San Francisco Bay PCBs TMDL – Implementation at Cleanup Sites

PCB TOTAL MAXIMUM DAILY LOAD (TMDL)

Basin Plan section 7.2.3, San Francisco Bay Polychlorinated Biphenyls TMDL, should be considered during site investigations and cleanups throughout the Region, particularly but not exclusively at sites located on the Bay margin. Of particular concern, and often overlooked, is the fact that PCBs in surface soil can be mobilized by stormwater runoff and flow to the Bay.

Fish tissue PCB concentrations are the direct cause of impairment to the Bay, and therefore the numeric target of the TMDL is a fish tissue PCB concentration protective of human health. The TMDL's fish tissue screening level of 10 ng/g represents a ten-fold reduction in fish tissue PCB concentration. To achieve this, surface sediment PCB concentrations in San Francisco Bay must be reduced to an average of 1 ug/kg. The TMDL's wasteload allocations were developed with the goal of achieving a ten-fold decrease in PCB sources to the Bay.

Of the sources to the Bay, stormwater runoff contributes the greatest mass of PCBs. The PCB TMDL establishes a wasteload allocation for stormwater of 2 kg/yr total PCBs, which represents a ten-fold decrease over the current estimated load. In an effort to achieve this reduction, Bay Area municipalities are pilot-testing remedial actions in areas where street sediments contain PCBs in the 1 mg/kg range *before any remedial action is taken*. Municipalities will spend millions of dollars to achieve the ten-fold reduction in PCBs required by the TMDL.

ACHIEVING THE PCB ALLOCATION AT CLEANUP SITES

Stormwater runoff from sites containing residual PCBs in soils after state- and federal-ordered cleanup contributes to sediment concentrations in the Bay, and such contributions must be essentially eliminated in order to achieve the TMDL target. For cleanup sites, the TMDL calls for implementing "on-land source control measures, to ensure that on-land sources of PCBs do not further contaminate in-Bay sediments."

PCBs cleanups that occur in urban areas often have a cleanup goal based on protection of human health, and this can allow residual PCB concentrations close to or exceeding 1 mg/kg to remain in surface soils. **Regardless of the cleanup goal, it is important that cleanup sites do not contribute any PCBs to surface water runoff. Remedial actions should be conducted so as to eliminate <u>all</u> means of conveyance of PCBs from cleanup sites, including sediment runoff, vehicular drag out, and airborne dust**. Achieving this may require a durable cover of soil, hardscape, or structures to prevent surface exposure of PCBs. The goal is to have zero discharge of residual PCBs at cleanup sites.

PCBs in aquatic environments require cleanup to ecological risk-based concentrations that are generally much lower than the one mg/kg human health level. For example, a San Francisco Bay tidal marsh PCB cleanup concentration was established at 90 ug/kg PCBs to protect clapper rails.

RECOMMENDED PCB ANALYTICAL METHODS

Sampling and analyses are needed to confirm that PCB levels are low enough to achieve the TMDL targets. For cleanup sites in the San Francisco Bay area, the analytical method for PCBs in soils should be capable of detecting total PCBs ***well below*** 1 mg/kg dry weight and approaching 25 ug/kg dry weight for soil, with a high likelihood that all PCBs present in the sample are detected. The Water Board's own Surface Water Ambient Monitoring Program uses a Reporting Level of 0.2 µg/kg for most PCB congeners in sediment.

Analytical methods that we know will attain this data quality objective, and that we recommend using at all cleanup sites, include the following:

- EPA Method 8270D (semivolatiles in soils/waste) modified by EPA Method 1625. Method 1625 is the application of isotope dilution/recovery correction to GC/MS methodology. Total PCBs are determined by summing the individual congener results. Results can be reported as either, or both, congeners or aroclors. Ball-park cost for this analysis is $375/sample.[1]
- EPA Method 1668A or 1668C, which combine high-resolution GC with high-resolution mass spectrometry (HRGC/HRMS). Results are reported for all 209 congeners in µg/kg dry weight. Ball-park cost for this analysis is $800-900/sample.[1] An alternative is to use the same method, but report results for the 40 PCB congeners monitored by the SF Bay Regional Monitoring Program: PCBs 8, 18, 28, 31, 33, 44, 49, 52, 56, 60, 66, 70, 74, 87, 95, 97, 99, 101, l05, 110, 118, 128, 132, 138, 141, 149, l51, 153, 156, 158, 170, 174, 177, 180, 183, 187, 194, 195, 201, and 203. Cost for this alternative may be about 15% less than the full congener analysis.[1]
- Note that cleanups conducted under the authority of the Toxic Substances Control Act (TSCA) have their own PCB analysis requirements. Contact the U.S. Environmental Protection Agency, Region 9, TSCA staff or see http://www.epa.gov/Region9/pcbs/ for further information.

Other analytical methods (such as 8082) generally do not identify and quantify all the PCB congeners that may be present at a cleanup site, which can result in inadequate cleanups. Municipalities are finding PCBs in roads and gutters that may be traced back to "closed" cleanup sites that did not use reasonably rigorous analytical methods and/or cleanup standards.

Methods such as 8082 identify and quantify aroclors by gas chromatography (GC) with an electron capture detector (ECD). Each aroclor consists of a number of PCB congeners. The aroclor is identified by the retention times of the highest peaks in the chromatogram, and is quantified by comparing the height or area of those peaks to those of a pure aroclor standard. Between 5-8 aroclors are typically reported in an 8082 method, depending on the lab method used. Some high production aroclor mixtures, such as 1270 (almost 100% congener 209), are rarely included in the method. In addition, PCBs in the environment undergo volatilization, partitioning, chemical transformation, photo-degradation, and biodegradation over time. These changes confound the matching of an environmental sample to an aroclor pattern. **As a result, other analytical methods often do not measure the total PCBs present in an environmental sample, and we do not recommend relying on such methods at this time.**

[1] Axys Analytical, personal conversation. May 1, 2012.

CAULK SAMPLING & ANALYSIS[2]

Structures, especially non-residential buildings, constructed or renovated between 1950 and 1980 may have PCBs in caulking and other building materials. A local study found that PCBs are prevalent in the caulk in Bay Area buildings constructed during that timeframe. PCBs were detected in 88% of the caulk samples tested; 40% of the samples contained > 50 ppm PCBs and 20% contained > 10,000 ppm PCBs. Please refer to the study's project page for more information about PCBs in caulks and sealants.

The following methods are recommended for sampling and analyzing caulk and sealants suspected of containing PCBs: Remove a one inch strip (or ~10 g) of the sealant sample from the structure using a utility knife with a solvent-rinsed, stainless-steel blade. Collect one sealant sample per sealant type on each structure to fully characterize the PCB content in the structure's sealants.

PCBs can be present in the percentage range in caulk, so a high resolution method is not necessary. EPA Method 8270 (semi-volatile organic compounds by gas chromatography-mass spectrometry) is appropriate. Report analytical results as the total of 209 PCB congeners, or the shorter list of 40 congeners above may be used.

BMPs for Controlling PCBs

Best management practices (BMPs) for controlling PCBs during removal from structures can be found at http://www.epa.gov/epawaste/hazard/tsd/pcbs/pubs/caulk/caulkcontractors.htm.

BMPs for controlling sediment during site grading and other construction activities are available at http://cfpub.epa.gov/npdes/stormwater/swppp.cfm.

[2] Further information on PCB-containing caulks and sealants can be found at http://www.sfestuary.org/projects/detail.php?projectID=29 and http://www.epa.gov/pcbsincaulk/.