PCBs in Bay Area Building Materials
Data Collection and Sampling

Introduction

- Data collection will involve three processes, each described in greater detail below:
  I. Identifying structures and materials likely to contain PCBs
  II. Validating the PCB screening method (portable X-Ray fluorescence (XRF) analyzer), and
  III. Sampling in Bay Area structures.

- San Francisco Estuary Institute (SFEI) staff Susan Klosterhaus and Lester McKee will lead this effort.

I. Material and Structure Selection Process

Objective

Define procedures to identify Bay Area structures that are likely to contain PCBs in their building materials.

Approach

Identify target materials and request permission to collect samples from representative structures in the Bay Area.

Target materials

Caulk/sealants (Thiokol or other sulfide-based polymer) used around windows, at building/ walkway interfaces, and in expansion joints; paints and coatings. Sealants were reportedly most commonly used in expansion joints between two abutting pieces of concrete. PCBs were reportedly not used in polyurethane-based sealants. In Sweden, the major application of sealants based on polysulfide Thiokol rubber was in buildings constructed with prefabricated concrete elements.

Target structures

Concrete and masonry buildings, bridges, parking garages, athletic facilities, public transportation infrastructure, roads, walkways, and dams that were built or substantially re-modeled between ~1950-1980 and that have not had the caulk replaced. Samples from all of these structure types that were built between 1957 and 1980 are ideal for providing the most detailed information for BMP development. Sampling will focus on publicly-owned structures due to expected easier access compared to privately-owned structures; however, privately-owned structures will be sampled opportunistically if available. Samples will be collected from structures built between 1929 and 1957 (early manufacturing era) and post-1984 (construction after ban) for confirmation purposes.

II. Validation of XRF as Screening Tool for PCBs in Caulking

Objective

Determine if a portable X-Ray fluorescence (XRF) analyzer can be used as a screening tool to estimate PCB concentrations in caulk (≥ 500 ppm) during the field sampling portion of the project. This phase will allow us to determine if chlorine concentrations measured using portable XRF can be used to predict concentrations of PCBs in caulk.

Approach

Analyze 10-20 samples of PCB-laden caulk using portable XRF and GC-MS (gas chromatography-mass spectrometry). This may allow screening of several Bay Area structures to guide determination of which samples to collect and/or analyze for PCBs (i.e. confirmation PCB analysis). Use of XRF will allow us to focus on materials that contain high concentrations of chlorine, and therefore are most likely to contain PCBs. Validation of the XRF as a screening tool in this project is also an opportunity to provide information on whether portable XRF can be used in future field evaluations as a reliable tool for estimating PCBs in caulking, and thus potentially reducing the need for costly chemical analysis.

III. Survey of San Francisco Bay Area Building Materials for PCBs

Objectives

1. Characterize types of materials and structures that contain PCBs in the Bay Area.
2. Determine the variability of PCBs within a material within a structure.
3. Collect data useful for estimating the total mass of PCBs in building materials so that estimates of PCB loadings from these materials to urban runoff can be made.

Approach

A sampling and analysis plan has not yet been developed. However, a proposed strategy is to use portable XRF to survey representative structures for chlorine concentrations and collect caulk samples from as many sites as possible, even when XRF indicates that chlorine concentrations are below detection. Next, physical sampling would require the removal of a small piece of caulking from each structure (approximately 1/2 to 2 ounces or about a one inch strip) from between one and five inconspicuous locations on each structure. Structures may include transportation infrastructure (e.g. roads, bridges, sidewalks) and/or publicly-owned buildings. Following completion of the field survey, a portion of the samples will be analyzed for PCBs based on availability and estimates of chlorine concentrations in each sample. An estimate of the volume and surface area of the material on the exterior of each structure will also be determined.

For More Information

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