PCB Strategy

For the

Commonwealth of Virginia

Virginia Department of Environmental Quality

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The Department of Environmental Quality monitors concentrations of chemical contaminants, including heavy metals and persistent bioaccumulative toxin pollutants such as polychlorinated biphenyls, in the tissue of fish and shellfish and in sediment. In 2004 the Virginia Department of Health changed the trigger level at which it issues fish consumption advisories for PCBs from 600 parts per billion to 50 ppb. DEQ used a 54 ppb screening value in 2002 and 2004 to assess PCB impairments in fish, so the VDH expansion of fish consumption advisories included those waters currently assessed by DEQ for PCB impairment.

During the past several years, DEQ staff has initiated a number of studies to determine the sources of PCBs found in fish tissue. These studies were approved for funding through the Virginia Environmental Emergency Response Fund. DEQ has found local citizen involvement in watershed source identification to be a critical element in its PCB source assessment strategy. Since 1999, DEQ has been using the Total Maximum Daily Load program to address water quality impairments in state waters. A TMDL study identifies the sources of pollution and the reductions of the identified pollutants needed to attain water quality standards.

DEQ has completed one TMDL study for PCBs and is in the process of developing several others. Limitations in funding and the significant number of waters requiring source assessment may at times necessitate prioritization of the work. DEQ has developed this strategy to prioritize and manage the source assessment and investigation of this large number of PCB fish advisory sites.

PCB STRATEGY FOR THE FUTURE

Assessment and planning process

DEQ is merging the existing toxic source assessment process with the requirements of the TMDL program. This planning effort will generally include source assessment, additional monitoring to quantify loadings, and quantifying the required reductions needed to attain the fish consumption use in the water bodies currently under advisory. The specific steps to be performed are defined as follows:

- Initiate data review of in-house and federal records and databases for potential PCB sources in the drainage areas adjacent to and upstream of the fish advisory to the headwaters; compile information in maps, tables, and a stakeholder information database.
- Solicit stakeholder input, for example, through mass mailing of survey forms to watershed residents and businesses.

- Perform additional fish tissue monitoring to delineate the extent of the PCB impairment (particularly upstream).
- Present initial findings at public meetings to kick off each TMDL development process.
- Identify additional monitoring needs (based on record review, public input and TMDL needs, e.g., monitoring by VPDES permittees or monitoring to assess aquatic life or wildlife impacts).
- Perform additional congener-specific monitoring at ultra-low detection levels as resources allow.
- Use technical advisory committee meetings for data review and procedural/technical input, develop TMDL loading estimates by source category and/or tributary (as data allow).
- Develop TMDL report, including TMDL implementation plan elements required by the Virginia Water Quality Monitoring, Information and Restoration Act.

Schedule for existing advisories

To move as expeditiously as possible toward removal of the existing fish consumption advisories, the list of 37 PCB advisories has been divided into three TMDL development groups, based on the steps that already have been performed and existing TMDL completion dates. The three groups are near-term (TMDLs due by 2007), mid-term (TMDLs due by 2009) and long-term (TMDLs due by 2011 through 2014 depending on priority). This schedule is subject to change depending on available resources and programmatic requirements, such as the need to meet the existing federal court consent decree governing Virginia's TMDL program.

Remediation process

Several options exist for sediment PCB remediation, and new technologies are undergoing research to determine their viability as cost-effective alternatives to existing methods. To avoid the potential for sediment recontamination, it is imperative that all upland sources be remediated before instream work begins.

Soil hot spots

Typically identified as part of a toxics source assessment, "soil hot spots" will be managed by soil removal, if the toxics source assessment points to heavily contaminated upland areas that have a direct pathway to a waterbody (i.e., nonpoint source). In accordance with the Toxics Substances Control Act, DEQ must notify the U.S. Environmental Protection Agency Office of Pollution Prevention and Toxics if elevated levels of PCBs (greater than 50 parts per million) are discovered. It is then within EPA's jurisdiction to determine if it will respond or if the contaminated soil is deferred to DEQ with EPA's oversight. DEQ will use risk-based screening levels and cleanup levels recommended by the EPA for assessment and cleanup of PCB sites. The TSCA cleanup levels are designed to protect human health under direct contact with the contaminated soil. They do not account for potential human health risk associated with fish consumption.

Sediment hot spots

Sediment PCB contamination occurs either from gradual inputs from nonpoint sources such as upland soil contamination or from low-level point source releases, illegal dump sites, air deposition or storm water runoff. Depending on available resources, with consideration given to the magnitude of sediment contamination and other site-specific variables, sediments within a water body can be cleaned up. A DEQ work group investigated developing statewide PCB screening levels and cleanup levels for sediment. However, due to the variability of sediments throughout the state, the group recommended that site-specific assessment and cleanup levels are more appropriate. If the TMDL development process identifies a required percentage reduction from in-stream sediment, such site-specific analyses can be used to determine the appropriate remediation action at sediment sites with elevated PCB concentrations.

Active sources

Active sources in addition to soil and sediment hot spots potentially include illegal dumping sites, air deposition, storm water runoff and permitted dischargers. Because such sources have not been extensively monitored or targeted in the past (in the absence of known PCB impairments), DEQ expects to increase its quantification of these sources during the TMDL development and implementation process. Because the public may be very knowledgeable about historical activities within a watershed, it is critical that public input is sought to help identify other potentially active sources. Additionally, DEQ is working with permit holders and the air program to start the data collection effort needed to identify these sources. Once identified, such active sources will be addressed through the appropriate programs for remediation.

I. INTRODUCTION

Background

The Department of Environmental Quality (DEQ) monitors concentrations of chemical contaminants, including heavy metals and persistent bioaccumulative toxin (PBT) pollutants such as polychlorinated biphenyls (PCBs), in fish and shellfish tissue and sediment. DEQ assesses the fish tissue contaminant monitoring data to identify impaired aquatic ecosystems for the 305(b)/303(d) Water Quality Assessment Integrated Report. The Virginia Department of Health (VDH) evaluates the same data to assess the human health risks for individuals who may consume fish from state waters and to determine the need for fish consumption advisories in those waters. **http://www.deq.virginia.gov/fishtissue/**

In 2004, VDH changed the trigger level at which they issue fish consumption advisories for polychlorinated biphenyls (PCBs) from 600 ppb to 50 ppb. DEQ used a 54 ppb screening value in 2002 and 2004 to assess PCB impairments in fish, so the VDH expansion in fish consumption advisories included those waters currently assessed by DEQ for PCB impairment. In addition to a reevaluation of the historical DEQ data, VDH assessed the most recent data collected by the DEQ. These data were not available at the time of DEQ's 305(b) assessments and 303(d) listings, so the VDH fish consumption advisories issued in 2004 may include additional waters not currently on the DEQ list of impaired waters.

Over the past several years, DEQ staff has initiated a number of studies under the Toxics Contamination Source Assessment Policy (Policy) and Protocol for Initiating Toxic Source Assessments in Accordance with the DEQ Toxics Contamination Source Assessment Policy (Protocol) to determine the sources of PCBs found in fish tissue. In following that Policy, as well as the agency Guidelines for Use of the Virginia Environmental Emergency Response Fund (VEERF), these studies were approved for funding through VEERF. Currently there is a shortage of money in VEERF for this purpose.

Since 1999, DEQ has been using the Total Maximum Daily Load (TMDL) program to address water quality impairments in state waters. DEQ completed one TMDL study for PCBs and is in the process of developing several other PCB TMDLs. A TMDL study identifies the sources of pollution and the reductions needed of the identified pollutants to attain water quality standards. Pollution from both point sources such as residential, municipal, or industrial discharges and non-point sources such as residential, urban, or agricultural runoff are included in the TMDL study. TMDL studies are based on monitoring data and require source assessments as well as the quantification of source contributions. Once the required pollutant reductions are identified, a clean up plan is developed that identifies specific corrective actions, their costs and benefits as well as timelines to restore water quality.
http://www.deq.virginia.gov/tmdl/homepage.html

DEQ is continuously remediating PCB sources through its waste management programs. Solid wastes and hazardous wastes in Virginia are regulated by DEQ, the Virginia Waste Management Board and the U.S. Environmental Protection Agency.
http://www.deq.virginia.gov/waste/homepage.html
http://www.deq.virginia.gov/vrp/

PCBs or polychlorinated biphenyls consist of a group of 209 individual compounds also known as congeners. Industrial preparation of PCBs produced technical mixtures of these individual congeners used in commercial formulations called Aroclors. After PCBs are released into the environment, the distribution of PCB congeners in Aroclors is altered considerably by physical, chemical, and biological processes. Over the years, PCBs in environmental samples have been analyzed quantitatively as Aroclor equivalents, as homologue groups, or as individual congeners. Prior to the early 1990s, most laboratories performed Aroclor analysis. However, this procedure can result in significant error in determining total PCB concentrations (underestimation), because it is based on the assumption that distribution of PCB congeners in environmental samples and parent Aroclors is similar. DEQ's experience has shown that in some cases, samples analyzed for Aroclors were often reported as "non-detectable," when the congener analysis resulted in the detection of PCBs in the same sample in the parts per million range.

The analysis of homologue groups or congeners provides a more accurate determination of total PCB concentrations than Aroclor analysis. As has been the practice with DEQ's Fish Tissue and Sediment Monitoring Program since 1993, the analysis of total PCBs as the sum of PCB congeners is recommended for conducting human health risk assessments for total PCBs and/or toxics source investigations and assessments.

Purpose

DEQ has developed this statewide strategy for PCBs for several reasons. First, the VDH change in the PCB trigger value is expected to result in an increase in fish consumption advisories throughout the Commonwealth. Second, the additional advisories would impact DEQ's current programs at a time when there are limitations in both VEERF funding and staff resources. This strategy provides a framework for agency use in implementing the Toxic Source Assessment Policy protocols in surface waters identified as contaminated by PCBs and for applying environmental management programs such as the TMDL and Voluntary Remediation programs.

The strategy represents a merger of three existing DEQ efforts to address toxics, specifically PCB impairments: 1) the Toxics Contamination Source Assessment Policy; 2) the TMDL program with its mandate to identify and remediate sources causing impairments in Virginia's streams, lakes and estuaries and 3) the Waste Management Division's activities to remediate contaminated sites. The strategy reflects DEQ's commitment to develop and implement TMDLs for impaired waterbodies and was built around the scheduling and programmatic requirements of the TMDL program while at the same utilizing the results and lessons learned from toxic source assessments and site clean-up activities. Virginia State law requires each fish advisory to be included on the impaired waters list. Basing the PCB strategy on the impaired waters list is a conservative approach that will address not only all PCB fish advisories but also allows consideration for any other waters assessed as impaired due to elevated PCB levels.

The process of addressing PCB contamination in State waters involves source identification, monitoring and data analysis, TMDL development and waste load allocation for specific sites, and clean-up or remediation. Implementation of the elements of the strategy will be based upon availability of funding.

The specific approaches identified as elements of this PCB strategy are as follows.

For monitoring and assessment:

- Continue current fish tissue collection program;
- Coordinate with VDH on updating fish consumption advisories to reduce exposure; and,
- Continue current data assessment program and update Impaired Waters List as needed.

For source assessment:

- Implement Source Investigation / Identification projects using resources from VEERF and other avenues;
- Utilize documents developed by the regional offices for prioritization of waters for PCB assessment, file search inventories, and assessment of facilities for potential PCB sources; and,
- Develop sediment/soil endpoints to trigger detailed assessment.

For planning and remediation:

- Develop TMDLs for PCB impaired waters;
- Manage identified potential source(s) via TMDL process / VRP / TSCA / etc.;
- Clean up contaminated sites and river segments, as appropriate, to eliminate source of PCBs to aquatic environment; and,
- Monitor contaminated sites and river segments, as appropriate, to evaluate changes in watershed specific PCB transport phenomena, natural attenuation, and remediation effectiveness.

Section 3 of the agency Toxics Source Assessment Policy describes the circumstances indicating the possible need for a toxic contamination source assessment. This strategy is intended to supplement that section by:

- incorporating staff experience gained over the years in undertaking PCB source assessment and follow-up monitoring activities in response to fish consumption advisories;

- providing soil, sediment and clean-up concentration levels for PCBs developed by an agency multimedia (water/waste) workgroup; and,

- describing approaches that have been used by various agency programs to eliminate, remove or remediate the PCB contamination once the source(s) have been identified.

Since these PCB impaired waters will need to have TMDLs developed, TMDL program objectives are also integrated into the strategy.

II. SCOPE OF THE PCB PROBLEM

Recent action by the VDH expanded the number of PCB fish consumption advisories in the Commonwealth from twelve to thirty-seven. The following table lists these 37 advisories, along with a description of the waterbody affected, the boundaries and its river basin location. The table also identifies the status of any action that has been taken with the water relative to DEQ programs, such as, inclusion on the 303(d) Impaired Waters List, toxics source assessment conducted, status of the TMDL and remediation efforts, and the dates when fish tissue and sediment data were collected.

The map presents the locations of the 37 advisories for the affected rivers, lakes and bays throughout Virginia.

The expanded advisories increase the total river miles subject to fish consumption advisories due to PCBs from approximately 972.8 miles to 1810.6 miles. The number of acres of impoundments and lakes increase from approximately 32,705 acres to 70,507 acres, and the square miles of estuaries, primarily the Chesapeake Bay and Mobjack Bay, increase by approximately 1,517 square miles.

ID	VDH Waterbody with PCB Advisory	Waterbody description and location	Major Drainage Basin	Listed on 04 303(d) list? [1]	Toxic source assessment performed?	TMDL initiated and Date Completed	Remedial actions performed?	Dates of fish and sediment sampling	Waterbody Size
1	**Potomac River**	Potomac River basin - the following tributaries between the VA/MD state line near Rt. 340 bridge (Loudoun County) to the I-395 bridge in Arlington County (above the Woodrow Wilson Bridge): Goose Creek up to the Dulles Greenway Road bridge, Broad Run up to the Rt. 625 bridge, Difficult Run up to the Rt. 7 bridge, and Pimmit Run up to Rt. 309 bridge.	Potomac	**N**	**N**	**N**	**Y (3 VRP Facil.)**	***2004,* 2001, 96, 89, 86, 85, 83, 79**	**24.0 miles**
2	**Potomac River, Tidal**	Potomac River Basin - the tidal portion of the following tributaries and embayments from I-395 bridge (above the Woodrow Wilson Bridge) to the Potomac River Bridge at Rt. 301: Four Mile Run, Hunting Creek, Little Hunting Creek, Pohick Creek, Accotink Creek, Occoquan River, Neabsco Creek, Powell Creek, Quantico Creek, Chopawamsic Creek, Aquia Creek, and Potomac Creek	Potomac	**Y**	**Y (Quantico)**	**Y**	**Y (2 Fed Facil.- Quantico, Woodbridge)**	**2004, 2001, *2000, 97, 96, *1993,90, 87, 84, 83, 81, 80,79**	**126.1 miles**
3	**Bull Run**	Bull Run near Manassas Park (Prince William County) from the I-66 bridge downstream to the Rt. 612 (Yates Ford Road) bridge	Potomac	**Y**	**N**	**N**	**N**	***2004,* 2001, 99, 90, 87**	**13.6 miles**
4	**Potomac River, Tidal**	Potomac River Basin - the tidal portion of the following tributaries from the Potomac River Bridge at Rt. 301 to mouth of river near Smith Point: Upper Machodoc Creek, Monroe Creek and Coan River	Potomac	**Y**	**N**	**Y**	**Y (1 Fed Facil - Dahlgren)**	***2004,* 2001**	**31.5 miles**
5	**North Fork and South Fork Shenandoah River**	South Fork Shenandoah River downstream from Rt. 619 bridge crossing near Front Royal, North Fork Shenandoah River downstream from Riverton Dam and Shenandoah River from the confluence of North and South Forks to VA/WV state line	Shenandoah	**Y**	**Y**	**10/1/01**	**Y (Avtex)**	**2001,*1999, 96, *1992, 90 *1989, 88, 87, 85, 83, 79**	**40.6 miles**
6	**Lewis Creek**	Lewis Creek near Route 252 south of Staunton downstream to the confluence of Middle River near Laurel Hill	Shenandoah	**Y**	**N**	**N**	**N**	**2001**	**12.0 miles**
7	**Maury River**	Maury River from Buena Vista at Rt. 60 to the confluence of the James River	James	**Y**	**work initiated**	**N**	**N**	***2001, 95, *1993, *1992**	**14.9 miles**

8	**James River**	James River from Big Island Dam (below Blue Ridge Parkway) downstream to the I-95 James River Bridge in Richmond including its tributaries Hardware River up to Rt. 6 bridge and Slate River up to Rt. 676 bridge	James	**Y**	**Y**	**N**	**N**	**2001, 95, 90,89, 87, 86, 84, 82, 81, 80, 79**	**233.6 miles**
9	**James River, Tidal**	James River from the I-95 James River bridge in Richmond downstream to the Hampton Roads Bridge Tunnel and the tidal portion of the following tributaries: Appomattox River, Bailey Creek, Bailey Bay, Chickahominy River, Skiffes Creek, Pagan River (its tributary Jones Creek and Chuckatuck Creek), Nansemond River (its tributaries Bennett Creek and Star Creek) and Hampton River and Willoughby Bay, Elizabeth River system (Western Br., Eastern Br., Southern Br., and Lafayette River) and tidal tributaries St. Julian Creek, Deep Creek, and Broad Creek	James	**Y**	**Y (Appomattox & Bailey)**	**N**	**Y (3 Fed Facil.- Driver, Naval Base, Ft. Eustis)**	***2003, *2001, 2000, *1997, 95, 96, 94, *1993, *1992, 91, 90, 88, 87, 86, 85, 84, 82, 81, 80, 79**	**324.4 miles**
10	**Rappahannock River**	Rappahannock River from the I-95 bridge above Fredericksburg downstream to the mouth of river near Stingray Point including its tributaries Hazel Run up to I-95 bridge crossing and Claiborne Run up to Rt. 1 bridge crossing	Rappahannock	**Y**	**N**	**N**	**N**	**2001, 95, *1994, 89, 86, 85, 84, 82, 81, 80, 79**	**123.1 miles**
11	**Mountain Run**	Mountain Run from Rt. 15/29 bridge crossing near Culpeper City to the confluence with Rappahannock River	Rappahannock	**N**	**Y**	**N**	**N**	***2001, 1999, *1975 *1972, *1971**	**19.4 miles**
12	**Dan River**	Dan River within the state of Virginia from the Brantley Steam Plant Dam in Danville downstream to the confluence with Roanoke River on J. H. Kerr Reservoir, including its tributaries Hyco River up to Rt. 738 bridge and Banister River up to the Banister Dam	Roanoke	**Y**	**N**	**N**	**N**	**2002, *2000, *1999, *1993, 91, 88, 85, 83, 79, *1971**	**67.3 miles**
13	**Roanoke River**	Roanoke River (upper section) from the confluence of North and South Fork Roanoke River near Gaging Station at Lafayette downstream to Niagara Dam including its tributaries Peters Creek up to Rt. 460 bridge crossing and Tinker Creek up to the confluence with Deer Branch Creek near Rt. 115	Roanoke	**Y**	**N**	**Y**	**N**	***2002, *1999, *1993, 87, 86, 85, 83, 81, 80, 79**	**36.5 miles**

14	**Roanoke River / Smith Mountain Lake**	Roanoke River/Smith Mountain Lake from below the Niagara Dam on Roanoke River downstream to Smith Mountain Dam including Blackwater River arm up to the Rt. 122 bridge	Roanoke	**Y**	**Y**	**N**	**N**	***2004, *2002,** **1999, *1998, 94, *1993**	**129 miles, 19810 acres**
15	**Roanoke (Staunton) River**	Roanoke (Staunton) River from below Leesville Dam downstream to the confluence of Dan River	Roanoke	**Y**	**Y**	**Y**	**N**	**2002, *1999, *1998, *1993, 91, 87, 86, 85, 83, 79, *1971**	**98.4 miles**
16	**Kerr Reservoir**	Kerr Reservoir within the state of Virginia from the confluence of Dan River and Roanoke River to John H. Kerr Dam including its tributaries Eastland Creek and Nutbush Creek (within the state of Virginia)	Roanoke	**Y**	**N**	**N**	**N**	**2002, 99, *1998, 94, *1993, 89, 87, 85, 83, 79, *1971**	**112.6 miles, 32328 acres**
17	**Meherrin River**	Meherrin River from below Emporia Dam downstream to the Rt. 730 bridge	Chowan	**Y**	**N**	**N**	**N**	**2002, 1996**	**28.2 miles**
18	**Guest River**	Guest River from Rt. 23 near Esserville downstream to the confluence with Clinch River including its tributary Bear Creek up to the confluence with Yellow Creek	Tennessee	**Y**	**work initiated**	**N**	**N**	***2003, 2002, 2001, 97, 1991**	**23.4 miles**
19	**Stock Creek**	Stock Creek from Rt. 650 bridge above Natural Tunnel downstream to the confluence with Clinch River near Clinchport	Tennessee	**Y**	**work initiated**	**N**	**N**	**2002**	**4.5 miles**
20	**Wolf Creek**	Wolf Creek from Rt. 670 near Abingdon downstream to Rt. 75 near Green Spring	Tennessee	**N**	**N**	**N**	**N**	**2002, 1997**	**3.1 miles**
21	**Beaver Creek**	Beaver Creek from Beaver Creek Dam downstream to the VA/TN state line within the city of Bristol	Tennessee	**Y**	**work initiated**	**N**	**N**	***2004, 2002**	**7.2 miles**
38	**North Fork Holston River**	North Fork Holston River from below Saltville downstream to Rt. 80.	Tennessee	**Y**	**N**	**N**	**Y (EPA removal site)**	**2002, 1997, 91, 88, 86, 85, 83, 81, 80, 79**	**14.6 miles**
22	**Knox Creek**	Knox Creek from the VA/KY state line upstream to its headwaters near the VA/WV state line including its tributaries	Big Sandy	**Y**	**work initiated**	**N**	**N**	***2004, *2003, 2002, 97, 91**	**89.4 miles**
23	**Levisa Fork River**	Levisa Fork River from the confluence with Slate Creek at Grundy to the State line	Big Sandy	**Y**	**work initiated**	**N**	**N**	**2002, *2000, 97, 91, 90, 89, *1987, 86, 85, 83, 81, 79**	**14.1 miles**

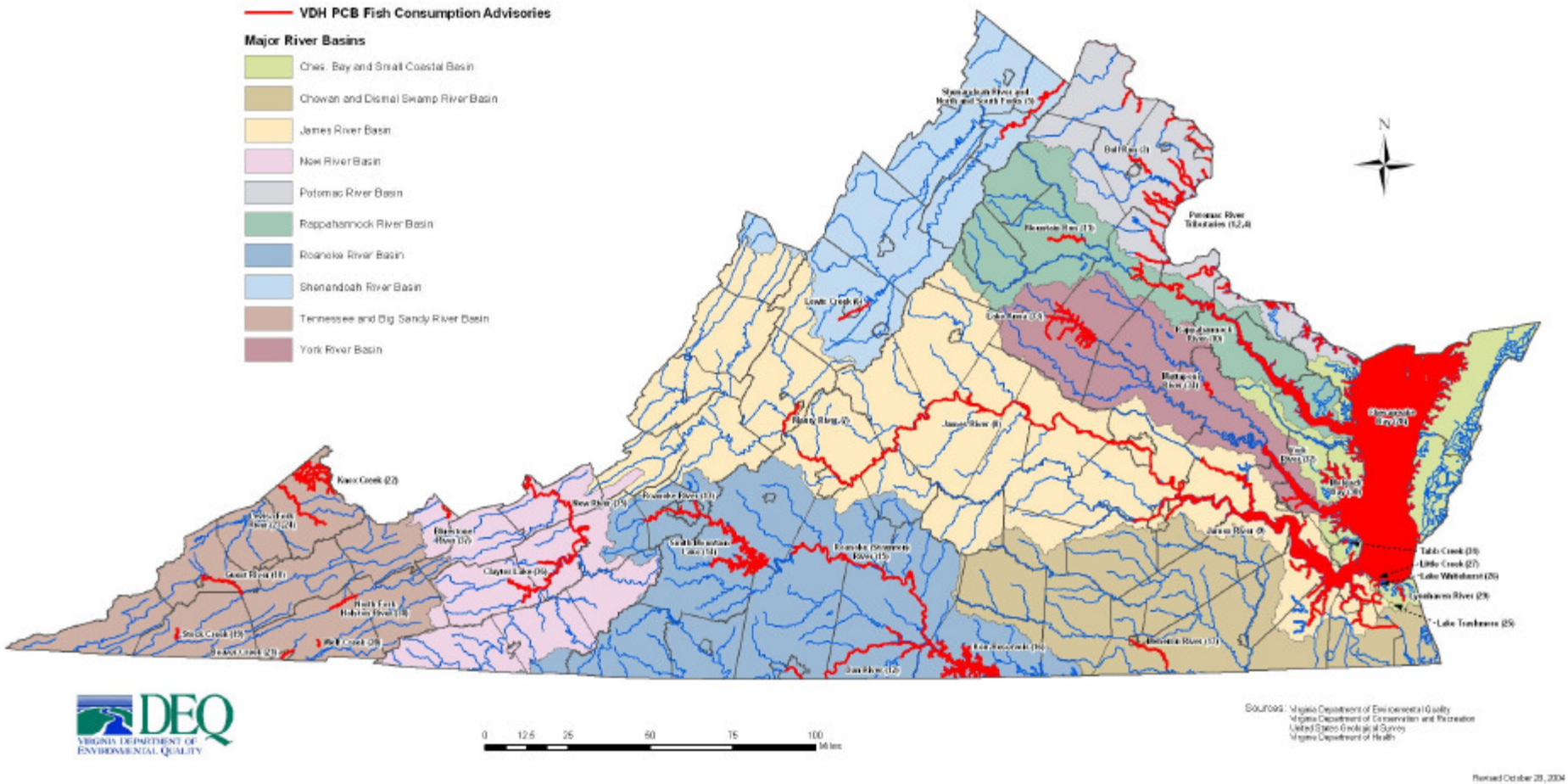
24	**Levisa Fork River**	Levisa Fork River from confluence with Slate Creek upstream to the confluence with Contrary Creek (intersection of Rt. 460 and Rt. 680) including its tributary Garden Creek up to the confluence with Right Fork of Garden Creek (Int of Rt. 624 and Rt. 632)	Big Sandy	**Y**	**work initiated**	**N**	**N**	**2002, *2000, 97, 91, *1987**	**17.8 miles**
25	**Lake Trashmore**	Lake Trashmore (entire lake), Virginia Beach	Chesapeake Bay/ Small Coastal	**N**	**N**	**N**	**N**	**2003, 1998**	**55 acres**
26	**Lake Whitehurst**	Lake Whitehurst (entire lake), Norfolk City	Chesapeake Bay/ Small Coastal	**N**	**N**	**N**	**N**	**2003, 1998**	**467 acres**
27	**Little Creek**	Little Creek near US Naval Reservation Little Creek Amphibious Base	Chesapeake Bay/ Small Coastal	**Y**	**N**	**N**	**N**	**2003, 1998**	**3.8 miles**
28	**Chesapeake Bay**	Mainstem Chesapeake Bay and its small coastal tidal tributaries	Chesapeake Bay/ Small Coastal	**N**	**N**	**N**	**N**	***2003, 1994**	**1462 sq. miles**
29	**Eastern Branch Lynnhaven River**	Eastern Branch Lynnhaven River, Virginia Beach	Chesapeake Bay/ Small Coastal	**N**	**N**	**N**	**N**	**2003, 1998**	**5.8 miles**
30	**Mobjack Bay**	Mobjack Bay and tributaries particularly East River, North River and Ware River	Chesapeake Bay/ Small Coastal	**N**	**N**	**N**	**N**	**2003, 1998**	**55 sq. miles**
31	**Tabbs Creek**	Tabb Creek (entire creek) near Langley Air Force Base, a tributary of Northwest Branch Back River	Chesapeake Bay/ Small Coastal	**N**	**N**	**N**	**Y (1 Fed Facil - NASA Langley)**	**2003, 1998**	**2.0 miles**
32	**York River**	York River from West Point downstream to the mouth near Tue Point and tidal portion of the following tributaries: King Creek, Queen Creek and Wormley Creek	York	**N**	**N**	**N**	**Y (2 Fed Facil. Naval Weapons Sta., Camp Peary)**	***2003, 2000, 96, 95, 94, 93, 90, 87, 84, 82, 81, 80, 79**	**49.7 miles**
33	**Lake Anna**	Lake Anna (entire lake) including its tributaries Terry's Run, Goldmine Creek and Contrary Creek	York	**Y**	**work initiated**	**N**	**N**	***2003, 2000, 94**	**12895 acres**
34	**Mattaponi River**	Mattaponi River from the confluence with Herring Creek (Rt. 600 close to river near Herring Creek Mill) downstream to the confluence with Aylett Creek (Rt. 600 close to river at Aylett Mill)	York	**N**	**N**	**N**	**N**	***2003, 1996, 94**	**10.0 miles**
35	**New River**	New River from below Claytor Lake Dam downstream to the VA/WV state line near the town of Glen Lyn in Giles County, VA	New	**Y**	**Y**	**N**	**N**	***2004, *2002, *2001, 2000, 90, 88, 86, 85, 83, 81, 80, 79**	**67.7 miles**

36	**New River / Claytor Lake**	New River/Claytor Lake from the Rt. 77 bridge near Jackson Ferry downstream to Claytor Lake Dam including its tributaries Peak Creek up to the confluence with North Fork Peak Creek (Tract Fork) in Pulaski and Reed Creek up to the confluence with Miller near Rt. 121 bridge near Max Meadows	New	**Y**	**N**	**N**	**N**	***2004,* 2000, 87**	**68.3 miles, 4952 acres**
37	**Bluestone River**	Bluestone River from the Rt. 460 bridge just south of Bluefield, VA downstream to VA/WV state line near the town of Yards in Tazewell County, VA	New	**Y**	**work initiated**	**Y**	**N**	***2003, *2002, 2000, 90, 89, 86, 85, 83, 81, 80, 79**	**8.6 miles**

1. The segments with VDH PCB advisories that were not listed on the 2004 303d list will be added to the 2006 303d list.
2. Red asterisked dates in last column indicate follow up monitoring and/or special studies activities

VDH PCB Fish Consumption Advisories

(October 2004)



III. ACTIONS TAKEN BY DEQ

Water Quality Standards

DEQ has adopted a Water Quality Criterion for total PCBs of 0.0017 ug/L to protect human health from toxic effects through fish consumption. This Water Quality Criterion is designed to prevent the fish from becoming contaminated above a concentration of 54 ug/kg total PCBs in edible tissue in order to provide an appropriate level of protection to the public and maintain the fish-consumption use of the waterbody. In order to assess whether the level of protection intended by the Water Quality Criterion is met, DEQ monitors fish tissue to determine if the edible filets of fish in a waterbody are below this level of contamination. VDH has rounded this value to 50 ug/kg total PCBs and uses this as a level of concern in fish filets in determining the need for issuing fish-consumption advisories.

Fish and Sediment Monitoring

Central office DEQ staff from the Water Quality Standards and Biological Monitoring Program routinely collect fish samples from designated monitoring stations throughout Virginia for contaminant analysis. "Tier I" is a screening study of a relatively large number of sample stations to identify sites where concentrations of contaminants in stream sediments and/or the edible portions of fish indicate potential aquatic ecosystem impairment and/or significant health risks to human consumers. These "Tier 1" sampling stations are selected on a rotational river basin approach among the fourteen river basins in Virginia.

If "Tier 1" results reveal potential problems, a more intensive "Tier 2" study is initiated to determine the magnitude, geographical extent, and potential sources of contamination in the fish. Prioritization of the "Tier II" studies is made in consultation with VDH to ensure that they have the data they need to issue or expand existing fish consumption advisories. Recent examples (see **Appendix A**) of these more intensive follow up studies of PCB contaminated fish are the sampling in the Roanoke River basin in the late 1990s (General Assembly appropriation) and the VEERF funded PCB fish collection and analysis in the New River, Bluestone River,

James River, Guest River, Beaver Creek, Knox Creek, and Smith Mountain Lake (Roanoke River).

A sediment sample is collected at each fish monitoring station. These sediment samples can be helpful in source assessment work for delineating the boundary areas of contamination and identifying high contamination areas that might indicate a nearby source or depositional area.

When the VDH requests intensive follow-up fish tissue studies, DEQ will design the study for the specific contaminant and waterbody. These intensive studies will typically consist of collecting and analyzing multiple samples of fish tissue, either as composites or individuals and/or different size classes of the same species that showed elevated concentrations of the toxic contaminant as well samples of additional species. The study will include multiple sampling sites along the waterbody bracketing the original site that prompted the additional study. Sediment samples will also be collected in the waterbody and analyzed to aid in source identification. These intensive follow-up studies will be conducted as soon as DEQ resources for funds for chemical analysis and staff availability allow after the request for the study. Typically the intensive study will begin the year after the request is made, or will be scheduled for the next rotation of routine fish and sediment sampling back into the river basin.

Data results from both Tier 1 and 2 sampling are shared with VDH for their evaluation for potential fish consumption advisories, posted on the Department's website for public access, and assessed via the 305(b) reporting process.

Water Quality Assessment

The fish tissue concentration data are used during the 305(b) assessment and reporting process. As noted previously, a fish tissue concentration of total PCBs in excess of 54 ug/kg indicates that the level of PCB contamination in fish exceeds the intended level of protection provided by the Water Quality Criterion used to protect the fish consumption use of the waterbody. Under current 305(b) guidance, one fish tissue sample exceeding 54 ug/kg total

PCBs will result in the waterbody being classified as "fully supporting with observed effects" for the fish consumption use. Two samples exceeding this concentration will result in an "impaired" assessment for fish consumption use in the waterbody. VDH also assesses the fish-PCB concentration data and if the mean concentration of total PCBs exceeds 50 ug/kg total PCBs for samples of the same species, VDH may issue a Fish-Consumption Advisory for the waterbody. A VDH issued Fish-Consumption Advisory will also result in a 305(b) "impaired" assessment for the waterbody. Waterbodies classified as "impaired" will be subject to more intense monitoring in the future and will ultimately become involved in the TMDL process.

Source Assessment

Appendix A summarizes DEQ's actions to date to address identified PCB problems in waterbodies within each of the following river basins: Potomac River, Shenandoah River, James River, Rappahannock River, Roanoke River, Chowan River, Tennessee River, Big Sandy River, Chesapeake Bay, Atlantic Ocean and Small Coastal River, York River and New River.

In most cases where PCB contamination is found in a waterbody, the problem will ultimately be addressed via a TMDL, but this does not prevent regional staff from undertaking a preliminary source assessment outside the TMDL if funding can be found. If the regional offices are to undertake such work outside the TMDL process, funding sources other than VEERF - such as TMDL, SEP, budget addendum by the General Assembly or federal funding - need to be identified and utilized.

Regional office initiated studies to determine the sources of PCBs found in fish tissue have followed the source assessment steps outlined in the Toxics Contamination Source Assessment Policy. As the regional offices have gained experience in PCB specific source identification work, they have developed several assessment tools to supplement the guidance provided in the Policy.

Public Involvement. The West Central (WCRO) and South West (SWRO) regional offices found local citizen involvement in watershed source identification to be a critical element

in their PCB source assessment strategy. For the New River PCB impairment, WCRO's approach was to form an advisory committee which directed the location of sediment sampling locations. This resulted in identification of a potential source but it was a very costly approach that utilized VEERF funding for the sample analysis. SWRO's approach for the Bluestone River was to introduce the topic of PCB impairment at the bacteria and benthics TMDL meetings and to seek citizen feedback on sources for PCBs. **Appendix B** is an example of a stakeholder survey used by SWRO. By involving the stakeholders assembled to begin work on other impairments for the river, PCB source assessment activities were initiated prior to the official TMDL process scheduled start date for PCB impairments in that watershed.

Prioritization of Source Assessment Activities. Limitations in funding and the significant number of waters requiring source assessment may at times necessitate prioritization of the work. With file searches costing an estimated $25,000 in salaries and first phase chemical monitoring plans averaging almost $100,000 per waterbody, utilization of a prioritization matrix can help an office select which waters to address first. **Appendix C** provides an example of a matrix developed by the Piedmont Regional Office (PRO) to assist in prioritization of PCB source assessments, but the matrix could be modified for use for prioritization of source assessments for other pollutants of concern.

File Search and Inventory. PRO, WCRO and SWRO staff searched agency files and records for potential sources of PCBs and found this to be a necessary first step in source identification. See **Appendix D** for sample file search inventory forms and flow chart/decision trees used by the WCRO to identify facilities that were potential sources of PCB contamination in the New River Basin. **Appendix E** contains a New River PCB Source Investigation Survey that was mailed to the facilities on the potential source list. Interviews by telephone or on-site inspections were used to refine the list of potential facilities that warranted soil and/or sediment sampling. **Appendix F** contains a Bluestone River PCB Source Investigation Survey.

TMDLs

PCB related TMDL activities in Virginia to date consist of one completed TMDL project and a number of ongoing efforts. These activities are summarized in **Appendix A**.

Remediation

The DEQ Waste Division and EPA administered programs created by the federal Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, commonly called Superfund) and the Virginia Waste Management Act. Another tool for addressing hazardous waste sources including PCBs is Virginia's Voluntary Remediation Program. The purpose of the Voluntary Remediation Program is to encourage hazardous substance cleanups that might not otherwise take place. The program is a streamlined mechanism for site owners or operators to voluntarily address contamination at sites with concurrence from DEQ.

Under the aforementioned waste management programs administered by DEQ and EPA, case examples where PCB related clean up or remediation actions have occurred at facilities are included in **Appendix A**.

IV. PCB STRATEGY FOR THE FUTURE

Virginia's PCB strategy is intended to address waters that have been identified as impaired by PCBs, i.e. as having PCB levels high enough to cause fish consumption advisories. Therefore, it encompasses activities that may potentially exceed the currently existing procedures. For example, past experience has shown that ultra-low detection levels are necessary to determine PCB levels in waterbodies and sediment at concentrations near the water quality criteria. The methodology for such analysis, while not part of standard methods, has been widely used and is supported by EPA for use in such investigations. DEQ therefore will encourage VPDES permit holders in watersheds with PCB impaired waters to start monitoring their effluent and stormwater quality using these methods. Similarly, Virginia's water and waste programs currently use certain soil and sediment PCB concentrations to determine if a site warrants additional investigation (screening values) or if a site has been remediated sufficiently to minimize on-site human health risks (clean-up value). In order to address the existing human health risk from fish consumption and possibly existing impacts to aquatic life uses and wildlife, both screening and clean-up values may be lowered significantly either as part of the PCB assessment process (to include TMDL development) or as part of the PCB remediation process (to include TMDL implementation). The two processes that encompass the specific elements of the PCB strategy are described in the following sections.

Assessment and Planning Process

This section provides the details of merging the existing toxic source assessment information with the requirements of the TMDL program. This planning effort will generally include source assessment, additional monitoring to quantify loadings, and quantifying the required reductions needed to attain the fish consumption use in the water bodies currently under advisory. The planning effort may also involve assessing impacts to aquatic life uses and wildlife, as appropriate. The specific steps to be performed are related to both the TMDL program requirements and the components of the Toxics Contamination Source Assessment Policy and are defined as follows:

- Initiate data review of in-house and federal records and databases for potential PCB sources in the drainage areas adjacent to and upstream of the fish advisory to the headwaters; compile information in maps, tables, and a stakeholder information database.
- Solicit stakeholder input, for example, through mass mailing of survey forms to watershed residents and businesses
- Perform additional fish tissue monitoring to delineate the extent of the PCB impairment (particularly upstream)
- Present initial findings at public meetings to kick off each TMDL development process
- Identify additional monitoring needs (based on record review, public input and TMDL needs, e.g. monitoring by VPDES permittees or monitoring to assess aquatic life or wildlife impacts)
- Perform additional congener-specific monitoring at ultra-low detection levels as resources allow:
  - water column and/or SPMD for in-stream loadings and source assessment (funded, e.g., by TMDL program, EPA, future VEERF funding etc.)
  - source loading (e.g. stormwater and wastewater discharges) and on-site monitoring (funded, e.g., by permitted facility, EPA, future VEERF funding etc.)
- Utilize Technical Advisory Committee (TAC) meetings for data review and procedural/technical input, develop TMDL loading estimates by source category and/or tributary (as data allow)
- Develop TMDL report including TMDL Implementation Plan (IP) elements required by WQMIRA

In implementing these steps, DEQ considers the procedures outlined in the Policy and Protocol as separate requirements and not necessarily applicable to the TMDL development process. The geographic scope of TMDL development may make it impractical to implement the procedures to the degree specified in the Policy and Protocol. Given sufficient time and funding, however, site-specific toxic source assessments as outlined in the Policy and Protocol may be used to collect data in advance of TMDL development to provide information on potential PCB loads coming from various areas in the watershed. Alternatively, detailed toxic source assessments in accordance with Policy and Protocol may be performed as part of the

TMDL implementation process to identify areas with elevated PCB levels that may be candidates for remediation.

Schedule for Existing Advisories

In order to move as expeditiously as possible toward removal of the existing fish consumption advisories, the list of 37 PCB advisories has been divided into three TMDL development groups, based on the steps that have already been performed and already existing TMDL completion dates. The three groups are near-term (TMDLs due by 2007), mid-term (TMDLs due by 2009) and long-term (TMDLs due by 2011 through 2014 depending on priority). DEQ recognizes that this schedule is subject to change depending on available resources and programmatic requirements such as the need to meet the existing Federal Court Consent Decree governing Virginia's TMDL program. The following paragraphs and tables provide a list of advisories and affected waterbodies in each group, as well as locational information (including Hydraulic Unit Codes –HUCs), timelines and the actions needed to complete the TMDL.

Group I (near-term) consists of completing ongoing PCB TMDL projects by 2006/07. These projects were initiated because of high stakeholder interest, interstate interests and/or endangered species interests. They address advisories with IDs 2, 4, 6, 13, 15, and 37 listed in the Section II table and are in various stages of completion.

Group I – Ongoing PCB TMDL Projects, complete by 2006/07				
Stream/ River Basin	Virginia HUCs	County	Actions needed for completion	Comment
Bluestone River/ New	N36	Tazewell (VA)	➢ Public/TAC meetings ➢ 2nd round monitoring ➢ Documenting source assessment/remediation ➢ Developing allocations ➢ Draft report by mid 05	➢ Also WV ➢ Project managed by DEQ

Roanoke River/ Roanoke	L01- L07 L30 L36 L38 L40	Roanoke, Montgomery, Campbell, Pittsylvania, Charlotte, Halifax	➢ Public/TAC meetings ➢ Any supplemental monitoring (TBD) ➢ Documenting source assessment/remediation ➢ Developing allocations ➢ Draft report by end 05	➢ Project managed by EPA
Tidal Potomac River/ Potomac	All HUCs contribut-ing to tidal Potomac	Arlington, Fairfax, Pr. William, Stafford, King George, Westmoreland, Northumberland	➢ Public/TAC meetings ➢ Supplemental monitoring (funded by EPA) ➢ File review ➢ Documenting source assessment/remediation ➢ Developing allocations ➢ Draft report by end 06	➢ Also MD, DC ➢ Project managed by ICPRB
Lewis Creek/ Shenandoah	B12	Augusta	➢ 2nd round public/TAC meetings ➢ 2nd round monitoring ➢ Developing allocations ➢ Draft report by mid 05	➢ TMDL is for biological impairment, data may be used for PCB impairment

Group II (mid-term) consists of developing TMDLs for waters with completed toxic source assessments by 2008/2009. These toxic source assessments were initiated based on stakeholder interest and degree of use, utilizing VEERF or other available funding. Completion of these TMDLs in the allotted timeframe depends on available funding and staff resources. They address advisories with IDs 9, 18-24, 33, 35 and 36.

Group II – PCB TMDL Projects for waters with Toxic Source Assessments, complete by 2008/2009				
Stream/	Virginia	County	Actions needed for completion	Comment

River Basin	HUCs			
New River/ New	All New River HUCs except N33, 36, 37 and N01–5	Tazewell, Bland, Pulaski, Giles, Montgomery, Wythe, Floyd, Grayson, Carroll	➢ Public/TAC meetings ➢ Any supplemental monitoring ➢ Documenting source assessment/remediation ➢ Developing allocations ➢ Draft report by mid 08	➢ Project managed by DEQ
Beaver Creek, Wolf Creek/ Holston Stock Creek/ Clinch Tennessee; Big Sandy	O07 O06, P13 …	Washington, Scott	➢ Public/TAC meetings ➢ Any supplemental monitoring ➢ Documenting source assessment/remediation ➢ Developing allocations ➢ Draft report by end 08	➢ Also TN ➢ Project managed by DEQ
Tidal James	All HUCs contribu-ting to tidal James		➢ Public/TAC meetings ➢ Any supplemental monitoring ➢ File review ➢ Documenting source assessment/remediation ➢ Developing allocations ➢ Draft report by mid 09	➢ Project managed by DEQ
Lake Anna	F06 F07 F08	Louisa, Spotsylvania	➢ Public/TAC meetings ➢ Complete supplemental monitoring (ACOE) ➢ File review ➢ Documenting source assessment/remediation ➢ Developing allocations ➢ draft report by mid 09	➢ Current project with ACOE
Guest River, Bear Creek/		Wise, Russell	➢ Public/TAC meetings ➢ Any supplemental monitoring	➢ Also TN ➢ Project

TN Big Sandy			➢ File review ➢ Documenting source assessment/remediation ➢ Developing allocations ➢ Draft report	managed by DEQ
Knox Creek, Levisa Fork, Tug Fork/Big Sandy	Q03 Q08 …	Buchanan	➢ Public/TAC meetings ➢ Any supplemental monitoring ➢ Documenting source assessment/remediation ➢ Developing allocations ➢ Draft report by mid 09	➢ Also KY ➢ Project managed by DEQ

Group III (long-term) consists of TMDL development for the remaining waters based on a prioritization matrix that takes into account public interest, degree of use, severity of impairments, among others. The prioritization matrix is attached to this document as **Appendix B**. Group III will address all remaining advisories (IDs 3, 7, 8, 10-12, 14, 16, 17, 25-32, and 34). A statewide schedule for Group III waters will be developed based on the prioritization matrix and will be made available for public comment by December 2005.

DEQ plans to initiate the necessary steps to identify PCB sources in those watersheds with the highest Group III priority no later than early 2006. A review of available data and source information in existing records and databases will be performed over the first two years as resources allow. **Appendix D** contains a template for performing such file searches. After this initial information is complete, it will be presented in maps and/or tables at the first TMDL public meeting to solicit additional information on potential source areas. Based on that information, follow-up monitoring will occur in the contributing watersheds during 2008/2009. TMDLs for these waters should be completed by 2010/2011. TMDLs for all remaining Group III waters should be complete by 2014. The development of TMDLs within the allotted timeframe is dependent upon available funding and staff resources.

Remediation Process

Through the years PCB remedial actions have been implemented in Virginia and around the country to reduce PCB loadings to a system. Before a remedy can be selected, it is very important to answer many engineering related questions that will lead to the best action for that situation. For example, consideration must be given to the ability to meet the clean-up level in-stream, removal and disposal costs associated with sediment "hot spots", how widely dispersed the PCBs are in the system and whether a given action will make a difference in meeting the designated use. Furthermore, compliance with all appropriate environmental regulations must factor into the clean-up activity.

Several options currently exist for sediment PCB remediation, and new technologies are undergoing research to determine their viability as cost-effective alternatives to existing methods. Some remedial options that have been used for PCB reduction include:

1) Facility specific removal actions of contaminated soils,
2) Removal action such as dredging of PCB "hot spots",
3) Restricting the bioavailability and movement of PCBs through the use of capping (e.g., a potential new technology is "reactive cap" that adsorbs and isolates PCBs).
4) Thermal desorption, and
5) Natural attenuation.

To avoid the potential for sediment recontamination, it is imperative that all upland sources be remediated before instream work begins.

Remediation work for PCBs will occur during various phases of this strategy. In general, if site-specific toxic source assessments or sediment monitoring have identified “hot spots”, i.e. areas of PCB levels elevated above existing screening values, in soils (i.e. on land) or in sediment (on stream banks and stream bottoms), these sites will be referred to existing state and/or federal programs for clean up/remediation. The identification and remediation of such sites can occur pre-TMDL development, during TMDL development or post-TMDL development.

The clean-up levels and screening levels in the absence of a completed TMDL will be based on existing guidelines and criteria. Once TMDLs have been completed, more stringent

clean-up levels may be needed to reflect the pollutant reductions specified in the TMDL. This will be decided on a case-by-case basis and will be implemented using the adaptive management or iterative implementation approach currently employed in Virginia's TMDL program. **Appendix G** describes the technical basis for the development of site-specific screening levels and cleanup levels for PCBs that the agency is implementing. More details regarding soil hot spots, sediment hot spots and the PCB TMDL implementation process are provided below.

Soil Hot Spots

Typically identified as part of a toxics source assessment, 'soil hot spots' will be referred to the appropriate program(s) for clean up (for example TSCA or VRP). Management actions such as soil removal can be initiated if the toxics source assessment points to heavily contaminated upland areas that have a direct pathway to a waterbody (i.e., non-point source). In accordance with the Toxics Substances Control Act (TSCA) contained in 40 CFR761, the DEQ Regional Office must notify the EPA Office of Pollution Prevention and Toxics if elevated levels of PCBs ($\geq$ 50 ppm) are discovered. It is then within EPA's jurisdiction to determine if they will respond or if the contaminated soil is deferred to DEQ's Waste Division with EPA's oversight.

TSCA PCB soil clean-up levels (40CFR 761.61 Self-Implementation Rules) are generally used by DEQ and are applied on a case-by-case basis. These values include:

- Less than 1 ppm for high occupancy areas with no conditions
- Less than 10 ppm for high occupancy areas with a cap
- Less than 25 ppm for low occupancy areas with no conditions
- Less than 100 ppm for low occupancy areas with a cap

TSCA defines high occupancy as greater than 16.8 hours per week. (EPA, 1998).

The TSCA clean-up levels are designed to be protective of human health under direct contact with the contaminated soil. They do not account for the human health risk associated with fish consumption. If the contaminated area is remediated to TSCA occupancy criteria but a direct pathway remains for the heavily contaminated soil to reach a waterbody, wetland, or groundwater, further action may be necessary to protect the fish consumption or aquatic life use.

The TMDL process, designed to protect these in-stream uses, would identify pollutant reduction goals such as 75% reduction of the PCB load from industrial or tributary watershed areas. These pollutant reduction goals may ultimately result in more stringent clean-up levels than those associated with TSCA clean-ups or they may identify additional areas for clean up.

Sediment Hot Spots

Identified as part of either a toxics source assessment or DEQ's ambient fish tissue and sediment monitoring program, 'sediment hot spots will be referred to the appropriate program(s) for clean up. Sediment PCB contamination occurs either from gradual inputs from non-point sources such as upland soil contamination or from low level point source releases, illegal dump sites, air deposition or stormwater runoff. Since PCBs are very hydrophobic there is a strong tendency for them to adsorb to particulate matter when entering a waterbody. PCBs from upland sources would already be adsorbed to soil. When the contaminated particles end up in reduced flow depositional areas, they settle out and become embedded in the bottom sediments. If sufficient deposition of heavily contaminated particulates occurs, areas like this become "hot spots". These hot areas are considered a non-point source and serve as a significant pathway for bioaccumulation in aquatic life, most notably fish.

Depending on available resources, with consideration given to the magnitude of sediment contamination and other site-specific variables, sediments within a waterbody can be remediated. In the case of setting a targeted clean-up level, since an overall regulatory or risk based target level has not been established statewide, DEQ has determined that a site-specific sediment level would be more appropriate due to unique characteristics associated with each water body. An example of a tool that is available for determining a site-specific clean-up level is the Bioaccumulation and Aquatic System Simulator (BASS), which uses sediment PCB concentrations to help predict what levels will end up in different species of fish (**see Appendix G**). By meeting site-specific sediment clean-up level instream, PCB concentrations in fish will eventually drop as less contaminant will be bioavailable.

If the TMDL development process identifies a required percent reduction from in-stream sediment, such site-specific analyses can be used to determine the appropriate remediation action at sediment sites with elevated PCB concentrations.

Active sources

Active sources in addition to soil and sediment hot spots potentially include illegal dumping sites, air deposition, stormwater runoff, and permitted dischargers. Because such sources have not been extensively monitored or targeted in the past (in the absence of known PCB impairments), DEQ expects to increase its quantification of these sources during the TMDL development and implementation process. Since the public may be very knowledgeable on historical activities within a watershed, it is critical that their input is sought to help identify other potentially active sources. Additionally, DEQ is pursuing collaboration with permit holders and the air program to start the data collection effort needed to identify these sources. Once identified, such active sources will be addressed through the appropriate programs for remediation.