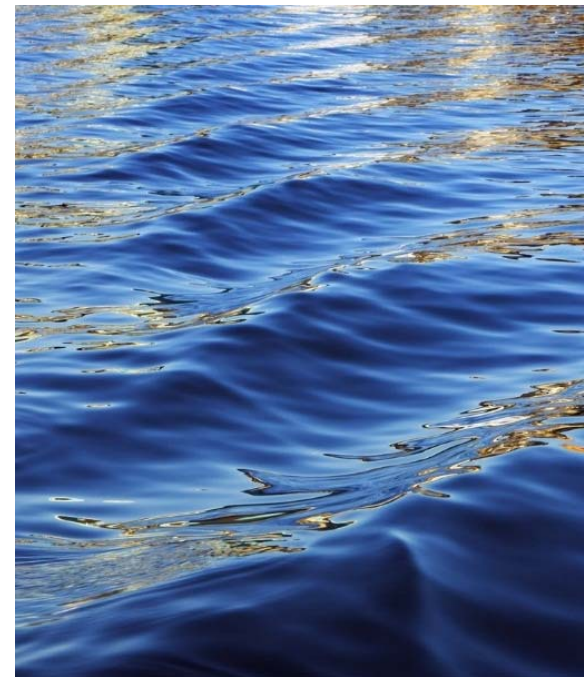


PCBs in Region 7

PCB FAST Toolbox and Other Resources

Annah Murray
PCB Coordinator
U.S. EPA Region 7

October 1, 2019



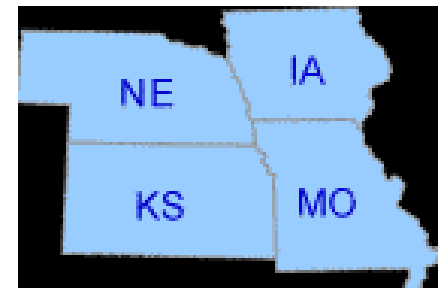
PCBs – Not Just Another Chlorinated Hydrocarbon

- **Introduction**

- Annah Murray, Region 7 PCB Coordinator for just over a year
- Started at U.S. EPA a little over four years ago
- B.S. and M.S. in environmental geology with a focus on contaminant transport.

- **Topics**

- Polychlorinated Biphenyls or PCBs – a group of manmade organic chemicals consisting of carbon, hydrogen and chlorine
- PCBs – Properties and Uses
- PCB Impacts to Human Health and the Environment
- Regulations and History
- Disposal and Cleanup Options
- Exciting tools and new resources available for PCB work nationwide
 - PCB Module in RCRA Info
 - PCB FAST
 - PCB Quick Reference Guide



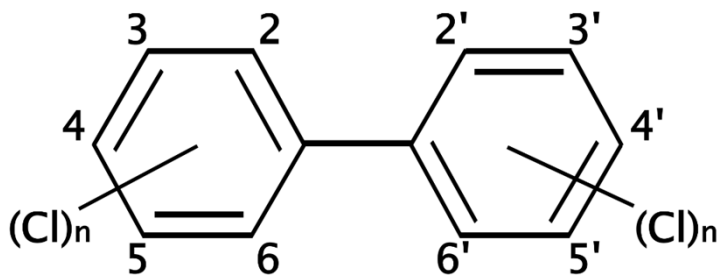


PCBs

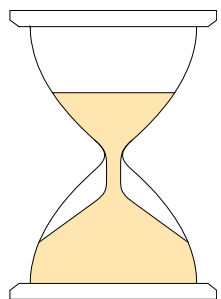
Properties and Uses



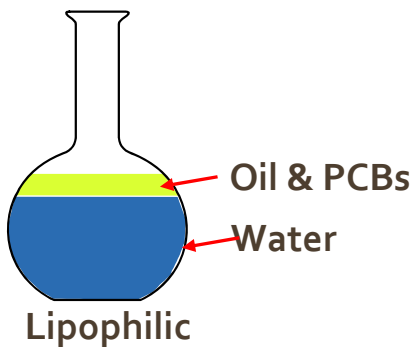
Chemical Properties of PCBs



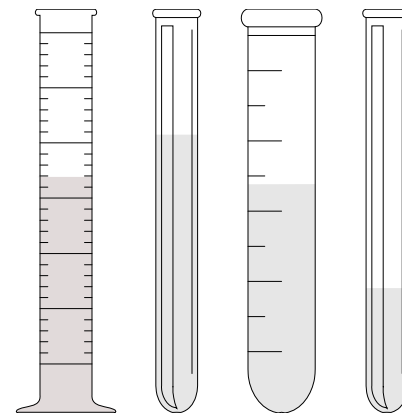
209 Congeners – Unique well-defined compounds in the PCB Class



Stable to aging



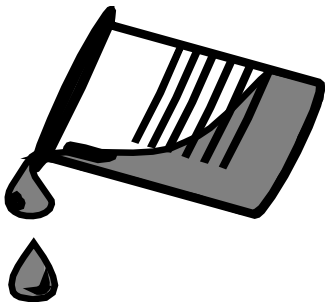
Lipophilic



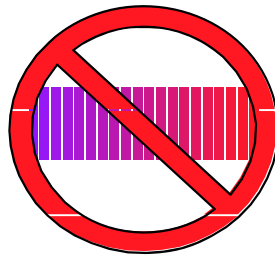
Used as mixtures of congeners
commonly called Aroclors

(Aroclor 1254 → First 2 digits usually refer to the number of carbon atoms in the phenyl rings, for PCBs this is 12; and the second 2 digits are percentage of chlorine, 54% chlorine by mass)

Physical Properties of PCBs



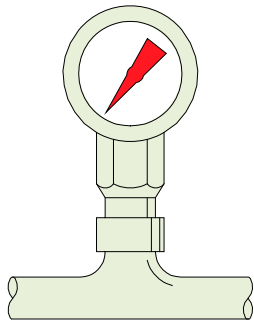
Viscous liquid or solid



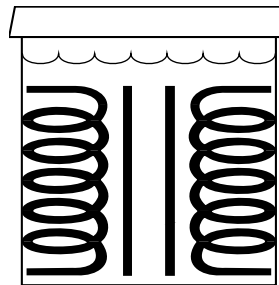
Colorless



Odorless



Low vapor pressure

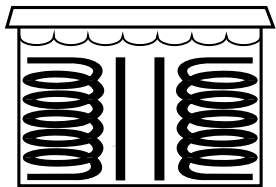


Low electrical conductivity

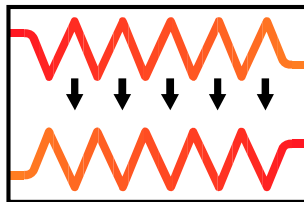


Flame retardant

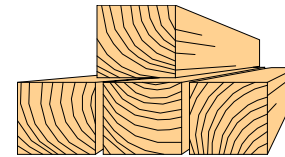
Uses of PCBs (commercially produced 1929-1978)



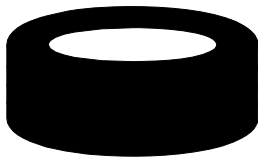
Dielectric fluid



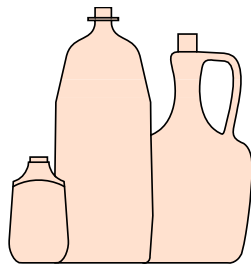
Heat transfer fluid



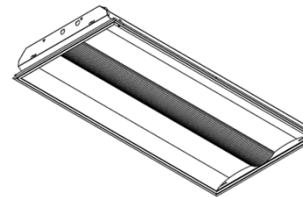
Construction materials (e.g.,
caulk, sealants, tiles, etc.)



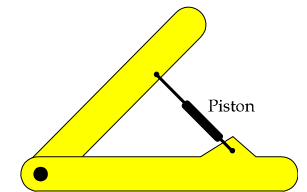
Gaskets & damping felt



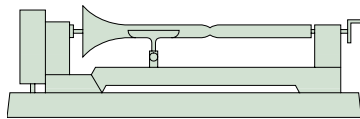
Plasticizer



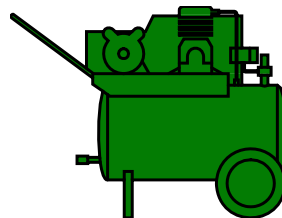
Fluorescent light ballasts



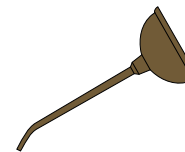
Hydraulic fluid



Cutting oils



Vacuum pump fluid

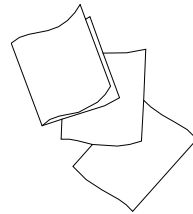


Lubricants

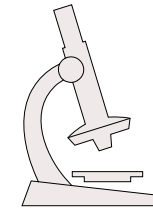
Uses of PCBs (continued)



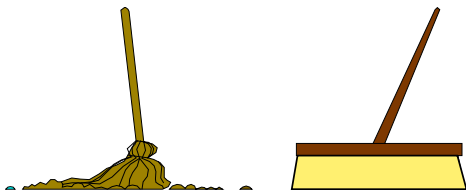
Adhesives



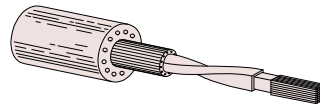
Carbonless copy paper



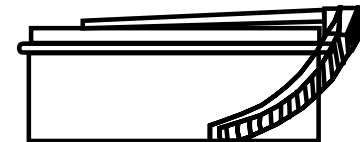
Microscopy
(mounting media & immersion oil)



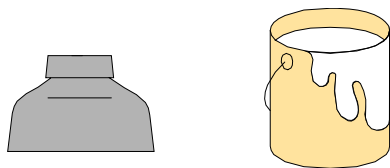
Dedusting agents



Electric cable insulation



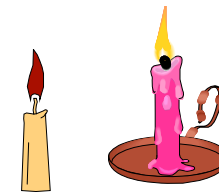
Fuel tank coatings



Inks & paints



Pesticide extenders



Casting wax



PCBs

Human Health and the Environment



Human Health Impacts

- Cancer – PCBs are shown to cause cancer in animals and are probable human carcinogens
- 12 congeners are “dioxin-like”
- Regional Screening Levels – Values with target cancer risk of $1E-06$ and a target hazard quotient of 1.0

Contaminant		Screening Levels										Protection of Ground Water SSLs			
Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air ($\mu\text{g}/\text{m}^3$)	key	Industrial Air ($\mu\text{g}/\text{m}^3$)	key	Tapwater ($\mu\text{g}/\text{L}$)	key	MCL ($\mu\text{g}/\text{L}$)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)
Polychlorinated Biphenyls (PCBs)															
~Aroclor 1016	12674-11-2	4.1E+00	n	2.7E+01	c**	1.4E-01	c	6.1E-01	c	2.2E-01	c**		2.1E-02	c**	
~Aroclor 1221	11104-28-2	2.0E-01	c	8.3E-01	c	4.9E-03	c	2.1E-02	c	4.7E-03	c		8.0E-05	c	
~Aroclor 1232	11141-16-5	1.7E-01	c	7.2E-01	c	4.9E-03	c	2.1E-02	c	4.7E-03	c		8.0E-05	c	
~Aroclor 1242	53469-21-9	2.3E-01	c	9.5E-01	c	4.9E-03	c	2.1E-02	c	7.8E-03	c		1.2E-03	c	

Key Takeaway Point:

Screening levels (SLs) for PCBs are risk-based concentrations derived from combining exposure information and toxicity data; are updated periodically, extensively reviewed, and made publicly available at :

<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>

Human Health Effects

- PCBs have been shown to cause cancer in animals, as well as a number of serious non-cancer health effects in animals and humans, including:
 - **Effects on the immune system**
 - Significant decrease in size of the thymus gland, reduction in immune response, decreased resistance to Epstein-Barr virus and other infections (Source: <https://www.cdc.gov/epstein-barr/about-ebv.html>)
 - **Reproductive system**
 - Reduced birth weight, conception rates, and sperm counts.
 - **Nervous system**
 - Newborn monkeys exposed to the types of PCBs found in human breast milk showed persistent and significant deficits in neurological development, including visual recognition, short-term memory, and learning.
 - **Integumentary (dermal and ocular effects)**
 - **Endocrine system**
 - Endocrine disruption and Thyroid hormone impacts
 - **Other health effects** [global and national studies in humans support evidence for potential carcinogenic and non-carcinogenic effects of PCBs. Source: Integrated Risk Information System (IRIS) https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0294_summary.pdf]

Biomonitoring

- Biomonitoring:
 - Biomonitoring refers to the measurement of chemicals in human bodies, such as in blood or urine. (<https://www.epa.gov/ace/ace-biomonitoring>)
 - The data are from a national survey that collects blood specimens from a representative sample of the U.S. civilian noninstitutionalized population every two years, and then measures the concentration of various contaminants in the blood. (n = 2273)
 - The 2001-2004 data can be found here: <https://www.epa.gov/americaschildrenenvironment/ace-biomonitoring-polychlorinated-biphenyls-pcbs>
- Statistically Significant Findings using PCB Indicator B7:
 - The median level of PCBs in blood serum among women ages 16 to 49 years (the sum of PCBs 118, 138, 153 and 180) was 30 ng/g lipid (0.03 ppm).
 - The 95th percentile concentration of PCBs among women ages 16 to 49 years was 106 ng/g lipid (0.106 ppm).
- The Agency for Toxic Substances and Disease Registry has determined that “Substantial data suggest that PCBs play a role in neurobehavioral alterations observed in newborns and young children of women with PCB burdens near background levels.” (U.S. EPA, 2013. America's Children and the Environment, Third Edition) (<https://www.epa.gov/americaschildrenenvironment/americas-children-and-environment-third-edition>)
 - 2000, 2003, and 2013 publications can be found here: <https://www.epa.gov/americaschildrenenvironment/ace-publications>

Environmental Impacts

- Persistent, bioaccumulative, and can be transported long distances
- 500 of the 1,598 National Priorities List sites identified by EPA have found PCBs.
- From the RSL Table for Aroclor 1242:
 - Residential Soil RSL 0.23 mg/kg (Industrial soil is 0.95 mg/kg)
 - Residential Air RSL .0049 ug/m³ (Industrial air is 0.021 ug/m³)
 - Groundwater MCL 0.5 ug/L total PCBs (Protection of groundwater SSL is 0.0012 ug/L)
 - Tapwater is 0.0078 ug/L
- State and Local Fish advisories (ex:5 of the 10 fish consumption advisories in MO are for PCBs, and over 13 counties in NE has similar advisories).
- Agency for Toxic Substances and Disease Registry Facts (ATSDR)
 - EPA regulates lakes and streams impacted with PCBs (not to exceed 0.17 ppt)
 - FDA regulates edible fish sold, down to 2 ppm
 - OSHA regulates that workers not be exposed by inhalation in 8 hours for 5 days per week to more than 1 mg/m³ for Aroclor 1242; and not more than 0.5 mg/m³ for Aroclor 1254. (≈500 ug/m³)



PCBs

Regulations and History (very brief)

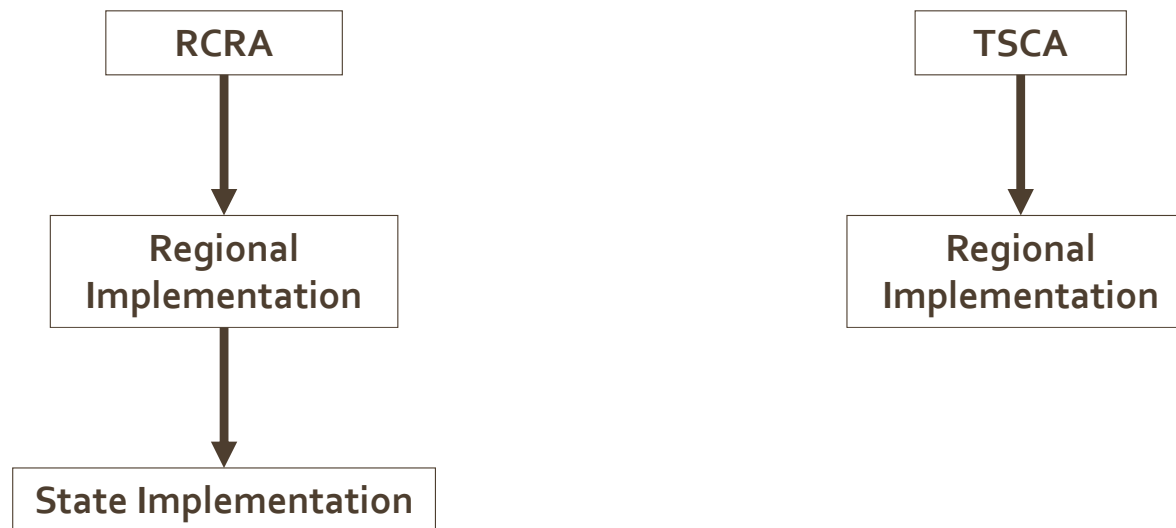


Regulatory History

- **Manufactured in U.S. from 1929 to 1979**
- **Toxic Substances Control Act, or TSCA, passed by Congress in 1976**
 - TSCA Section 6(e) banned the manufacture and use of PCBs
 - Allowed EPA to authorize limited uses through a rulemaking process
 - EPA issued regulations in 1979 on the use, manufacturing, processing, distribution in commerce, cleanup, and disposal of PCBs
 - 1998 “Mega Rule” – major changes to the cleanup and disposal sections
 - 2017 Frank R. Lautenberg Chemical Safety for the 21st Century Act – Risk-based chemical assessments and a consistent source of funding
- **TSCA PCB Regulations found at 40 CFR Part 761**
- **PCB Cleanup and Disposal Program evolved separately from other cleanup and disposal programs**
 - Transferred the program to the “RCRA Office” (Office of Resource Conservation and Recovery) in 2007, but the regs stayed the same
 - Regulations regarding the use of PCBs are still managed by the TSCA program office

Implementation of the PCB Regulations

Unlike RCRA, TSCA *not* delegated to states
However TSCA *is* tracked in a RCRAInfo module, just like RCRA



See PCB Module and Report

PCB Module in RCRA Info – *NEW in 2018!!* – Data Population Phase

RCRAInfo Home - Internet Explorer

File Edit View Favorites Tools Help

RCRAInfo Home Reports USITS Settings Tools Documentation Annah

Approval Type	Activity Type	Approval Status	Approving Authority	Most Recent Milestone Date	Most Recent Milestone Description	Days Since Application Received
761.65(d) - Commercial Storage	Initial	Administratively Continued	Region 7	09/12/2013	Approval Issued by EPA	2,216
761.65(d) - Commercial Storage	Renewal	Draft with EPA	Region 7	07/26/2019	Application Received	-12
761.65(d) - Commercial Storage, 761.72 - Scrap Metal Recovery Ovens and Smelters	Renewal	Draft with EPA	Region 7	01/30/2019	Application Received	165
761.65(d) - Commercial Storage, 761.72 - Scrap Metal Recovery Ovens and Smelters	Renewal	Administratively Continued	Region 7	07/11/2013	Approval Issued by EPA	2,294
761.61(a) - Remediation Waste Self-Implementing	Initial	Draft with Facility	Region 7	03/21/2019	Meeting with EPA	
761.61(a) - Remediation Waste Self-Implementing	Initial	Draft with Facility	Region 7	11/01/2016	61(a) Notification	
761.61(c) - Remediation Waste Risk-based	Initial	Draft with Facility	Region 7	07/01/2003	61(c) Cleanup Application Received	5,857
761.61(a) - Remediation Waste Self-Implementing	Initial	Draft with EPA	Region 7	04/18/2019	61(a) Notification	
761.77 - Coordinated Approval	Initial	Draft with Facility		03/19/2019	Meeting with EPA	

19

100%

PCB Regulations – 40 CFR Part 761

- **Key Sections of the Regulations:**

- Definitions
 - Use Authorizations
 - Applicability
 - Disposal/Storage Options
 - Cleanup Options
 - Import/Export
 - Recordkeeping
 - Sampling/Analytical Requirements
- PCBs are regulated by concentration, date of release, and type of waste.
 - No use is authorized at any concentration outside of a totally enclosed manner.
 - See TSCA FAST



TSCA FAST Toolbox

- In October 2014, U.S. EPA took a hard look at the process involved, and requirements for, approving PCB cleanup plans.
- This effort resulted in over 25 recommendations to reduce inefficiencies that were received from the various participants.
- These recommendations were then used in developing and releasing the 2017 PCB Facility Approval Streamlining Toolbox (PCB FAST), designed to help responsible parties and regulators reduce delays, improve communication, and increase efficiency in the cleanup and disposal of PCBs at a site.
- A way to manage both expectations and planning budgets.
- Provides 4 specific tools to guide PCB-impacted sites through the regulatory requirements.

Main Types of PCB Wastes

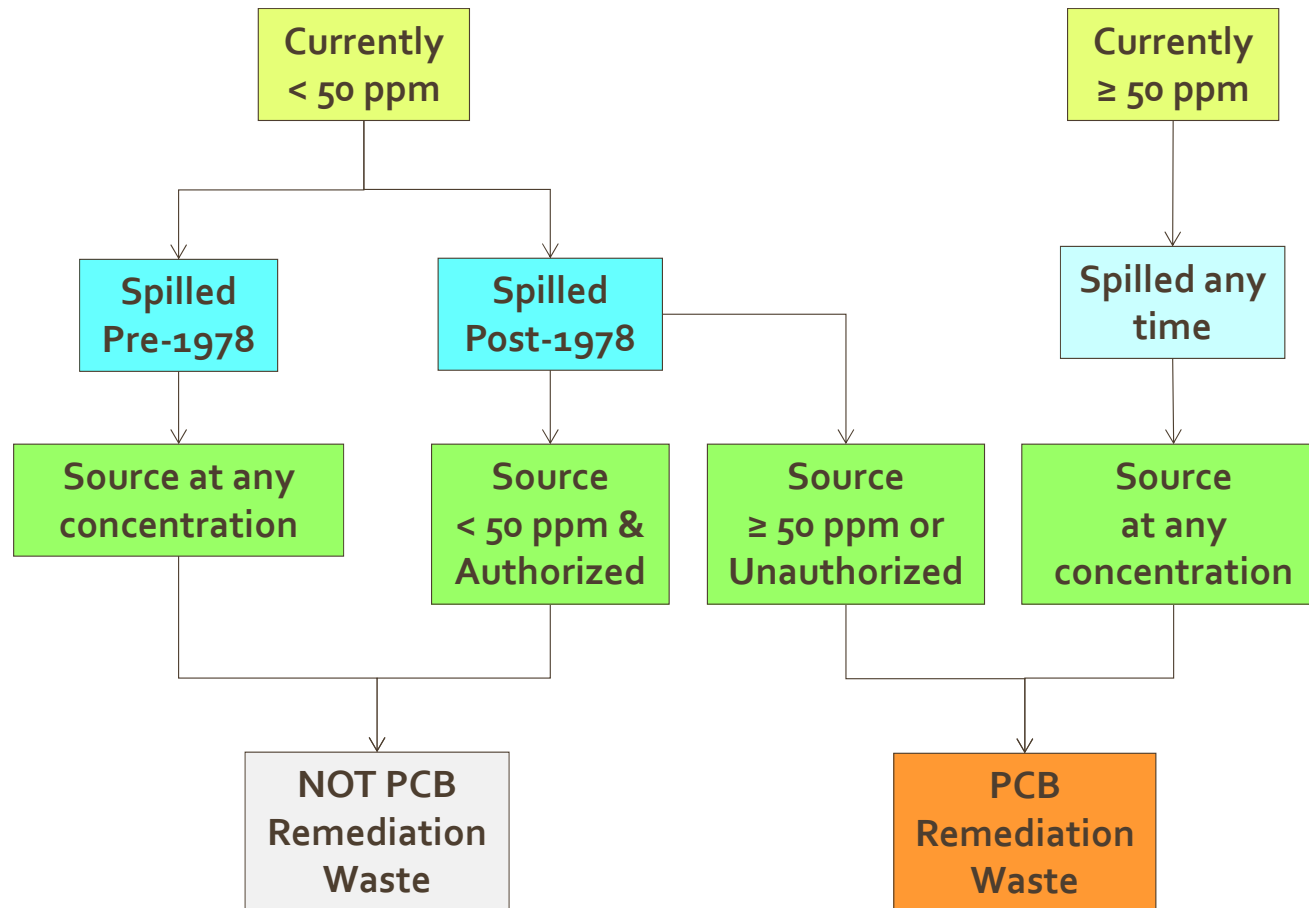
- **PCB Liquids**
 - Liquids like mineral oil dielectric fluid ≥ 50 ppm
- **PCB Articles**
 - Transformers, capacitors, natural gas pipelines, electrical equipment
 - "PCB-Contaminated" if 50-500 ppm; "PCB" if ≥ 500 ppm
- **PCB Bulk Product Waste**
 - Non-liquids that are currently > 50 ppm and were manufactured to contain PCBs
 - Examples: caulk, paint, plastics
 - May be disposed of in municipal landfills at any concentration
 - If state allows and landfill is able/willing to accept it
- **PCB Remediation Waste**
 - Contaminated from a spill or release of PCBs (e.g., soil, concrete, masonry)
 - Regulatory requirements depend on *spill date and source concentration*

Examples of Remediation Waste:

- **Bulk PCB Remediation Wastes**
 - Soil
 - Dredged materials
 - Gravel
 - Mud
 - Sediments
 - Sludge (industrial, sewage)
- **Non-Porous Surfaces**
 - Building stone (impermeable polished)
 - Ceramics (smooth glazed)
 - Glass (smooth)
 - Metal (smooth uncorroded)
 - Plastics (high density)
- **Porous Surfaces**
 - Asphalt
 - Building stone (porous)
 - Ceramics (unglazed)
 - Concrete and cement
 - Plaster
 - Plastics (low density)
 - Paint or coating on metal
- **Liquid PCB Remediation Wastes**
 - Aqueous decantate from sediment
 - Leachate
 - Removed water from bulk PCB remediation wastes
 - Water in direct contact with PCBs (e.g., in contact with oil or soils containing PCBs)

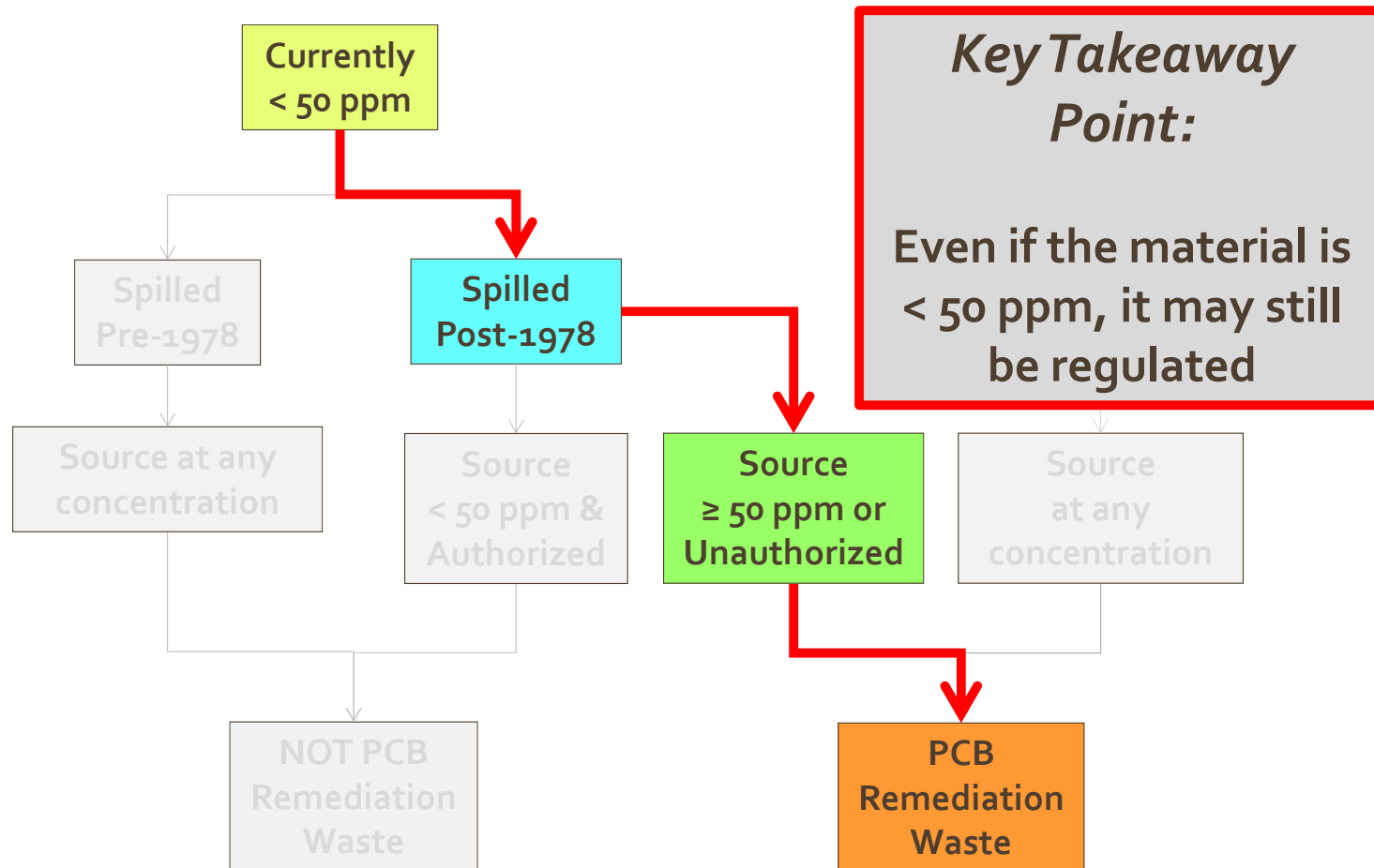
Definition of "PCB Remediation Waste"

This is a generalized depiction; see 40 CFR 761.3 for full detail



Definition of "PCB Remediation Waste" (continued)

This is a generalized depiction; see 40 CFR 761.3 for full detail



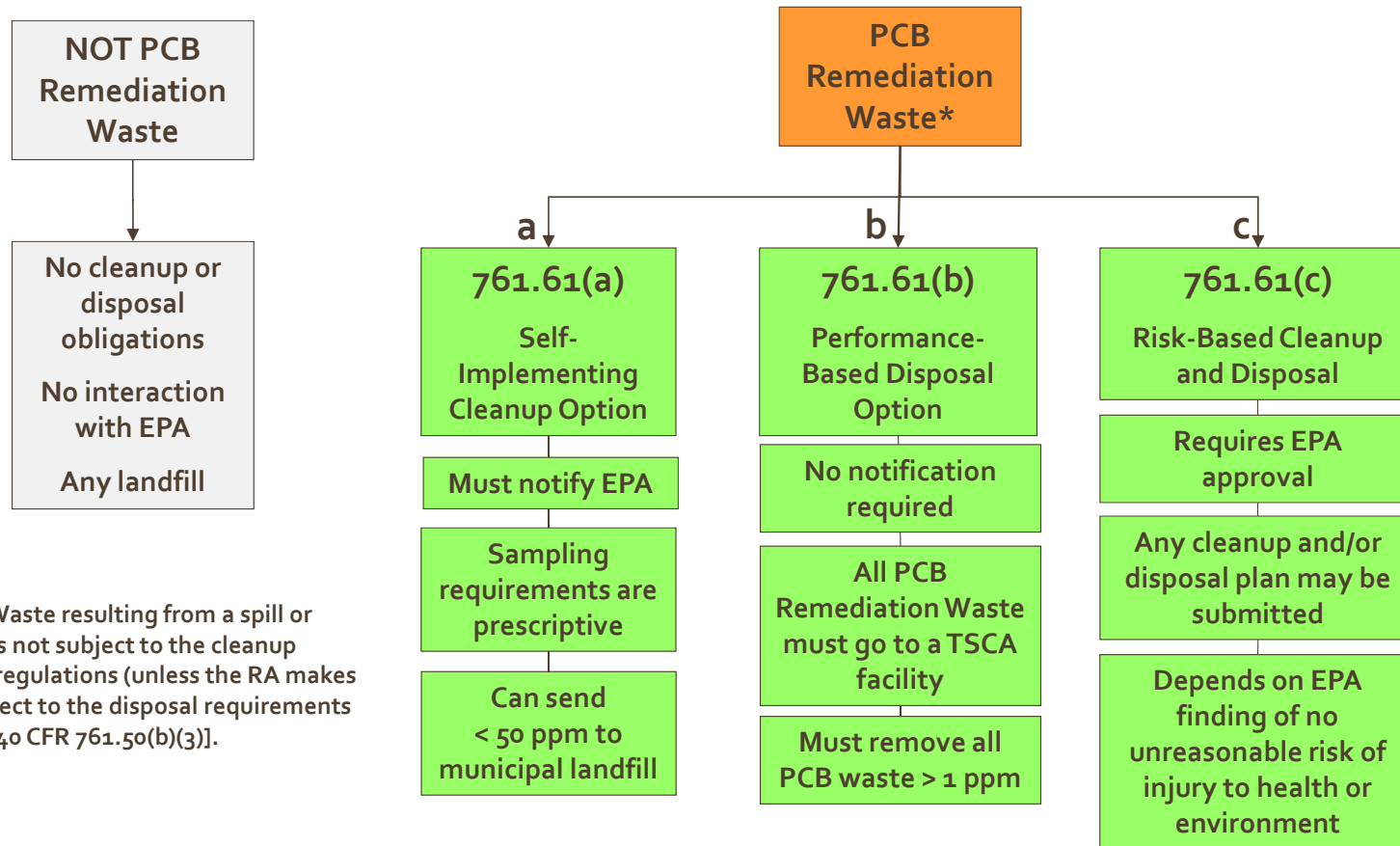


PCBs

Disposal and Cleanup Options



PCB Remediation Waste – Cleanup and Disposal Options



* PCB Remediation Waste resulting from a spill or release before 1978 is not subject to the cleanup requirements of the regulations (unless the RA makes a finding), but is subject to the disposal requirements if it is picked up [see 40 CFR 761.50(b)(3)].

PCB Disposal Options

The general, most conservative disposal options are a TSCA-approved landfill (for non-liquids) or a TSCA-approved incinerator.

Other disposal options are available depending on the media, concentration, and the cleanup option.

- **EPA issues TSCA approvals to:**

- **Incinerators** (761.70)
- **Landfills** (761.75)
- **Alternatives Technologies to Incineration** [761.60(e)] (e.g., chemical dechlorination or thermal desorption)
- **Alternative Decontamination** [761.79(h)]
- **Risk-Based Disposal Approvals** [761.61(c) & 761.62(c)]

- **“Permitted by Rule”**

- Certain decon methods [761.79(b)]
- Scrap Metal Recovery Ovens (761.72)
- High-Efficiency Boilers (761.72)

- **Non-TSCA Options**

- RCRA C landfills
- RCRA D and other non-hazardous landfills

- **Coordinated Approvals** (761.77)

- If already has permit through other authority, like RCRA
- The permit must be “no less stringent in protection of health or the environment than the applicable TSCA requirements.”



PCBs

Existing Tools and New Resources



Existing Resources

- **Comprehensive Q&A Manual**
 - Commonly asked questions on all manner of topics
- **Sampling Guidance**
 - How to sample natural gas pipeline, apply a grid sampling plan, do wipe sampling, etc.
- **Spill Cleanup Policy Guidance**
 - An enforcement policy that applies to spills less than 72 hours old
- **Checklists for 61(a) and 61(c) cleanup applications**
 - Excellent resource for those submitting cleanup plan

A more complete list of PCB guidance can be found at the EPA website under “**Learn**” at <https://www.epa.gov/pcbs>

Resources Mentioned in This Presentation

- **RSL Tables:** <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>
- **PCB Biomonitoring:** <https://www.epa.gov/sites/production/files/2015-05/documents/biomonitoring-pcbs-data.pdf>
- **IRIS:** https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0294_summary.pdf
- **ATSDR:** <https://www.atsdr.cdc.gov/ToxProfiles/tp.asp?id=142&tid=26>
- **Toxicity Equivalence Factors Fact Sheet for "Dioxin-like" PCBs:** <https://semspub.epa.gov/work/HQ/174558.pdf>
- **TSCA FAST Toolbox:** <https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process>

- **BONUS:** Region 7 Quick Reference Guide: (Call or email your regional coordinator for a copy of this clickable document.)

PCB Cleanup Options

The PCB regulations include three options for management of PCB remediation waste:

①	②	③
Self-implementing cleanup and disposal [40 CFR section 761.61(a)]	Performance-based disposal [40 CFR section 761.61(b)]	Risk-based cleanup and disposal [40 CFR section 761.61(c)]
This option links cleanup levels with the expected occupancy rates of the area or building where the contaminated materials are present. The disposal requirements of this option vary based on the type of contaminated material and concentration of PCBs in the materials. <i>You must notify EPA if you intend to utilize the self-implementing option.</i> ★ Consider using Tool 3, TSCA Self-Implementing PCB Cleanups Checklist, provided in the PCB Facility Approval Streamlining Toolbox (PCB FAST) on Page 29.	Through this option, facilities: <ul style="list-style-type: none">• Dispose of contaminated non-liquid materials in a TSCA chemical waste landfill, TSCA incinerator, or in a TSCA-approved alternate disposal method,• Decontaminate non-liquid contaminated material under TSCA-regulated decontamination procedures, or• Dispose of non-liquid contaminated materials in a facility with a coordinated approval issued under TSCA Section 761.61(b) only addresses disposal of PCB remediation waste. <i>EPA notification and approval is not required under this option; however, you are encouraged to contact your Regional PCB Coordinator with questions.</i> Facilities are required to follow any manifesting, transportation and storage requirements that may apply. Materials left on site > 1 ppm PCBs would still have TSCA obligations for those remaining materials.	This option allows for a site-specific approval to sample, cleanup or dispose of PCB remediation waste in a manner other than the self-implementing or the performance-based disposal options. <i>This option requires you to obtain an approval from EPA based on a finding that the proposal will not present an unreasonable risk of injury to health or the environment.</i> ★ Consider using Tool 4, TSCA Risk-Based PCB Cleanups Checklist, provided in the PCB Facility Approval Streamlining Toolbox (PCB FAST) on Page 39.



PCB FAST Toolbox

Tools and Checklists

- **Tool 1: Initial Discussion with Responsible Party Checklist**
 - You don't have to know everything about your site.
 - The goal is to engage with your PCB Coordinator as early as possible.
- **Tool 2: PCB Sites Cleanup Framework**
 - A collaborative communication with EPA on a conceptual site model
 - Worksheet to guide you through some of the most important steps
 - Identifying data gaps
 - Additional considerations (real-time dust monitoring, etc.)
- **Tool 3: TSCA Self-Implementing PCB Cleanups Checklist – 61(a)**
 - Checklist to help get to a complete application
- **Tool 4: TSCA Risk-Based PCB Cleanups Checklist – 61(c)**
 - Checklist for a complete application
 - Additional information section of considerations EPA may request further information on

Key Advice

- Contact your EPA Regional PCB Coordinator **early** – as soon as you think you might have or know you have PCBs on your site.
- **Why?**
 - Because the PCB regulations require a separate and distinct process that often requires EPA notification/approval; delays are likely if EPA is not involved early.



Questions?

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PCB Coordinator

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913-551-7895

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