Collaborators:
 - EPA, commercial labs, universities
 - Some challenges to address:
 - Oxidation efficiency
 - Mole balance
 - Volatile loss
 - Different approaches for aqueous vs solid samples



Environ. Sci. Technol. Lett. 2023, 10, 4, 292–301
<https://pubs.acs.org/doi/10.1021/acs.estlett.3c00061>



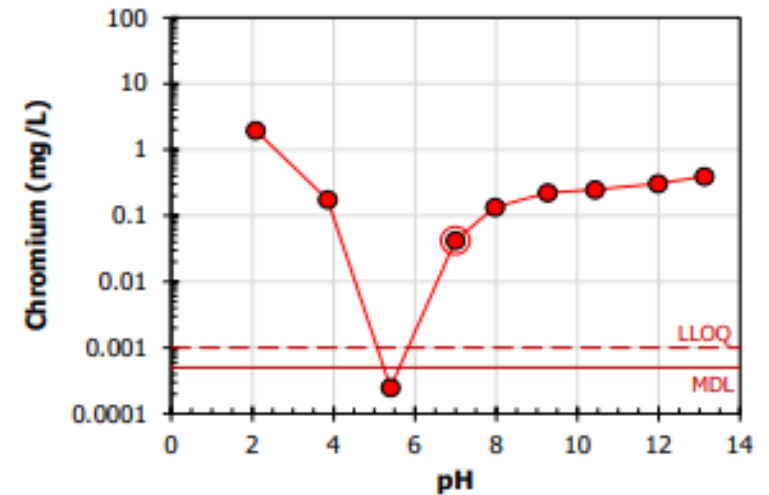
Organic methods updates: Plans for Validated Methods List, Chapters

- Validated Methods:
 - 5035A: Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples
 - Incorporate reference to frozen holding time study in ASTM D6418 research report
 - 8015D: Non-halogenated organics using gas chromatography/flame ionization detection (GC/FID)
 - Add light hydrocarbons, validation study initiated by Environmental Standards, Inc.
 - 8330B: Nitroaromatics, Nitramines, and Nitrate Esters by High Performance Liquid Chromatography (HPLC)
 - Add insensitive munitions, validation study initiated by DoD
- Chapter 4: Organic Analytes
 - Revise sample preservation and holding time criteria for acrolein and acrylonitrile, stability study initiated by the Environmental Monitoring Coalition

Leaching Method Updates: LEAF for Organics

LEAF: Leaching Environmental Assessment Framework

- Framework:
 - Multi-point aqueous leaching methods
 - Data management/visualization software
 - “How To” guide
 - Case studies
- Identify key variable(s) affecting leaching behavior
- Estimate “source term” i.e., aqueous concentration, release rate to use as inputs for screening level or scenario-based assessments
- Evaluate immobilization strategies prior to field deployment
- Non-regulatory (i.e., not replacing TCLP/Method 1311 for HW determinations)



<https://www.epa.gov/hw-sw846/leaching-environmental-assessment-framework-leaf-methods-and-guidance>

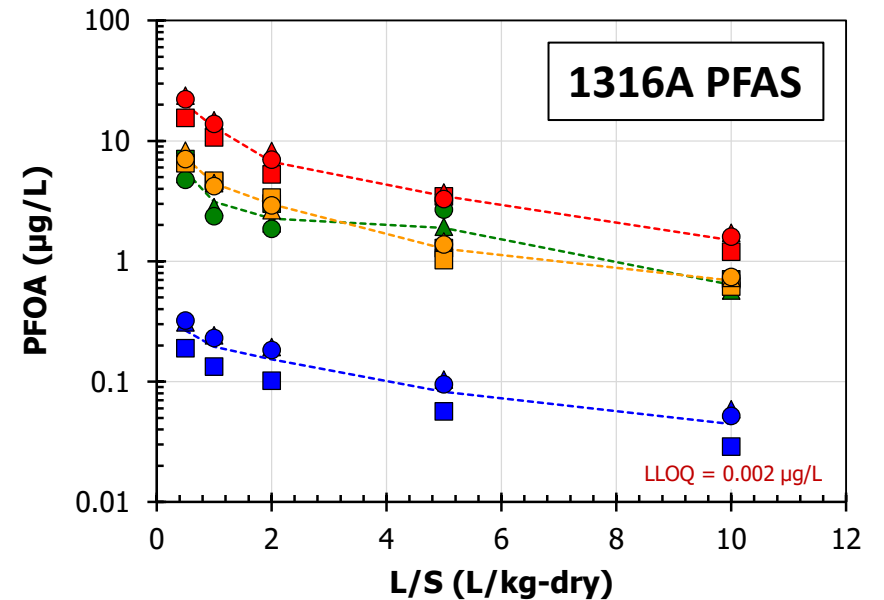
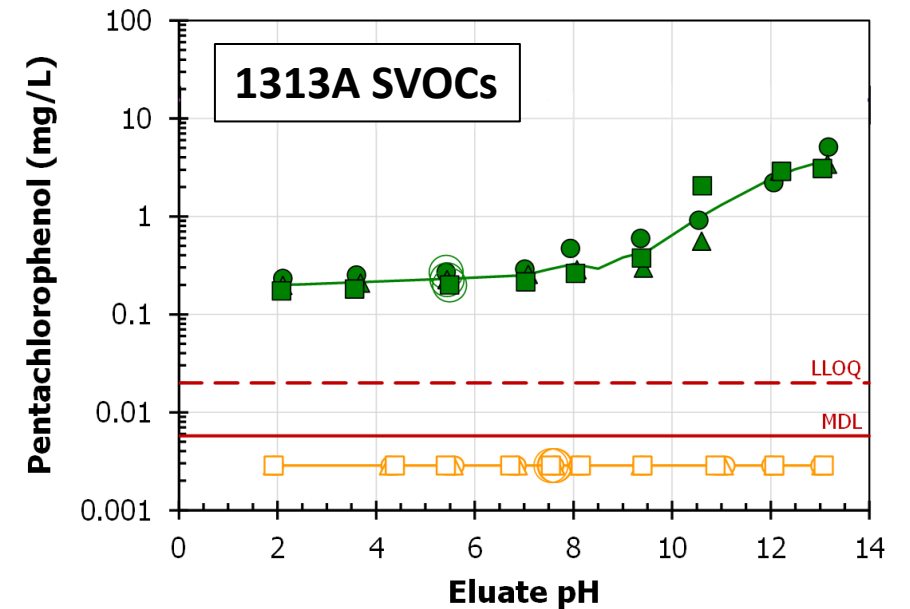
Leaching Method Updates: LEAF for Organics

- Batch equilibrium (**1313, 1316**)
 - *Contaminant concentration and release as function of:*
 - *Eluate pH*
 - *Liquid-solid ratio (L/S)*
- Up-flow column percolation (**1314**)
 - *Contaminant concentration and flux as a function of water percolated*
- Mass transport rate (**1315**)
 - Tank-based leaching test, monolithic or compacted granular
 - *Rates of contaminant release*



Leaching Method Updates: LEAF for Organics

- Background Information Document in review for 1313A, 1314A, 1316A
 - Semivolatile organic chemicals (SVOCs)
 - PFAS
- Method development underway for 1315A
- More development work needed for VOCs, mercury
- **Multi-laboratory validation study anticipated to begin in summer/fall 2023**



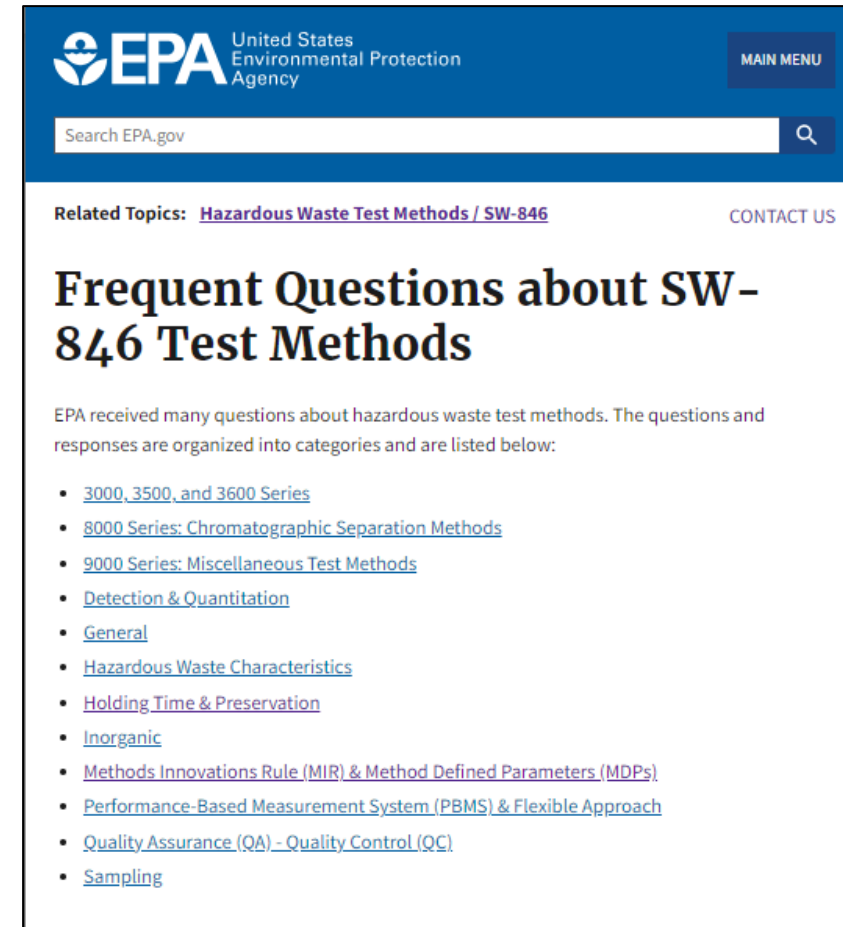


ASTM-EPA Collaboration: Flash Point Test Methods

- ASTM standards D8174-18, D8175-18
 - ORCR published Modernizing Ignitable Liquids Determinations rule in June 2020
 - Incorporated D8174 and D8175 by reference in RCRA
 - Current status:
 - Standards procured for interlaboratory studies, ready to ship
 - Planning with ILS committee
 - **Interlaboratory study anticipated to begin in fall 2023**

Website plans: Revamping SW-846 FAQs

- Reorganize by methods series, subject
- Searchable table by key word
- Parallel web page – will not replace existing format at least initially

A screenshot of the EPA website's "Frequent Questions about SW-846 Test Methods" page. The page features the EPA logo and name at the top left, a search bar, and a "MAIN MENU" button. Below the search bar, there are links for "Related Topics: Hazardous Waste Test Methods / SW-846" and "CONTACT US". The main heading is "Frequent Questions about SW-846 Test Methods". The text states: "EPA received many questions about hazardous waste test methods. The questions and responses are organized into categories and are listed below:". A list of categories follows, including "3000, 3500, and 3600 Series", "8000 Series: Chromatographic Separation Methods", "9000 Series: Miscellaneous Test Methods", "Detection & Quantitation", "General", "Hazardous Waste Characteristics", "Holding Time & Preservation", "Inorganic", "Methods Innovations Rule (MIR) & Method Defined Parameters (MDPs)", "Performance-Based Measurement System (PBMS) & Flexible Approach", "Quality Assurance (QA) - Quality Control (QC)", and "Sampling".

EPA United States Environmental Protection Agency

Search EPA.gov

Related Topics: [Hazardous Waste Test Methods / SW-846](#) CONTACT US

Frequent Questions about SW-846 Test Methods

EPA received many questions about hazardous waste test methods. The questions and responses are organized into categories and are listed below:

- [3000, 3500, and 3600 Series](#)
- [8000 Series: Chromatographic Separation Methods](#)
- [9000 Series: Miscellaneous Test Methods](#)
- [Detection & Quantitation](#)
- [General](#)
- [Hazardous Waste Characteristics](#)
- [Holding Time & Preservation](#)
- [Inorganic](#)
- [Methods Innovations Rule \(MIR\) & Method Defined Parameters \(MDPs\)](#)
- [Performance-Based Measurement System \(PBMS\) & Flexible Approach](#)
- [Quality Assurance \(QA\) - Quality Control \(QC\)](#)
- [Sampling](#)

Communications: SW-846 Newsletter

- Moving SW-846 mailing list (1000+ contacts) to govdelivery
- Contacts will be able to subscribe/unsubscribe
- Provide more regular communications about SW-846 updates, upcoming validation studies



SW-846 methods program contacts:

Troy Strock, chemist

- Phone: (202) 566-0504
- E-mail: strock.troy@epa.gov

Jocelyn Hospital, branch chief

- Phone: (202) 566-2233
- E-mail: hospital.jocelyn@epa.gov

Opportunities for involvement:

- Participate in an upcoming validation study
- Sign-up for SW-846 mailing list, submit a technical question about SW-846 methods:
<https://www.epa.gov/hw-sw846/forms/contact-us-about-hazardous-waste-test-methods>



ORCR staff with Kim Kirkland (former WCB branch chief), retired at the end of 2022



Charlie Appleby (retired CLP organics guru) with Dana Stalcup (former OSRTI deputy office director and OEM office director)



Resource Conservation and Recovery Act

National regulatory framework for waste management:

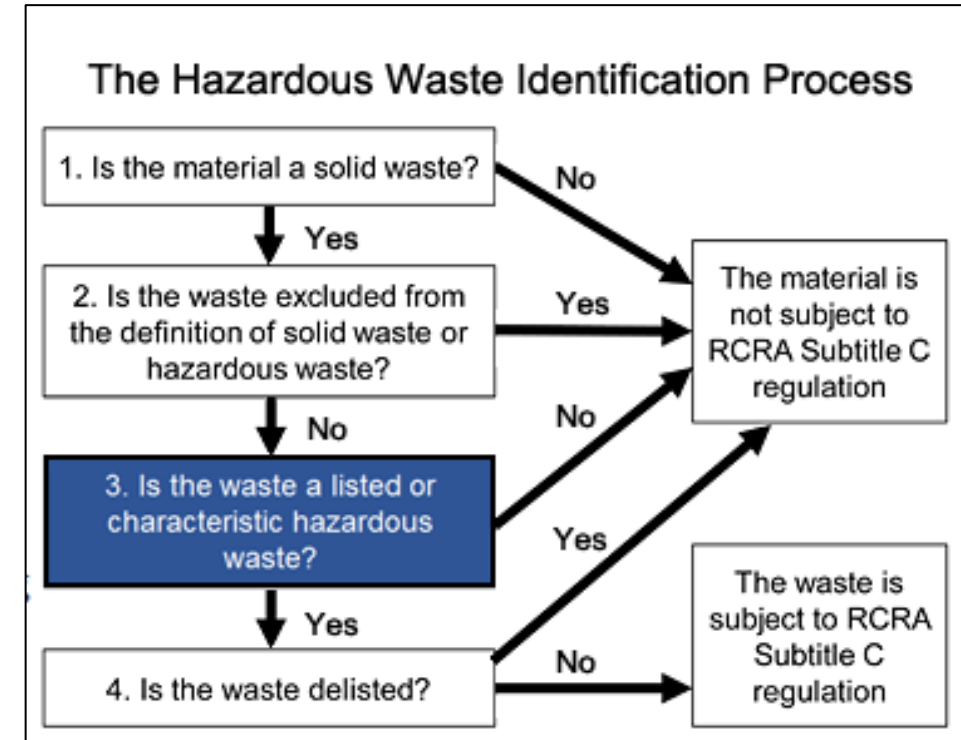
- Non-hazardous solid waste:
 - Subtitle D, 40 CFR Parts 239-258
 - Municipal, Industrial, Construction & Debris
 - State-led implementation
- Hazardous waste:
 - Subtitle C, 40 CFR Parts 260-273
 - Must be managed from cradle to grave
 - Must meet treatment standards prior to land disposal
 - Most states are authorized to implement
 - State regulations may be more stringent than federal RCRA regulations, but must be at least as stringent

The screenshot shows the EPA website page for RCRA. The header includes the EPA logo, the text 'United States Environmental Protection Agency', a search bar, and a 'MAIN MENU' button. Below the header, there is a 'CONTACT US' link. The main content area is titled 'Resource Conservation and Recovery Act (RCRA) Laws and Regulations'. It includes a brief description of the RCRA, followed by two columns of links: 'RCRA Overview' and 'RCRA Regulations'. The 'RCRA Overview' column has links for 'What is RCRA?', 'How Does RCRA Work?', and 'History of RCRA'. The 'RCRA Regulations' column has links for 'Non-hazardous Waste', 'Hazardous Waste', and 'Underground Storage Tanks'. Below these are two more columns: 'RCRA Tools and Resources' and 'Resources for State Officials'. The 'RCRA Tools and Resources' column has links for 'A to Z Index of Topics', 'Code of Federal Regulations (CFR)', 'Sign Up for Our e-Newsletters', 'Federal Registers', 'RCRA Online', 'RCRA in Focus', and 'RCRA Orientation Manual'. The 'Resources for State Officials' column has links for 'State Authorization Under RCRA', 'Policies and Guidance Documents for RCRA State Authorization', 'Documents, Data and Manuals for State Authorization', and 'Rule Checklists, Summaries and Federal Register Notices for State Authorization'. There is a 'CONTACT US' button in the bottom right corner of the page.

<https://www.epa.gov/rcra>

RCRA Hazardous Wastes

- Characteristic Hazardous Wastes §261.20-261.24:
 - Ignitable, Corrosive, Reactive, Toxic
- Listed Hazardous Wastes §261.31-261.33:
 - F and K lists: certain manufacturing and industrial process wastes
 - P and U lists: certain discarded unused commercial chemical products
- Standards for owners or operators of hazardous waste Treatment Storage and Disposal Facilities §264, 265
- Land disposal restriction §268: Must be treated, meet applicable treatment standards



<https://www.epa.gov/hw/defining-hazardous-waste-listed-characteristic-and-mixed-radiological-wastes>