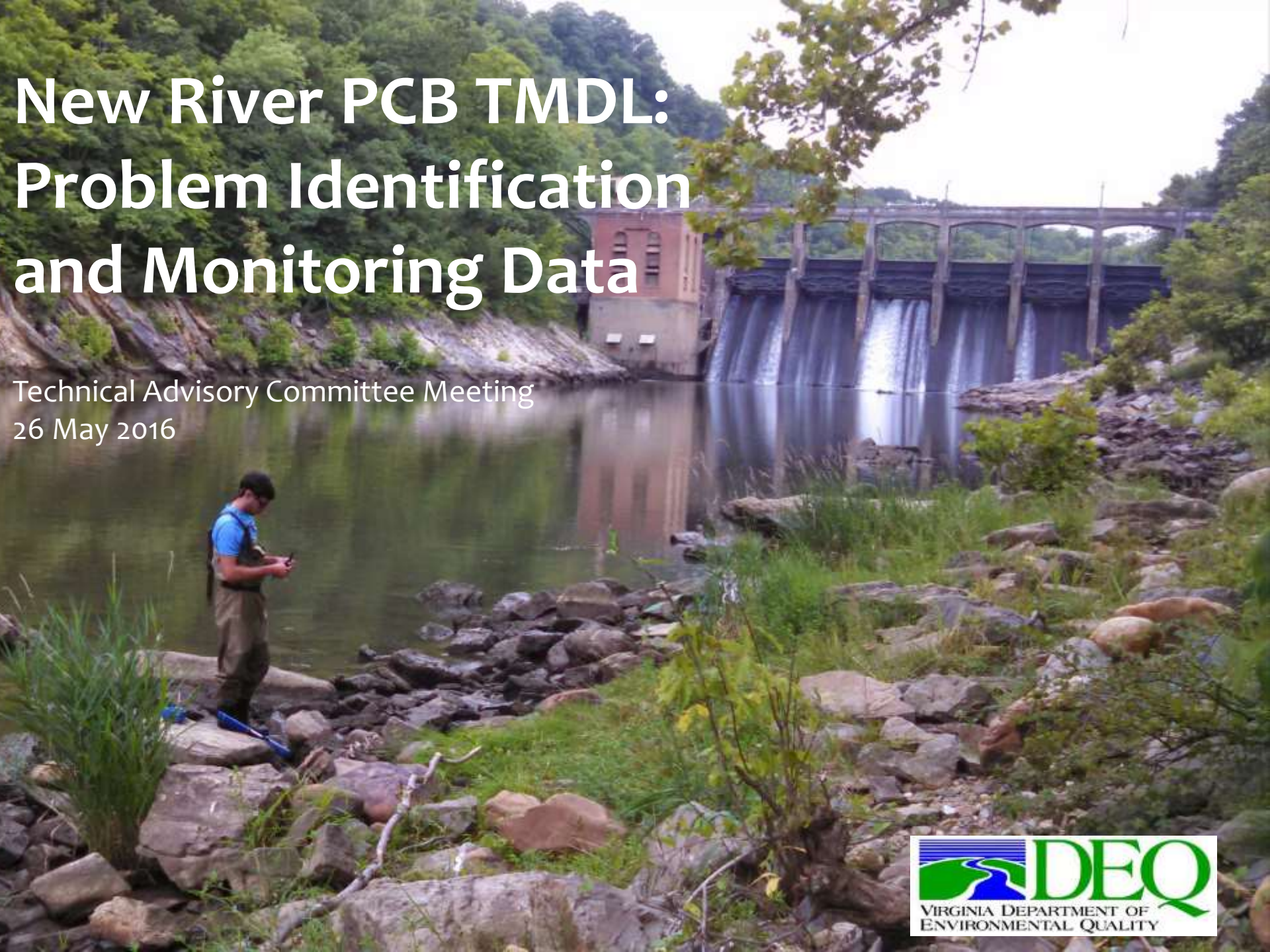
New River PCB TMDL: Problem Identification and Monitoring Data

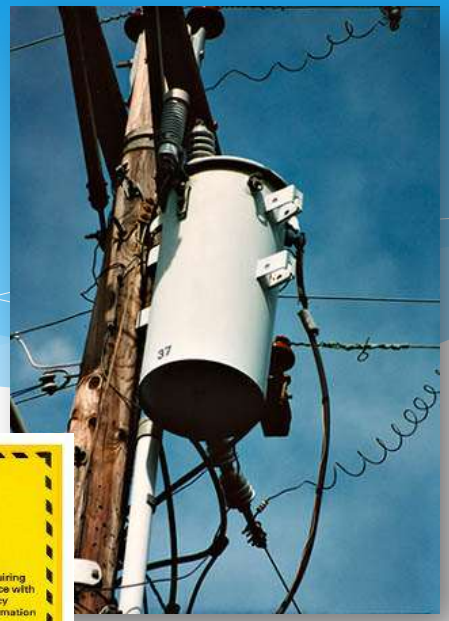
Technical Advisory Committee Meeting
26 May 2016

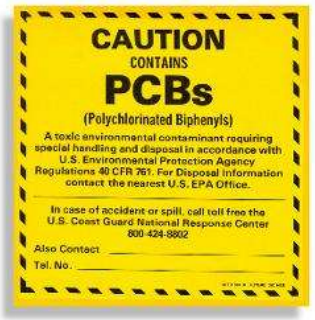


DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Background: PCBs

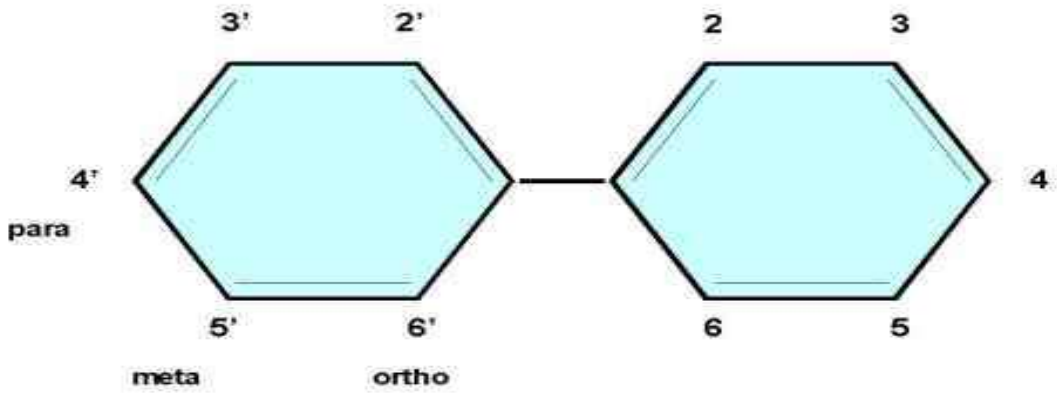
* Estimated that > 1.5 Billion lbs. manufactured in the U.S. until 1977 - "Legacy Contaminant"
* Very stable and heat resistant
  * Persistent in environment
* Common uses:
  * Transformers, capacitors, hydraulic fluids, circuit breakers, PVC Products, carbonless copy paper, caulking material, paints, and more!





Background: PCBs

* Biphenyl molecule (1-10 chlorine atoms)
* 209 distinct PCB Compounds
* Regulated by DEQ as Total PCB (tPCB) = 209 compounds summed
* Referred to as PCB Aroclors (Monsanto tradename) = mixture of PCB compounds



Structure of Polychlorinated Biphenyl (PCB) Molecule

PCBs: Problem Identification

* Bioaccumulate at low concentrations (lipids)
* "Probable" human carcinogen
* Other toxicological effects (humans)
  * Immunotoxicity, reproduction and developmental, hepatotoxicity (liver), neurotoxicity, and chloracne
* Major Sources of Exposure (humans)
  * Consumption of contaminated fish
  * Inhalation (dust from contaminated sites)

PCBs: Problem Identification
A Legacy Pollutant?

* Banned in late 70's
* Accumulate and persist in river sediments from historic releases
  * "Hot Spots"
* Generally not detected in VPDES Program (unless in a PCB impaired watershed)

PCBs: Problem Identification

Current Releases?

* PCBs used many years after banned
* Contaminated sites with active transport (non-point - e.g., CERCLA, RCRA, VRP, unknown)
* Point Sources
* Dielectric oils considered non PCB < 50 ppm
  * (Fish advisories at 0.02 ppm)
* Inadvertent production
  * Carbon + heat + chlorine
  * Up to 50 ppm allowed (TSCA)
* Atmosphere

Problem Identification:
Impairment Listing

* Fish Tissue Listing on 303 (d) Impaired Waters List for Virginia
  * 2002 Section 303(d) Listed
  * Extended listing in 2006
* 2010 – 2012 "Observed Effect" for PCBs in Water Column

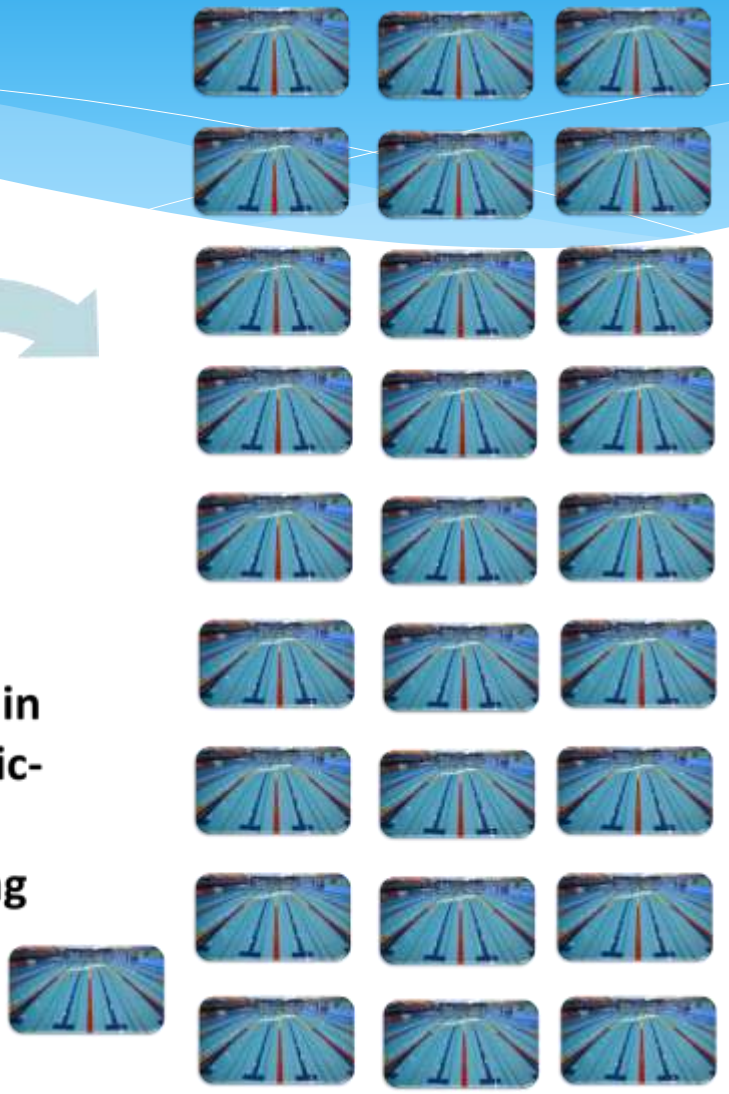
DEQ's Screening Value for Fish Tissue (parts per billion)	Water Quality Criterion (parts per billion)
20	0.00064

Virginia's PCB Water Quality Criterion

Water Quality Criterion represents concentration of PCBs in the water that are low enough to minimize accumulation in fish so they are safe for people to eat

DEQ's Screening Value for Fish Tissue (parts per billion)	Water Quality Criterion (parts per billion)
20	0.00064

One drop in 31 Olympic-sized Swimming Pools!



Problem Identification

VDH Fish Consumption Advisories

* Virginia Department of Health
* Initial listing in 2001
* Based on DEQ fish tissue collection data
* Establishes human health guidelines for consumption of certain fish species
  * Number of fish per month
  * Fish cooking/preparation
* Doesn't affect recreational use (swimming, boating, water skiing)

Problem Identification

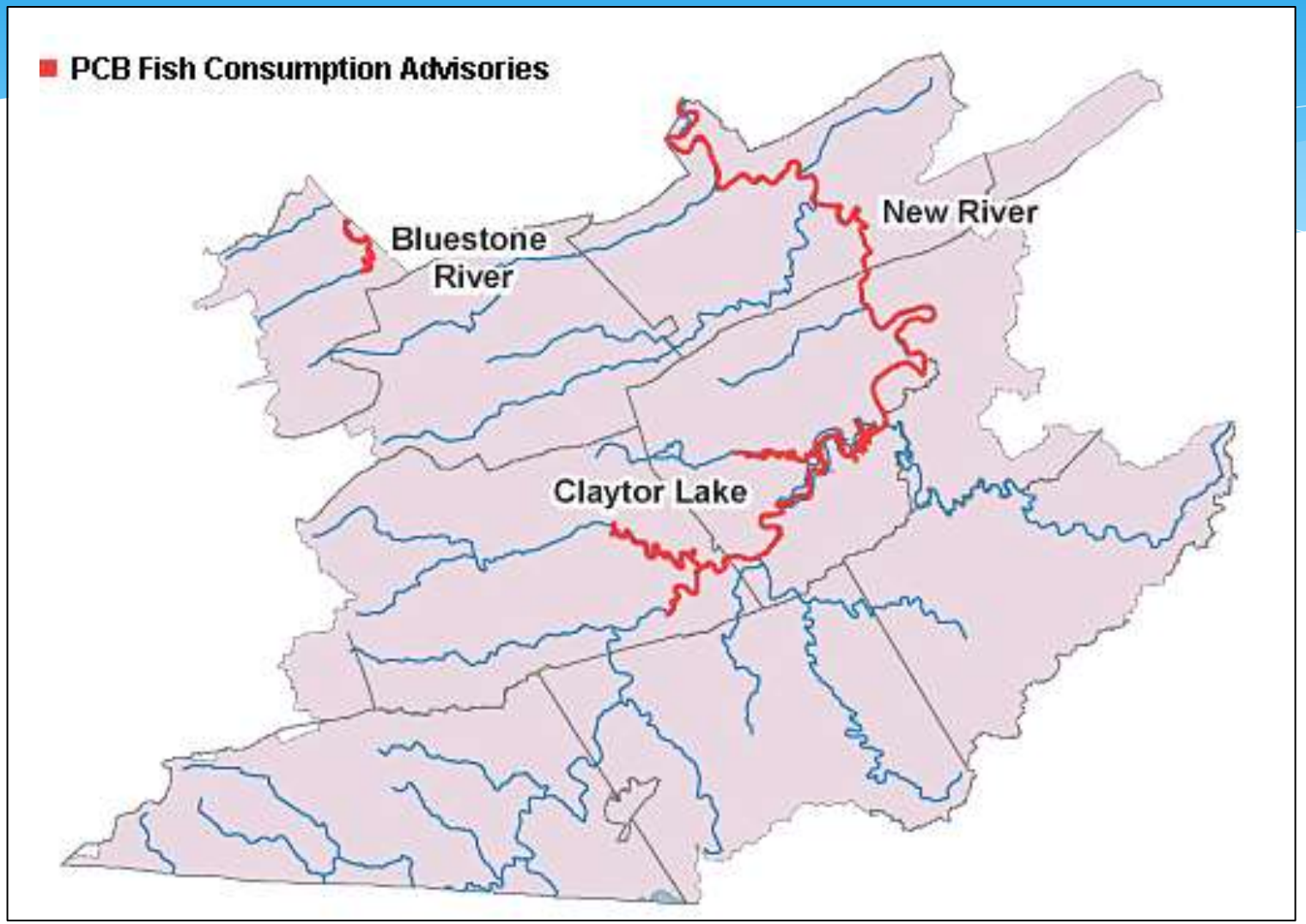
VDH Fish Consumption Advisories

Waterbody and Affected Boundaries	Affected Localities	Contaminant	Species	Advisories/Restriction
New River from below Claytor Lake Dam downstream ~ 68 miles to the VA/WV state line near the town of Glen Lyn in Giles County, VA (8/6/01; modified 12/13/04)	Giles Co., Montgomery Co., Pulaski Co. and Radford City	PCBs	Carp Flathead Catfish Channel Catfish	**DO NOT EAT** No more than two meals/month
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. These river segments comprise ~68 miles. (12/13/04)	Pulaski Co. and Wythe Co.	PCBs	Carp Smallmouth Bass	No more than two meals/month
Bluestone River from the Rt. 460 bridge just south of Bluefield, VA downstream ~ 9 miles to VA/WV state line near the town of Yards in Tazewell County, VA (8/6/01; modified 12/13/04)	Tazewell Co.	PCBs	Carp White Sucker Rock Bass Largemouth Bass	**DO NOT EAT** No more than two meals/month

http://www.vdh.state.va.us/epidemiology/DEE/PublicHealthToxicology/Advisories/NewRiver.htm

Problem Identification

VDH Fish Consumption Advisories



http://www.vdh.virginia.gov/Epidemiology/dee/PublicHealthToxicology/Advisories/NewRiver.htm

2004 PCB Source Investigation

* Goal: Identify PCB Sources
* Initiated due to 2001 Fish Consumption Advisory (VDH)
* New River PCB Source Citizen's Search Committee
  * Advised DEQ on direction and substance of investigation
  * Provided local perspectives
  * Reviewed sampling plans and data
  * Participated in 6 meetings (2002 – 2004)

2004 PCB Source Investigation

* Narrow down the "universe" of facilities: 1,350 Industrial facilities identified that may have used/stored PCBs
* Screening Criteria Applied:

1. 335 facilities were…
   * Not a school
   * Operated prior to 1980
   * Operations included: hazardous materials, oil distribution, landfill operation, waste oil storage, OR wastewater treatment >1 MGD
2. 80 facilities were…
   * Not a tire pile, UST facility, hospital, pump station, concrete plant, asphalt plant, or major municipal facility (with no industrial contributions)

2004 PCB Source Investigation

* 80 facilities surveyed
* 60 phone interviews
* 48 facility inspections

18 Facilities + 2 Streams = 47 Samples

2004 Source Investigation
Facilities & Streams

* Celanese Acetate - Narrows
* Chemical Lime - Ripplemead
* AEP – Glen Lyn
* Intermet – Radford
* City storage yard – Radford
* SEMCO/Railroad Power Plant – Narrows
* Patrick Enterprises – Pembroke
* RAAP – Radford
* Cloyds Mountain Landfill – Giles Co.
* Virginia Tech Duck Pond - Blacksburg
* AEP Claytor Hydro Dam – Radford
* Quarry near Claytor Hydro – Radford
* Radford University – Radford
* Former New River Tannery – Pearisburg
* Big Walker Creek – Giles Co.
* Sugar Run – Giles Co.
* Corning – Blacksburg
* Crab Creek, Unnamed Tributary – Christiansburg

Full Report available on DEQ's website!

Site Location	Site Identification	Number of Samples	Type of Sample
Narrows	Celanese Acetate	6	soil/sediment
Ripplemead	Chemical Lime	5	soil/sediment
Glen Lyn	AEP	5	soil/sediment
Radford	Intermet	6	soil/sediment
Radford	City storage yard	1	soil/sediment
Narrows	SEMCO/Railroad Power Plant	3	soil/sediment
Pembroke	Patrick Enterprises	1	soil/sediment
Radford	Radford Army Ammunition Plant	7	soil/sediment
Radford	AEP Claytor Hydro Dam	1	soil/sediment
Radford	Quarry near Claytor Hydro Dam	1	soil/sediment
Radford	Radford University	1	soil/sediment
Pearisburg	Former New River Tannery	3	soil/sediment
Giles County	Big Walker Creek	2	sediment
Giles County	Sugar Run	1	sediment
Blacksburg	Corning	1	soil/sediment
Christiansburg	UT, Crab Creek	1	sediment
Giles County	Cloyds Mt. LF	1	sediment
Blacksburg	VT Duck Pond	1	soil/sediment
Total Samples: 47			

2004 Source Investigation
Results Highlights

* Former Quarry adjacent to Claytor Dam: 25,472,449 ppb
* Report and Committee Conclusions:
  * All samples contained some quantified level of PCBs
  * No major ongoing sources identified
  * Some facilities have residual concentrations of PCBs onsite:
    * AEP
    * Intermet
    * RAAP
    * Bane School
    * Cloyds Mountain Landfill
  * Walker Creek and Sugar Run have very high instream sediment PCB concentrations
  * Environmental PCB sampling should focus on PCB congeners and not aroclors

DEQ TMDL Sampling Approach

* Source identification
* TMDL model support
* 2010 – 2015 fish tissue, water column, sediment
  * Fish tissue
  * Water column grab samples: High and Base Flow
  * Sediment samples as needed
* Strategy
  * 2004 Source Investigation Study follow up
  * Tributaries

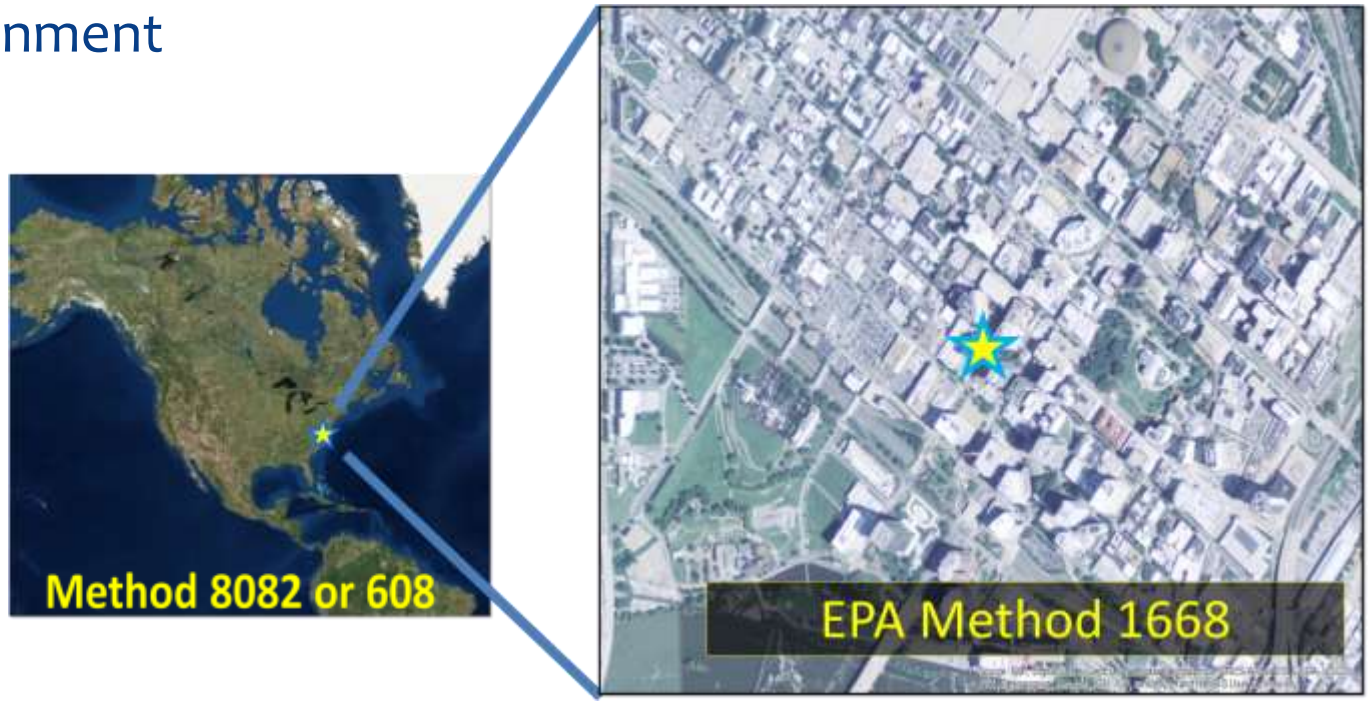
Analytical Methods

Method 8082 or 608:

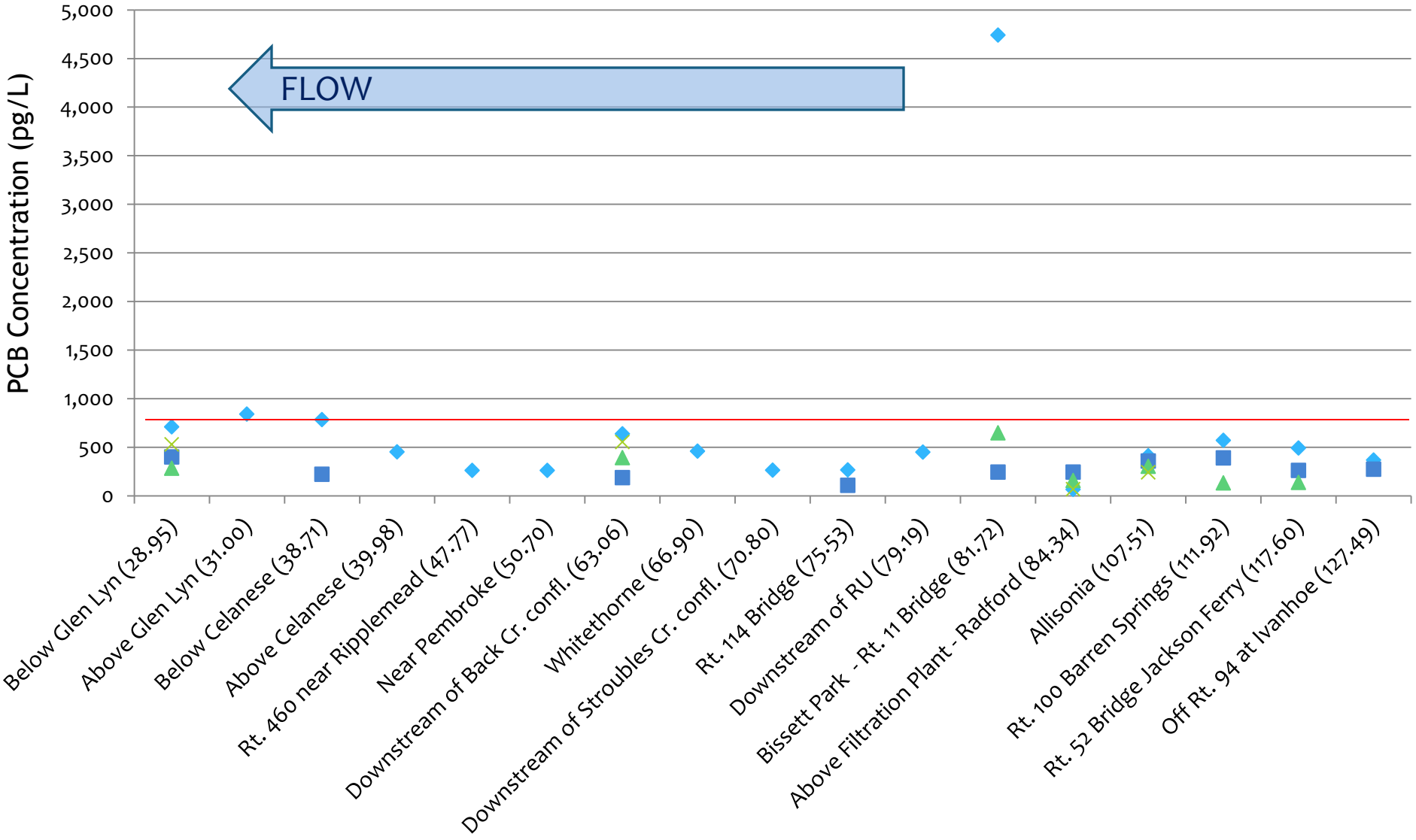
* Used for permit compliance
* Includes aroclors
* Does NOT account for weathering
* Likely underestimates PCB concentrations in the environment

Method 1668:

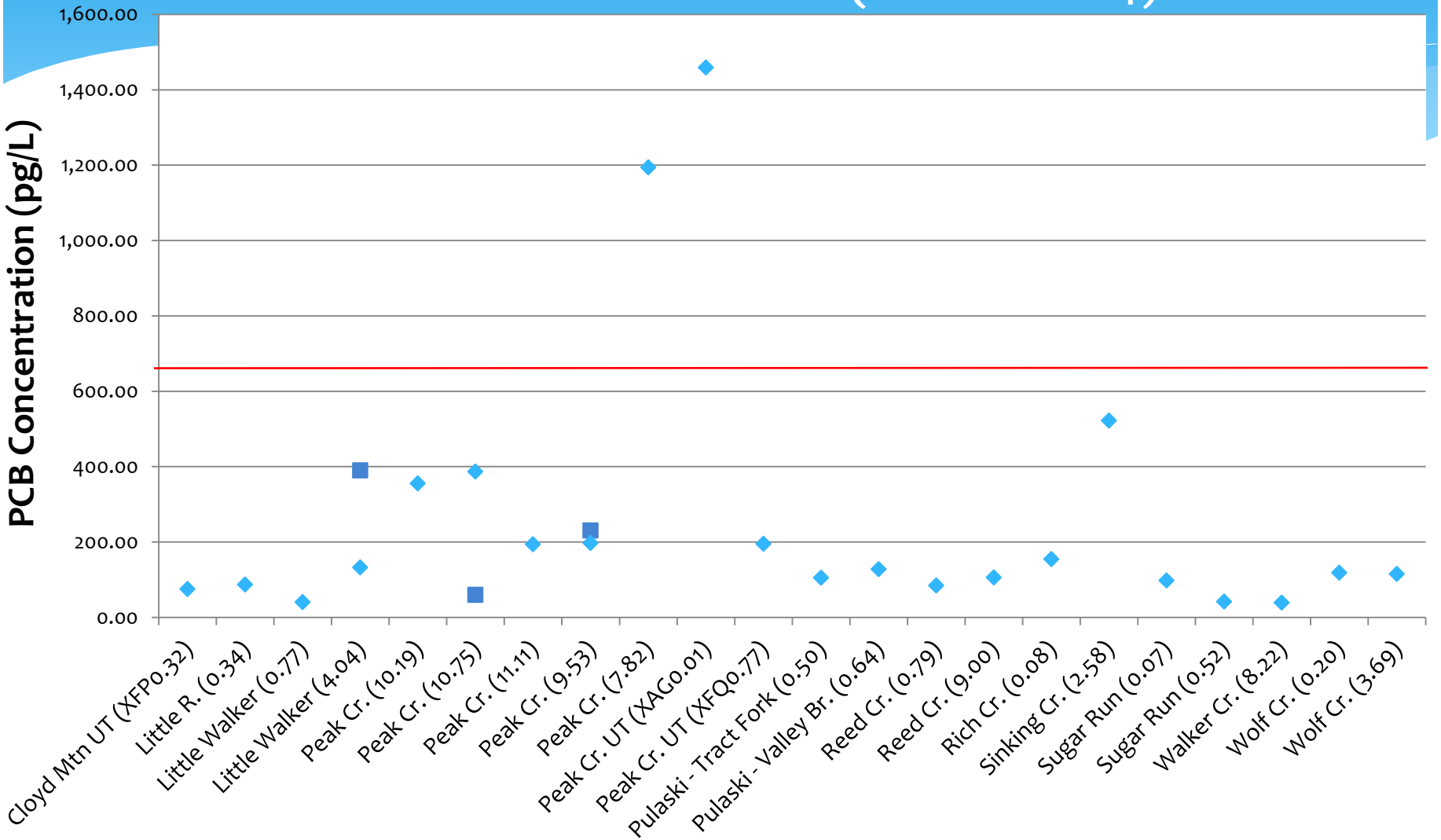
* Targets 209 Congeners
* Includes weathered, degraded and metabolized PCBs
* Allows for source fingerprinting
* DEQ has used since 2005



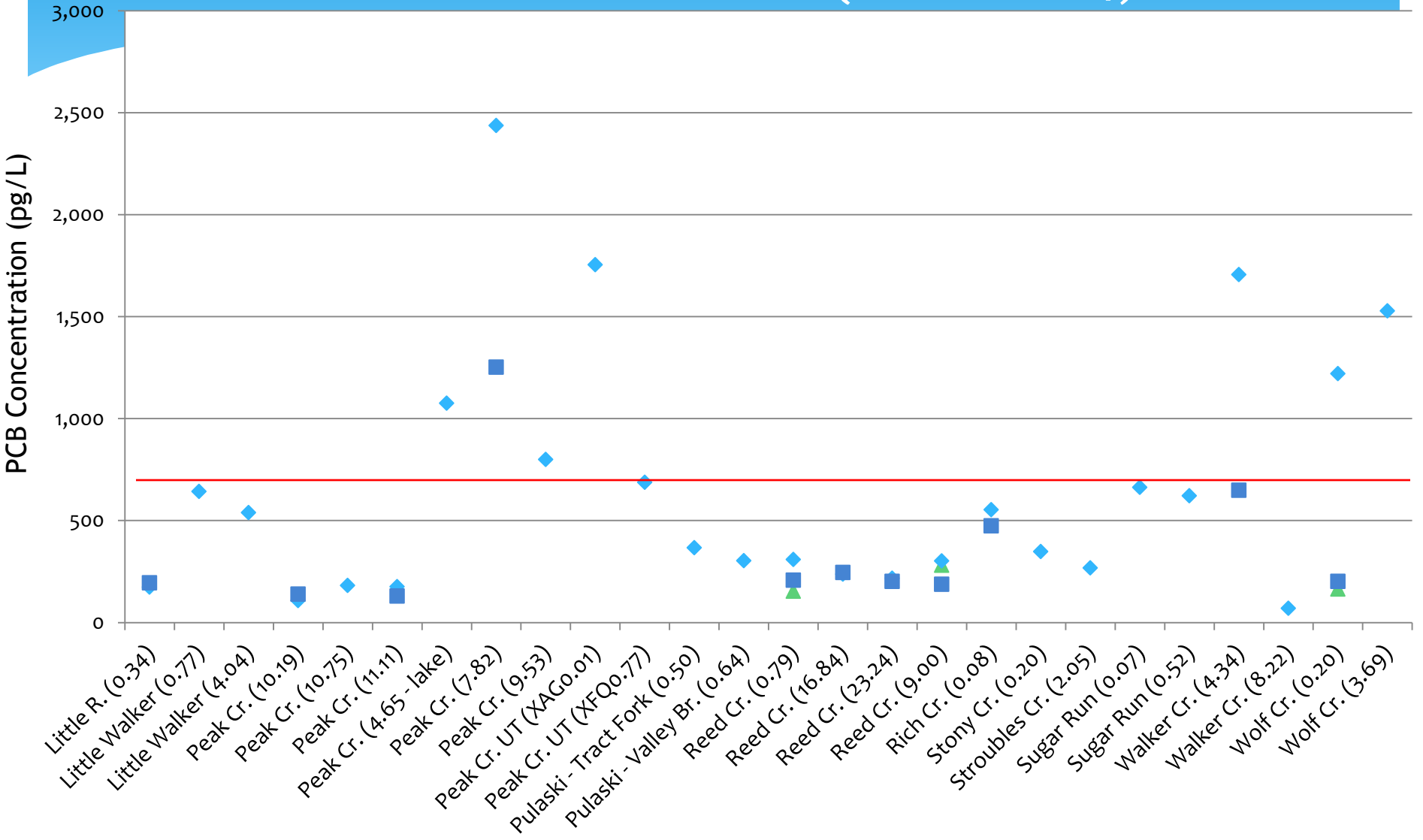
PCB Concentrations at High Flow
New River Main Stem (2010 – 2014)



PCB Concentrations at Base Flow
New River Tributaries (2012 – 2014)



PCB Concentrations at High Flow
New River Tributaries (2010 – 2014)



2010 – 2014 Sampling Conclusions

* Hot spots identified
* Capturing high flow events proved challenging!
* Empirical data for use in TMDL development
* DEQ sampling concurrent with VPDES facility-generated data
* Pilot project: Shiny Maps

Additional Sampling Proposal

* Sampling approach currently under development
* Soil Screening method
  * Intermet (Bissett Park)
  * Pulaski: XAG (UT Peak Creek)
  * Former Tannery near Pearisburg
  * Quarry near Claytor Dam (was the clean up adequate?)
  * Sugar Run (old Bane School)
  * Other?

Information Available on DEQ's Website

- PCB TMDL Webpage:
  - 2004 Source Investigation Report
  - New River PCB TMDL project documents
    - Presentations
    - Displays from April 5, 2016 kick-off meeting
    - Monitoring Maps
    - Guidance documents
- Water Quality Monitoring Webpage:
  - Statewide Fish Tissue and Sediment Results