



SW-846 The RCRA Program

Moving Forward

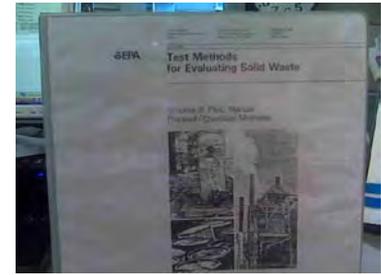
An EPA Update

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Materials Recovery and Waste Management Division (MRWMD)
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Topics to Be Covered

- ▶ What is SW-846?
- ▶ Who Uses It and Why?
- ▶ History of General RCRA Methods Policy, Regulatory Requirements, Guidance and Flexibility.
- ▶ Methods Selection.
- ▶ Organization of SW-846.
- ▶ What's New and What's In the Queue for 2014?

What is SW-846?



- ▶ Test Methods For Evaluating Solid Waste, also known as SW-846, is a living document of **250+** methods, validated, approved and appropriate for preparation and analysis of complex matrices for the Resource Conservation and Recovery Act (RCRA).
- ▶ A tool that enables analyses to be made specific to analytes of concern in matrices of concern at regulatory levels of concern.
- ▶ Methods manual that is in a modular format and flexible.

Who Uses it, and Why?

▶ Who? Internal and External Customers

- EPA HQ/regional program offices and laboratories (e.g, Superfund, Federal Facility Restoration and Reuse, Homeland Security, and Underground Storage Tanks), Other federal government agencies (e.g., DOD, FDA), States (e.g., NJ DEP), commercial labs, environmental community (ACIL, ILI, TNI, APHL), academic institutions, medical research organizations, and foreign countries.

▶ Why?

- SW-846 functions primarily as a “guidance document” setting forth acceptable, although not required, methods to be implemented by the user, as appropriate, in responding to RCRA-related sampling and analysis.
- Appropriate choice of methods can propagate cost effective remediation activities.
- General Analytical Policy and Philosophy of RCRA Program
- Regulatory Drivers (e.g., Permit, Determination of a waste characteristic, Corrective Action). *Required methods (Method Defined Parameter) can be found at: 40 CFR Part 260.11

History of General RCRA Methods Policy

Regulatory Requirements, Guidance and Flexibility

- ▶ SW-846 was developed in the early 80s, and followed a “Performance Based” methods program approach that was required for use in support of “RCRA”. Today, it still follows the same principles using a new ideology developed from the Forum for Environmental Measurement’s (FEM), titled “The Flexible Approach to Environmental Measurement”.
- ▶ Intended uses of both the analytical and method performance data to be generated must be determined and approved in the project planning stage by the regulated authority.
- ▶ For most RCRA analyses "any reliable method" may be used (58 FR 46040, Final Rule of Update II of SW-846, Aug. 1993). The regulations do not specify “how” the preparatory and determinative analyses will be performed.

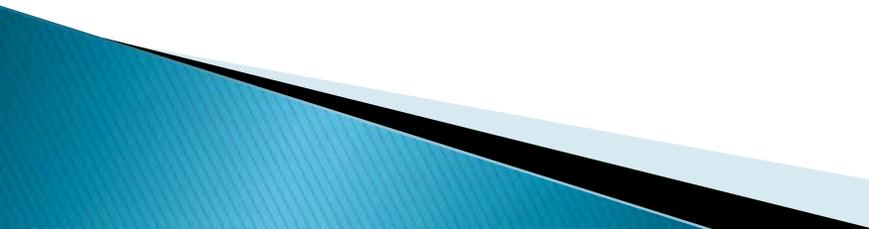
History of General RCRA Methods Policy Regulatory Requirements, Guidance and Flexibility Cont.

- ▶ October 1997 PBMS, 62 FR 52098 – allows the regulated community the flexibility to select any appropriate analytical test that meets the Data Quality Objectives (DQO) and demonstrates analytical capability.
- ▶ **The Methods Innovation Rule (MIR) or De-Reg Reg.), promulgated on July 14, 2005 (70 FR 34537), provided method selection flexibility for non-required methods, and listed required methods for RCRA in 40 CFR.260.11.**
- ▶ Authorized States can require the use of SW-846 methods for any or all applications in their RCRA Programs, however, the EPA Regions do not have the statutory authority to require the use of SW-846 methods for non-mandatory applications.

Flexibility of RCRA Methods

- ▶ Monitoring requirements under RCRA Subtitle C specify only that the analyst must demonstrate that one can determine the analytes of concern in the matrix of concern at the regulatory level of concern.
- ▶ RCRA specifies "what" needs to be determined, and leaves the "how" up to the analyst.
 - Questions before analyses:
 - Determine the questions. What do I need to know? How good do that data have to be?
 - How can you solve it? Process knowledge or there's a need for method selection (sample preparation and analyses).
 - What does your Project plan say?

Flexibility of RCRA Methods Cont.

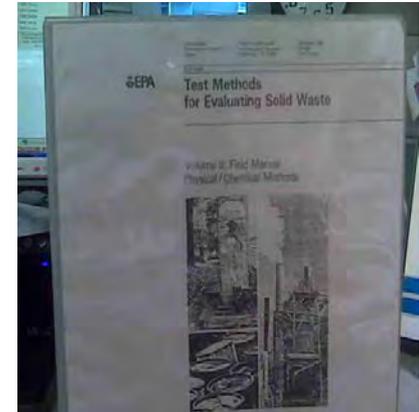
- ▶ With the exception of required use for the analysis of method-defined parameters (MDPs), SW-846 methods are intended to be guidance methods;
 - ▶ Each method contains general information on how to perform an analytical procedure or technique;
 - ▶ A laboratory can use a method as a basic starting point for generating its own detailed standard operating procedure (SOP), either for its own general use or for a specific project application;
 - ▶ Data users (e.g., states or federal government agencies) may impose additional QA/QC and data reporting requirements for their intended applications.
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Method Selection

<http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm>

SW-846 Methods are:

- ▶ New
- ▶ Revised
- ▶ Validated
 - http://www.epa.gov/epawaste/hazard/testmethods/sw846/new_meth.htm
- ▶ Previous Version



*Latest version most preferred

Organization of SW-846

- ▶ SW-846 is organized as a methods manual.
 - Minimizes redundancy in individual methods (Saves trees)
 - Organized into specific Functional Chapters and method series
- ▶ SW-846 has modular methods

Organization of SW-846

<u>CHAPTER</u>	<u>TOPIC</u>
One	Quality Control
Two	Choosing the Correct Procedure
Three	Metallic Analytes
Four	Organic Analytes
Five	Miscellaneous Test Methods
Six	Properties
Seven	Characteristics – Introduction and Regulatory Definitions

Organization of SW-846 Cont.

<u>CHAPTER</u>	<u>TOPIC</u>
Eight	Methods for Determining characteristics
Nine	Sampling Plan
Ten	Sampling Methods
Eleven	Ground Water Monitoring
Twelve	Land Treatment Monitoring
Thirteen	Incineration

Organization of SW-846 cont.

Modular Methods Format

- ▶ Module is defined as taking an analysis to a point where it can be stopped without adverse affect on the sample, e.g., sample extraction.
- ▶ Individual methods were developed for sample preparation, cleanup, and analytical determination.
- ▶ Modular format is necessary because RCRA deals with a large variety of matrices, e.g., air, soil, water, sediment, sludge, organic solvents, materials, etc.
- ▶ SW-846 analytical methods are modular and can be tailored to the analyses of specific matrices by choosing the appropriate sample preparation, cleanup and determinative methods.

*The DISCLAIMER and Chapter Two allow flexibility to modify SW-846 methods.

Examples of Modular Methods

- ▶ **Sample Preparation Methods**
 - Method 3540 – Soxhlet Extraction (Solids)
 - Method 3050 – Acid Digestion of Sediments, Sludges and Soils
- ▶ **Cleanup Methods**
 - Method 3640 – Gel Permeation Cleanup
 - Method 3665 – Sulfuric Acid/Permanganate Cleanup

Example of Determinative Methods

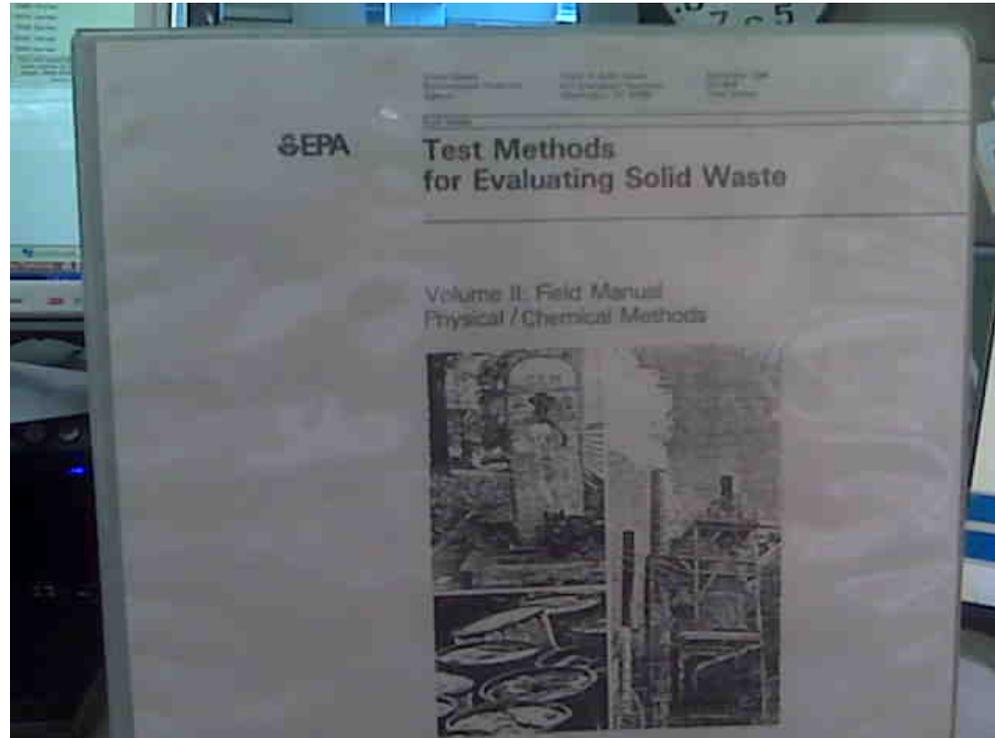
- ▶ Determinative Methods are used to measure the target analyte.
 - Examples of determinative methods are:
 - Method 8270 – Semivolatile Organic Compounds by GC/MS
 - Method 6010 – Inductively Coupled Plasma – Atomic Emission Spectrometry (ICP)
 - Method 6020 – ICP/MASS Spec

Which Version of SW-846 Method May Be Used?

SW-846 METHOD STATUS TABLE (Cont.)

METHOD NUMBER (Date in parenthesis is found at bottom right-hand corner of method).							METHOD TITLE
THIRD EDITION (9/86)	FINAL UPDATE I (7/92)	FINAL UPDATE II (9/94) IIA (8/93) IIB (1/95)	FINAL UPDATE III (12/96) IIIA (4/98) IIIB (11/04)	FINAL UPDATE IV (2/07)	UPDATE V (10/12)	OTHER METHODS (VARIOUS DATES)	
–	–	–	1030 (Up. III)	–	1030	–	Ignitability of Solids
–	–	–	–	1040	–	–	Test Method for Oxidizing Solids
–	–	–	–	1050	–	–	Test Methods to Determine Substances Likely to Spontaneously Combust
1110	–	–	1110A (Up. IIIB)	–	–	–	Corrosivity Toward Steel
–	–	–	1120 (Up. III)	–	–	–	Dermal Corrosion
1310	1310A	–	1310B (Up. IIIB)	–	–	–	Extraction Procedure (EP) Toxicity Test Method and Structural Integrity Test
–	1311	–	–	–	–	–	Toxicity Characteristic Leaching Procedure
–	–	1312	–	–	–	–	Synthetic Precipitation Leaching Procedure
–	–	–	–	–	–	1313 (9/12)	Liquid-Solid Partitioning as a Function of Extract pH using a Parallel Batch Extraction Procedure
–	–	–	–	–	–	1316 (10/12)	Liquid-Solid Partitioning as a Function of Liquid-Solid Ratio using a Parallel Batch Extraction Procedure
1320	–	–	–	–	–	–	Multiple Extraction Procedure
1330	1330A	–	–	–	–	–	Extraction Procedure for Oily Wastes

What's New and In the Queue for SW-846?



Update V, Update VI and Collaborations

Status of Update V

ORCR....

- ▶ Published Update V (78 FR No. 205, October 23, 2013).
- ▶ Announced the availability of 23 new and revised methods, 5 revised chapters, and SW-846 Policy Statement.
- ▶ Closed the comment period on January 23, 2014, 111 comments received.
- ▶ Reviewed comments and revising several methods based on accepted comments.
- ▶ Will announce the final methods package in a FR notice in the Fall of 2014 to formally incorporate Update V in SW-846.

23 new and revised methods, 5 revised chapters, and SW-846 Policy Statement

"Update V"

Published – 78 FR 63185/October 23, 2013

* New Methods

1030	Ignitability of Solids
3200*	Mercury Species Fractionation and Quantification by Microwave-assisted Extraction, Selective Solvent Extraction and/or Solid Phase Extraction
3511*	Organic Compounds in Water by Microextraction
3572*	Extraction of Wipe Samples for Chemical Agents
3620C	Florisil Cleanup
4025*	Screening for Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans (PCDD/Fs) by Immunoassay
4430*	Screening For Polychlorinated Dibenzo-p-Dioxins And Furans (PCDD/Fs) By Aryl Hydrocarbon-Receptor PCR Assay
4435*	Method For Toxic Equivalents (TEQS) Determinations For Dioxin-Like Chemical Activity with the CALUX® Bioassay
5021A	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis
6010D	Inductively Coupled Plasma-Atomic Emission Spectrometry
6020B	Inductively Coupled Plasma-Mass Spectrometry
6800	Elemental and Speciated Isotope Dilution Mass Spectrometry
8000D	Determinative Chromatographic Separations
8021	Aromatic and Halogenated Volatiles by Gas Chromatography Using Photoionization and/or Electrolytic Conductivity Detectors
8111	Haloethers by Gas Chromatography
8270D	Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry
8276*	Toxaphene and Toxaphene Congeners by Gas Chromatography/Negative Ion Chemical Ionization Mass Spectrometry (GC-NICI/MS)
8410	Gas Chromatography/Fourier Transform Infrared Spectrometry for Semivolatile Organics: Capillary Column
8430	Analysis of Bis(2-Chloroethyl) Ester and Hydrolysis Products by Direct Aqueous Injection
9013A	Cyanide Extraction Procedure for Solids and Oils
9014	Titrimetric and Manual Spectrophotometer Determinative Methods for Cyanide
9015*	Metal Cyanide Complexes by Anion Exchange Chromatography and UV Detection
9320	Radium 228
Chapters	Revised Chapters 1 -5
Policy Statement	SW-846 Policy Statement, definitions and terms

What's New and What's In the Queue for 2014?

“Update VI”

Leaching Environmental Assessment Framework (LEAF)

Posted under “Validated Methods” – Fall 2013

- 1313 – Liquid–Solid Partitioning as a Function of Extract pH using a Parallel Batch Extraction Procedure
- 1316 – Liquid–Solid Partitioning as a Function of Liquid–Solid Ratio using a Parallel Batch Extraction Procedure
- 1314 – Liquid–Solid Partitioning as a Function of Liquid–Solid Ratio for Constituents in Solid Materials using an Up–flow Percolation Column Procedure
- 1315 – Mass Transfer Rates of Constituents in Monolithic or Compacted Granular Materials using a Semi–dynamic Tank Leaching Procedure

New and Revised Methods (Inorganic and Organic)

- 1340– In–Vitro Bioaccessibility Assay For Lead in Soil
- 3050 – Acid Digestion of Sediments, Sludges, and Soils
- 6200 – Field Portable X–Ray Fluorescence Spectrometry For the Determination of Elemental Concentrations in Soils and Sediment
- 8260 – Volatile Organic Compounds by Gas Chromatography/ Mass Spectrometry
- 8270 – Semivolatile Organic Compounds by Gas Chromatography/ Mass Spectrometry

Leaching Environmental Assessment Framework (LEAF)

- ▶ Leaching characterization is applied to anticipated release conditions resulting in improved accuracy and more reliable environmental decision making

“An Integrated Framework for Evaluating Leaching in Waste Management and Utilization of Secondary Materials,” D.S. Kosson, H.A. van der Sloot, F. Sanchez, and A.C. Garrabrants, Environ. Engr. Sci., 19(3): 159–204, 2002.

- ▶ The LEAF methods were designed to address concerns of EPA Science Advisory Board

- Considers the form of the material (e.g., monolithic)
- Primary focus on parameters that affect leaching [(e.g., pH, liquid–solid ratio (L/S), release rate)]

- ▶ Intended for situations where “TCLP” is not required or best suited

- Assessment of non–hazardous materials for beneficial reuse
- Evaluating treatment effectiveness (not part of LDR regulation, but can be used for e.g., determination of equivalent treatment)
- Characterizing potential release from high–volume materials
- Corrective action (remediation treatability decisions)

Leaching Environmental Assessment Framework (LEAF)

- LEAF test methods have been developed, validated, and published and are available for use to characterize the leaching potential over a range of conditions (i.e., pH, liquid-to-solid ratio, and waste form)
- LEAF characterization tests can be used to evaluate range of materials to identify leaching behavior for range of field conditions for disposal and beneficial use
- Supporting software is available for implementation including (1) LEAF method templates and (2) LeachXS-Lite for data entry, analysis, visualization, and reporting
- Guidance is being developed to implement LEAF
- LEAF Methods have been released on EPA's Web Site:
http://epa.gov/wastes/hazard/testmethods/sw846/new_meth.htm

Collaborations and Potential Future Projects

- ▶ Forum for Environmental Measurements (FEM):
 - MoniTOR, Outreach, Detection Limit and Quantitation, Managers Quarterly, etc.
- ▶ ACIL/ILI – Method Review
- ▶ Regions – Expansion of Method 8015 (Resources permitting)

Other –

- DoD – Revision to Method 8330 (Resources permitting)
- Academic Institutions–
 - Vanderbilt University – LEAF Methods User Guide
 - Duquesne University – Using Method 6800 to explore the correlation of blood and autism.

Potential Future Projects (Resources Permitting)

- ▶ Regulatory Updates – Flash Point, Mercury Thermometers, Corrosivity (pH)

Contact Information

- ▶ Methods Team Home Page: www.epa.gov/SW-846

- ▶ Methods Information Communication Exchange (MICE)
 - Phone: (703) 818-3238
 - Fax: 703-818-8813
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 - <http://www.epa.gov/epawaste/hazard/testmethods/mice.htm>

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Let's Talk.... Any Questions?

