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MEMORANDUM -DRAFT

To: Peter Walke, Commissioner, Department of Environmental Conservation

Thru: Matthew Chapman, Director, Waste Management and Prevention Division

From: Patricia Coppelino, Senior Program Manager, Sites Management Section

Date: March 11, 2022

Subject: Regulatory Action Level for Polychlorinated Biphenyls in Indoor Air

Summary

This memorandum establishes a Regulatory Action Level (RAL) for residential and commercial releases and reporting with respect to polychlorinated biphenyls (PCBs) in indoor air of 22.5 ng/m³. This RAL does not apply to a corrective action taking place in a school pursuant to the School Action Levels issued by the Vermont Department of Health (VDH) and adopted by the Agency of Natural Resources (Agency) as interim environmental media standards pursuant to 3 V.S.A. § 2810 in December 2021. [PCBs in Indoor Air of Schools, Development of School Action Levels \(healthvermont.gov\)](#)

This interim standard is being adopted to direct what concentration is indicative of a release which requires compliance with the Investigation and Remediation of Contaminated Properties Rule (IRULE). It is highly recommended that parties endeavor to remediate to the lowest possible levels achievable when developing their corrective action plan to address indoor air issues associated with releases of PCBs.

The Agency is taking this step for two reasons:

- Screening values provided by the Environmental Protection Agency (Regional Screening Levels) and by the Vermont Department of Health (Residential Air Values) are both below the ability of most laboratories to regularly, consistently, and predictably detect; and
- The Agency has reviewed available studies that present indoor air concentrations of PCBs in uncontaminated residences and calculated a weighted average of 22.5 ng/m³ for total PCBs.



In addition, to support regulating PCBs in indoor air, the Agency will conduct an indoor air background study of buildings in Vermont that were constructed after 1985. This will further inform a State specific standard to be adopted when the IRULE is amended.

Background

In 2021, the Vermont Legislature required that by 2024 all schools built or renovated prior to 1980 test their indoor air for PCBs. Also in 2021, the definition of release was changed to include the intentional or unintentional action or omission resulting in the spilling, leaking, emission, or disposal of PCBs from building materials in a building or structure. [See Secs. E.709.2 and E.709.3 of Act 74 of the 2021 Legislative Session.](#)

This change authorized the Agency to regulate releases of PCBs from any type of building material to indoor air. The Agency has been working collaboratively with the VDH to create a School Action Level ([PCBs in Indoor Air of Schools, Development of School Action Levels \(healthvermont.gov\)](#)), as well as a regulatory level for non-schools; residential and non-residential.

The VDH derived health-based values for PCBs in residential and non-residential indoor air; 2.8 ng/m³ (residential) and 14 ng/m³ (non-residential). The method used to derive these values can be found here: [Indoor Air General Screening Values \(healthvermont.gov\)](#). These values are not currently adopted as standards in the IRULE.

The IRULE incorporates by reference the EPA Regional Screening Level (RSL) in the absence of an applicable Vermont Health standard. The EPA RSL for PCBs in Indoor air are 4.9 ng/m³ (residential) and 21 ng/m³ (industrial).

Background Air Concentrations (Ambient)

The Agency reviewed several sources that document background PCB concentrations in ambient air and indoor air at locations that are not contaminated with PCBs sources.

Hudson River PCB Superfund Site

Background ambient air sampling was conducted as part of the PCB cleanup conducted to remediate PCB at the Hudson River PCB Superfund Site. The location of the study, the Fort Edward boat launch, was chosen to provide a representative background sample of the dredge corridor (GE 2005e). The study used high volume (EPA Method TO-4A) and low-volume (EPA Method TO-10A) samplers at the same location, collecting 24-hour samples on 6 days between August 18, 2005, and September 27, 2005.

Between November 2005 and November 2006, the NYSDEC conducted an ambient air monitoring study at three sample sites (Locks 6, 7 and 8) on 41 different sampling days, specifically to establish baseline concentrations of PCBs prior to the start of remedial activities. The PCB concentrations ranged from 0.03 to 2.8 ng/m³, and the overall average of PCB samples was 0.6 ng/m³. NYSDEC noted that PCB concentrations were lowest at Lock 8, which is located on the Champlain Canal 1.7 miles from the closest point of the Hudson River.

Table 1 below is a compilation of the GE and NYSDEC ambient air background study.

Table 1. GE and NYSDEC Background Monitoring Data

Study	Location	Year	Dates	Range (ng/m ³)	Average (ng/m ³)
GE	Fort Edward Boat Launch	2005	August 17-September 28	0.8-3.73	2.41
NYSDEC	Lock 6	2005-2006	November 2005-November 2006	0.3-2.8	0.64
NYSDEC	Lock 7 (2)				0.47
NYSDEC	Lock 7 (4)				0.65
NYSDEC	Lock 8				0.07

Source: GE 2005j; NYSDEC 2007

A stand alone, high-volume background monitoring station was established in Fort Edward, New York, located 0.4 miles from the Upper Hudson River and 0.7 miles from the processing facility. Table 2 and Figure 3 provide a summary of data collected between 2009 and 2015 at the Fort Edward background monitoring station.

YEAR	Number of Samples	Range (ng/m ³)	Average (ng/m ³)
e1 (2009)	200	0.4-42.09	6.82
2011	210	0.07-37.3	4.38
2012	220	0.06-62.84	7.28
2013	195	0.38-54	5.6
2014	199	0.01-13.93	6.06
2015	201	0.01-62.84	2.35
Total Phase 2	1025	0.01-62.84	5.13

Source: General Electric 2009g, 2012d, 2013b, 2014c, 2015f, 2016h

Data from this study demonstrates the variability in PCB concentration in ambient air seasonally, through a year, and over multiple years.

The data was used to evaluate how background concentrations in ambient air were used to determine ability to achieve the VDH and EPA residential and non-residential derived values. This data does not support use of the VDH values for residential and non-residential, nor does it support the use of the EPA residential RSL. Both the VDH and EPA Residential values and VDH non-Residential Value are similar or lower than detected ambient air concentrations. The EPA Industrial RSL of 21 ng/m³ is above the ambient air concentrations detected in the multiyear study discussed above.

Background Air Concentrations (Indoor Air)

PCBs are present in the environment due to their widespread use and that their chemical structure is such that they don't degrade very rapidly. PCB degradation time ranges from several years to decades. Several studies were conducted to determine the indoor air PCB concentrations in uncontaminated buildings.

The Agency reviewed available published studies that reference indoor air sampling for PCBs in uncontaminated buildings. A paired study in apartment buildings in Denmark detected mean indoor total PCB concentrations to be 17.6 ng/m³ in uncontaminated apartments (Frederickson 2012). Another paired study in Denmark identified a mean indoor air concentration of total PCBs in indoor air to be 58 ng/m³ in uncontaminated apartments (Andersen 2020). Lastly a UK study of uncontaminated homes reported a mean total PCB concentration of 2.8 ng/m³ (Harrad 2006). These studies highlight the range and variability in indoor air concentrations of PCBs, but also how prevalent PCB detections are in buildings that do not contain PCB sources. This is important to note when evaluating what values should be considered for a regulatory purpose. Regulating at or below background will end up requiring property owners to assess and remediate a PCB release that may not exist in their building. It is necessary to ensure that a regulatory value takes ubiquitous background of PCBs in ambient and indoor spaces into consideration.

A weighted average of the indoor air results from each study referenced above was calculated. The result of this weighted average is 22.5 ng/m³, which is comparable to the EPA RSL Industrial value of 21 ng/m³. Using 22.5 ng/m³ as a regulatory action level takes background conditions (ambient and indoor) into consideration.

Laboratory Considerations

Currently, there are no commercial laboratories in the State of Vermont that can analyze in-house for PCBs in indoor air per method TO-10A (low volume) or TO-4A (high volume). -Discussions with nearby labs indicated that the reporting limit (RL) ranged from 2 to 7 ng/m³ for TO-10A Aroclor analysis. These reporting limits are dependent on collecting the maximum volume of air per the method: 24 hours of sample time with a maximum flow rate of 5 liters per minute (L/min).

The Agency also evaluated using Method TO-4A (high volume) to achieve lower reporting limits. It was determined that although this method could achieve the RL needed to support using the VDH and EPA RSL values, the cost, noise, and data uncertainty related to this method were deemed too large an impediment to rely on as a sampling method. The volume of air that TO-4A requires would rapidly need to be replaced by air outside of a standard room, thus not assessing typical room conditions, nor being representative of the PCB sources contributing to the air within a room. Method TO-4A is intended for ambient or outdoor sampling, or for vast open spaces such as factories and could be considered for use in this setting.

It is noted that laboratories can achieve a lower Method Detection Limit (MDL) than Reporting Limit, however, the MDL is a statistical calculation and is not consistent across laboratories.

Based on the current technical capabilities of commercial laboratories, use of the VDH RAV/NAV would not be achievable, as well as not being able to achieve the EPA Residential RSL. The EPA industrial RSL of 21 ng/m³ could be consistently achieved as well as the weighted background concentration of 22.5 ng/m³.