

Sampling: Representative and Useable Data

Indoor Air Impacts from PCBs in Building Products: Why It Matters & How to Properly Collect Air Samples

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1:30 PM**



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Sampling and Data Considerations

Best Practices

- Development Conceptual Site model (CSM)
 - Based on History of the Building/site to be evaluated
- Quality Assurance Project Plan (QAPP)
- Sampling & Analysis Plan (SAP)
 - Sampling Standard Operating Procedures (SOPs)
 - Laboratory Data Quality Assurance Plan(QAP)
 - Certification for Method(s) of Analysis (NELAP)



United States Office of Solid Waste and EPA 542-F-11-011
 Environmental Protection Agency Emergency Response (5102G) July 2011

Environmental Cleanup Best Management Practices: Effective Use of the Project Life Cycle Conceptual Site Model

Office of Superfund Remediation and Technology Innovation Quick Reference Fact Sheet

General Environmental Cleanup Steps	CSM Life Cycle	Best Management Practices SPP DWS/RTMT	CERCLA - Superfund	RCRA	Brownfields	UST	VCUP Varies by State	IR/ERP	MMRP
SITE ASSESSMENT	Preliminary CSM ↓ Baseline CSM	Conceptual	Preliminary Assessment (PA) Site Inspection (SI) National Priorities List (NPL) No Further Remedial Action Planned (NFRAP)	Facility Assessment (FA)	Phase I Environmental Site Assessment (ESA)	Initial Site Characterization Initial Response	PA SI	PA SI	PA SI MR Site Prioritization Protocol (MSPP)
SITE INVESTIGATION AND ALTERNATIVES EVALUATION	Characterization CSM Stage ↓ Design CSM Stage	↓	Remedial Investigation/Feasibility Study (RI/FS) Removal Actions - Emergency/Time Critical/Non-Time-Critical Proposed Plan Record of Decision (ROD)	Facility Investigation (FI) Corrective Measures Study (CMS) Statement of Basis (SOB) Final Decision and Response to Comments	Phase II ESA Remedial Action Plan (RAP)	SI Corrective Action Plan (CAP) Cleanup Selection	RIFS ROD	RIFS Proposed Plan ROD	RIFS
REMEDY IMPLEMENTATION	Remediation/Mitigation CSM Stage ↓ Post-Remedy CSM Stage	↓	Remedial Design (RD) Remedial Action (RA) - Interim and Final Long Term Response Action (Fund-lead groundwater/surface water restoration) Optimization	Corrective Measure Implementation (CMI)	Cleanup and Development Property Management Long-term O&M Redevelopment Activities (Private and Public-led)	Corrective Action - Low-impact site cleanup - Risk-based remediation - Generic remedies - Soil matrix cleanup	RD RA	RD RA - Interim and Final Remedy in Place (RIP)	RD Time Critical Removal Action (TCRA) RA RIP
POST-CONSTRUCTION ACTIVITIES	Post-Remedy CSM Stage	↓	Operational & Functional Period Operation & Maintenance (O&M) Long term monitoring (LTM) Optimization Long Term Response Action (Fund-lead groundwater/surface water restoration)	OSM On-site inspections and oversight	Property Management Long-term O&M Redevelopment Activities (Private and Public-led)	LTM	OSM LTM	Shakedown period Operating Property and Successfulity OSM LTM	Shakedown period Long Term Management
SITE COMPLETION		↓	Construction Complete (CC) Preliminary or Final Close Out Report (PCOR/FCOR) Site Completion - FCOR Site Deletion OSM as appropriate	Certification of Completion Corrective Action Complete with Controls or without Controls	CC Property Management	No Further Action (NFA)	CC	Response Complete (RC) NFA	RC NFA

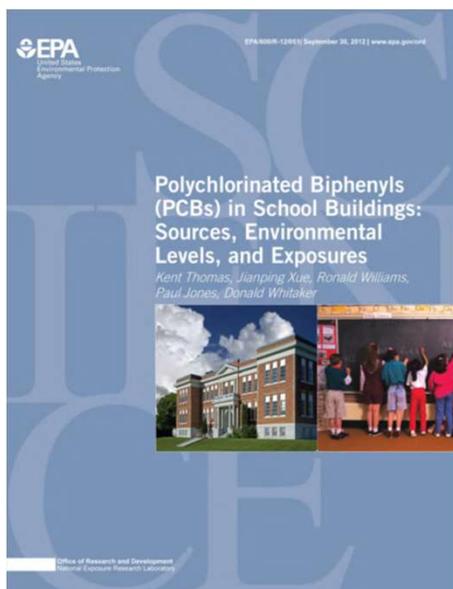
Abbreviations:
 SPP = Systemic Project Planning
 DWS = Dynamic Work Strategies
 RTMT = Real Time Measurement Technologies
 CERCLA = Comprehensive Environmental Response, Compensation and Liability Act
 RCRA = Resource Conservation and Recovery Act
 UST = Underground Storage Tanks
 VCUP = Voluntarily Clean Up Programs
 IR/ERP = Installation Restoration Program/ Environmental Restoration Program
 MMRP = Military Munitions Response Program



<https://www.epa.gov/sites/default/files/2015-04/documents/csm-life-cycle-fact-sheet-final.pdf>



PCB Sampling Considerations



Some considerations:

Known potential sources of PCBs in building should be considered when determining sample locations.

Building surveys assist in these determinations.

Potential sources incl:

- Ballasts used for fluorescent lighting
- Caulking
- Paint

Important consideration

- Total PCBs in Air = Particulates and Volatile components

Typically for inhalation evaluation Total PCBs are collected

Building HVAC System and operating parameters should be considered



Comprehensive EPA report. PCBs in Buildings
https://www.epa.gov/sites/default/files/2021-05/documents/final_pcb_buildings_fact_sheet_05-10-2021_to_upload.pdf

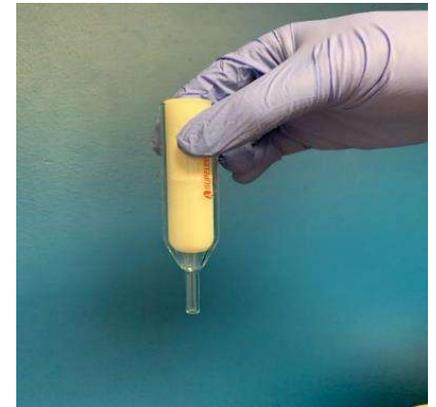


Sampling Highlights



Brief overview

- Pumps should be capable of sampling for 24hrs @ 5L/min with minimum loss of flow $\pm 5\%$
- Calibration before and sampling recommended
- Clean gloves should be used when handling the sample media.
- Certified clean PUFs are shipped in individually tagged bags in a metal Tube (some labs use foil)
- Tag# should be recorded on chain of custody (COC) once sampling is complete the PUF cartridge is placed in the same Bag and sample ID recorded on COC with the Tag# and returned in same metal shipping tube.
- The media is setup by pushing flexible tube on to the small bayonet end of the PUF holder. The tubing is connected to the pump suction connection.
- The sample is typically collected between 1 -2 meters above the floor



<https://www.sensidyne.com>

Samples returned to the cooler and put on ice. Shipping should ensure that the sample is <4 Deg_C on receipt at the laboratory.



Air Analysis Sorbent Media

COCs should be completed legible and full information on the form.

Record of custody should be complete from Laboratory release to receipt back at the laboratory.

Instructions included in sample set.

ALPHA ANALYTICAL AIR ANALYSIS - SORBENT MEDIA CHAIN OF CUSTODY		Page of	Date Rec'd in Lab	ALPHA Job #											
Westborough, MA TEL: 508-896-9220 FAX: 508-822-3285		Warefield, MA TEL: 508-822-9935 FAX: 508-822-3285		Project Information Project Name: Project Location: Project #: (Use Project name as Project #) <input type="checkbox"/>											
Client Information Client: Address: Phone: Fax: Email:		Report Information - Data Deliverables <input type="checkbox"/> FAX <input type="checkbox"/> ADEx Criteria Checker: <input type="checkbox"/> EMAIL <input type="checkbox"/> Add'l Deliverables Report to: (preferred than Project Manager)		Billing Information <input type="checkbox"/> Same as Client Info PO #: Regulatory Requirements/Report Limits State/Fed: Program: Criteria:											
Turn-Around Time Standard <input type="checkbox"/> Due Date: Time: Rush (only if pre-approved) <input type="checkbox"/>		These samples have been previously analyzed by Alpha <input type="checkbox"/>		ANALYSIS NOTE: For metals, please specify elements of interest and media type. <input type="checkbox"/> PM-10 <input type="checkbox"/> TSP <input type="checkbox"/> MCE											
Other Project Specific Requirements/Comments/Detection Limits:		For PCBs, selection is REQUIRED: <input type="checkbox"/> Congeners <input type="checkbox"/> Homologs <input type="checkbox"/> Aroclors (Low Vol only)													
All Columns Below Must Be Filled Out															
ALPHA Lab ID (Lab Use Only)	Sample ID	Date	Start Time	End Time	Flow Rate (L/min)	Total Volume (L)	Sample Matrix*	Sampler's Initials	Media ID (T)	TO-13A	PCBs (High Vol)	PCBs (Low Vol)	Hg via NIOSH 8009 Mod.	Metals	Sample Comments (i.e. PID)
* SAMPLE MATRIX CODES		AA = Ambient Air (Indoor/Outdoor) SV = Vol Vapor/Landfill Gas/SVS Other = Please Specify		(1) Required for PUF cartridges, PM-10 and TSP filters and TO-17 sorbent tubes		Media Type		P P P D T F T		Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS DOC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS. (See reverse side)					
F = Filter P = PUF Cartridge T = Sorbent Tube O = Other		Relinquished By:		Date/Time		Received By:		Date/Time							
Form No: 101-13 (rev 01-OCT-2013)															



- Return to Laboratory on ice!
- 7 day hold time

Includes Flow rates and stop & start times



EPA Method TO-10a PCBs in Air



Indoor air samples for PCBs collected following EPA Methods TO-10a
Highlights of the method

Air is drawn through a certified clean Poly Urethane Foam (PUF) Cartridge at a calibrated flow rate for a predetermined time to meet the targeted reporting limits.

- Samples should be received at laboratory at 4 deg C
- Extracted within 7 days on sampling, analyzed within 40 days.
- Extracted by Soxhlet (solvent), concentrated and analyzed on a GC/ECD system following the Laboratory's QSM.

Quality Control (QC) Samples

- Duplicate sample, 2 co-located samples collected concurrently
- Field blank goes through the same handling process as samples with no air being pulled through the PUF cartridge.



[Gas Chromatography | Agilent](#)



ECD detectors are particularly sensitive to halogens incl Chlorine containing compounds



PCB Methods in Air EPA Method TO-4A

Outdoor Air Samples

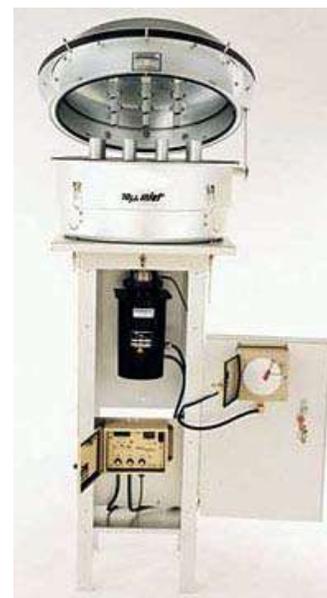
EPA TO-4A PCB Aroclors

EPA TO-4A Mod PCB Homologues/Congeners by GC/MS

FLOW RATE: 200 – 280 L/min

SAMPLER: PUF Cartridge with PUF Filter or PUF XAD

- Sample Time 4 to 24 hours
- Air Volume 48 M3 to 403 M3
- Reporting Limit ~ 0.0014 ug/M3 at 240 Liters for 24hrs



High Volume Sampler
Tisch

Important: Flow rates for TO-4A are generally too high for indoor Air applications



PCB Reporting in Air

Important to take sufficient sample to meet project DQO's
 Example: Method TO-10A to meet EPA residential screening levels

Duration of Sampling, hours	Low Volume Cartridge Nominal Flow Rate*, L/min	Laboratory Reporting Limit, ng/cartridge	Estimated Reporting Limit, ug/m ³
1	5	30.0	0.1000
2	5	30.0	0.0500
4	5	30.0	0.0250
6	5	30.0	0.0167
8	5	30.0	0.0125
12	5	30.0	0.0083
24	5	30.0	0.0042

Polychlorinated Biphenyls (PCBs)	CAS No.	Carcinogenic SL TR=1E-06 (ug/M3)
~Aroclor 1016	12674-11-2	0.1400
~Aroclor 1221	11104-28-2	0.0049
~Aroclor 1232	11141-16-5	0.0049
~Aroclor 1242	53469-21-9	0.0049
~Aroclor 1248	12672-29-6	0.0049
~Aroclor 1254	11097-69-1	0.0049
~Aroclor 1260	11096-82-5	0.0049

VT technical Guidance: All samples collected 24hrs at 5.0L/min
 Rapid School Action Level 22.5 ng/M3 (0.0225ug/M3)
 Minimum Laboratory Reporting Level 10ng/M3 (0.010ug/M3)



Summary

Useability Assessment

Confidence in reported from:

- Conceptual Site Model / Project Planning / Multiple Lines of Evidence
Sample to confirm what is already known.
- Quality Assurance Project Plan / Analyte List / RLs / Reg Criteria
Communicate with your Laboratory
- Field Sampler Skill Level of who collects the samples
Training, Experience and SOPs
- Data Assessment, Evaluation, Usability, Interpretation, Applicability
Validation of Laboratory Data - Skill Level of assigned staff



Questions

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