3/7/01

Total Maximum Daily Load

PCB

Valley and Little Valley Creeks

Entire Basin

Chester and Montgomery Counties

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Introduction

Pennsylvania has conducted monitoring of fish tissue contaminants since 1976. Early efforts were comprised of special studies in major waterbodies as well as smaller waters with suspected sources of contaminants. Routine sampling for tissue contaminants began in 1979 with implementation of the EPA "CORE" monitoring network that mandated collection of whole fish samples. Because Pennsylvania wanted the fish tissue monitoring program to focus on protection of public health, we began sampling both the edible portion and whole body at one-half of the stations. In 1987, Pennsylvania began sampling the edible portion almost exclusively. In order to increase spatial coverage, we also began rotating sampling through our routine ambient monitoring network and provided both Department of Environmental Protection (DEP) and Fish and Boat Commission field biologists the opportunity to sample suspected problem areas.

Fishing is a wholesome, relaxing pastime, and fish are nutritious and good to eat. Some fish, however, may accumulate contaminants to levels that may be harmful to those who eat them over a long period of time. In an attempt to protect public health, the Commonwealth periodically (at least annually) issues fish consumption advisories based on monitoring data from a number of sources. Advisories are issued jointly by the Department of Health, the Fish and Boat Commission, and DEP. The list of advisories is published in the "Pennsylvania Summary of Fishing Regulations and Laws" which is provided to each fishing license buyer, and is also available from the Department in hard copy and through the Internet. In addition, the annual list and any individual advisories needed between lists are issued using press releases.

A number of Pennsylvania waterbodies with fish consumption advisories were listed on the Clean Water Act Section 303(d) List of Impaired Waters for 1996. They were listed because long-term, unrestricted consumption of these fish could potentially lead to human health problems. This document addresses contamination of fish tissue in Valley and Little Valley Creeks, in Chester and Montgomery Counties, by PCB.

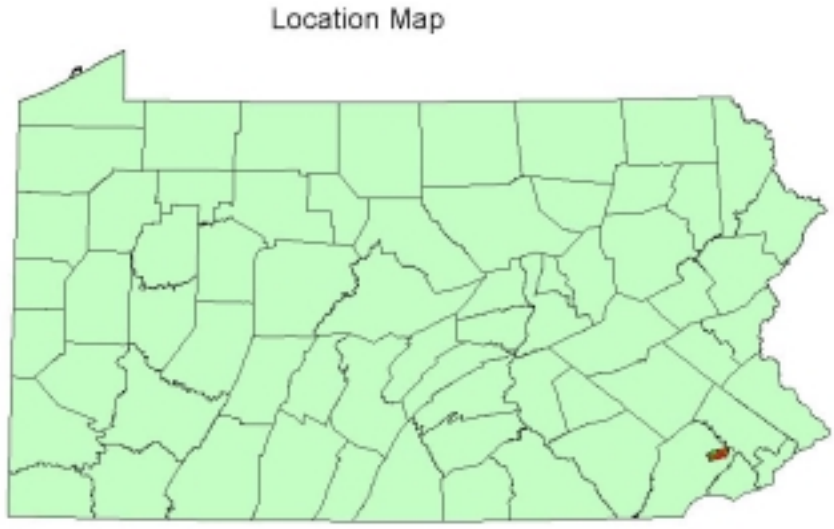
Background

This Total Maximum Daily Load (TMDL) applies to the Valley Creek basin (Stream Code 00991), including Little Valley Creek (Stream Code 00995), from the headwaters (River Mile 20.94) to the mouth (River Mile 0.0). Valley Creek was included on the 1996 Section 303(d) list as a low priority. It was also included, along with Little Valley Creek, on the 1998 303(d) list (Segment ID 9903) as a high priority for TMDL development. Valley Creek lies within State Water Plan watershed 3F; it should be noted that it was incorrectly listed as 3H on the 1996 303(d) list. Although three tributaries to Little Valley Creek, known locally as Cedar Hollow Road tributary, Hollow Road tributary, and North Valley Road tributary, were not listed specifically on the 1998 303(d) list, they are considered part of this TMDL document since the fish consumption

ban which serves as the basis for the 303(d) listing applies to "Valley Creek and all tributaries", i.e., the entire basin.

Directions to the mouth of Valley Creek, which is the end of the impaired segment, are as follows:

Exit the Pennsylvania Turnpike (I-76) at the Valley Forge Interchange (Exit 24). After exiting the tollbooth, make an immediate right onto North Gulph Road. Follow North Gulph Road approximately 1.1 miles to traffic light located at the entrance to Valley Forge National Historical Park. Go straight through light, at which point road turns into State Route 23. Continue west on Route 23 for approximately 2.4 miles to traffic light at the intersection of Route 23 and Valley Creek Road (Route 252). Immediately past the light, Valley Creek passes under Route 23, at a point approximately 1000 feet above its confluence with the Schuylkill River.



Valley and Little Valley Creek watersheds (highlighted)

The first public notice concerning fish tissue contaminants in the Valley Creek basin was issued in April 1980. The press release noted that holdover brown trout and white suckers contained 0.13 to 1.0 mg/kg (milligrams per kilogram) PCB. It stated that the Department did not believe that eating freshly stocked or holdover trout posed a health hazard because the levels were far below the 5 mg/kg FDA Action Level in place at the time. The press release further stated "…the Department is issuing this advisory for those persons, including pregnant women, who may wish as a matter of life style to avoid eating any food containing chemicals, pesticides, or food additives." A March 1983 release contained the same language and was based on a PCB level of 1.76 mg/kg in

Valley creek trout fillets. Slightly different advice was issued in April 1984. That advice was for "…pregnant women, young children and other segments of the population who may wish to avoid eating any food containing chemicals, pesticides, or food additives." The Pennsylvania Fish and Boat Commission (PFBC) adopted a "No Kill" regulation for the Valley Creek basin on April 29, 1985. Under this PFBC rule, it is unlawful to kill or possess any fish, although fishing is permitted. A statewide advisory issued June 26, 1986 included Valley Creek brown trout fillets containing 2.7 mg/kg PCB, in excess of the revised Action Level of 2 mg/kg. That release advised anglers not to eat fish with fillet concentrations in excess of the Action Level. As a reminder to the public, the Valley Creek advisory was reissued on January 12, 1993 due to brown trout fillet PCB levels of 2.008 mg/kg in Valley Creek and 3.094 mg/kg in Little Valley Creek.

TMDL Development

Endpoint Identification

The overall goal of a TMDL is to achieve the "fishable/swimmable" goal of the federal Clean Water Act. Because consumption advisories resulting in a "No Kill" regulation are in place, these goals are not being met in the Valley Creek basin.

The specific goal of a TMDL is to outline a plan to achieve water quality standards in the water body. For Valley and Little Valley Creeks, the TMDL goal is for the level of PCB in the water column to be equal to or less than the Commonwealth's water quality criterion. The criterion, found in the "Water Quality Toxics Management Strategy – Statement of Policy" (Chapter 16 of the Department's rules and regulations) is 0.00004 µg/l (micrograms per liter,equivalent to parts per billion) for PCB. PCB is a probable human carcinogen and this is a human health criterion developed to protect against excess cancer risk. Specifically, the Department's water quality toxics management program controls carcinogens to an overall risk management level of one excess case of cancer in a population of 1 million ($1x\ 10^{-6}$). Expressing this another way, the probability of an individual getting cancer is increased by a factor of 1 in 1 million.

Two means were employed in an effort to obtain readily available data on instream PCB levels for comparison to the criterion. First, the Department's Southeast Field Office searched for PCB data in the Valley Creek basin, including Little Valley Creek. Instream data was located in a 1990 document entitled "Draft Remedial Investigation (RI) Report" for the Paoli Rail Yard, which is a National Priorities List (NPL) site and the only known source of PCB in the Valley and Little Valley Creek basins. The report contains the results of surface water sampling performed throughout the Valley and Little Valley Creek basins for PCB. Two rounds of samples were collected and analyzed. The first round consisted of eighteen stations sampled during average (or baseflow) conditions. PCB was detected at only one station at a level of 0.00148 mg/l (milligrams per liter). The second round consisted of nineteen stations sampled following a rain event. PCB was undetected at 13 of these stations. At the remaining six stations where it was detected, it was reported as "estimated" at levels 2 – 5 times lower than the analytical detection limit. Such levels indicate a degree of uncertainty in the results and limit their

usefulness. Also, once in a water body, PCB becomes associated with soil particles and enters the sediments. The fact that the only detectable value occurred during baseflow conditions, when sediment in the water column is at it's lowest, casts further doubt on the validity of the data. As such, this data was not used in this TMDL analysis. Second, data from the EPA Storage and Retrieval System (STORET) was obtained. An "Inventory" Retrieval that would include data collected by all agencies using STORET was run for an area with a five-mile radius around the Department's fish tissue sampling station. That location is Water Quality Network (WQN) Station 154 – Valley Creek, approximately 100 feet upstream from the Pennsylvania Turnpike bridge near Valley Forge. One sampling station with PCB data was found, but the samples were collected between 1979 and 1980. This data does not represent current conditions.

As a means to compare current conditions to the water quality criterion, an estimated water column concentration was calculated based on the fish tissue concentration and a bioconcentration factor. The calculation involves dividing the average fish tissue concentration by the bioconcentration factor to obtain a projected water column concentration. The equation is:

$$\frac{TC}{BCF} = WC \times 1000$$

TC = Tissue Concentration in mg/kg (equivalent to mg/L)
BCF = EPA Bioconcentration Factor in L/kg
WC = Water Column Concentration (estimated) in mg/L
and multiplied by 1000 to obtain µg/L

The average fish tissue concentration is the mean of all samples. The data are included as Appendix A. The average concentration is used for two main reasons. First, the fish tissue samples are composites. This means that the sample result represents the average tissue concentration in three to five individuals, and not an exact value. Second, use of an average value considers the natural variation in tissue burden found in wild fish populations. The PCB bioconcentration factor (BCF) of 31,200 from the EPA criteria development document (EPA 440/5-80-068, October 1980) was used. This BCF was used because no Bioaccumulation Factor (BAF) is available for statewide use. The use of the BCF is consistent with the provisions of the Department's water quality toxics management strategy. An estimated water column concentration was calculated for each species. These were then averaged in order to provide a single estimated concentration for the segment.

The average PCB level in brown trout from Valley and Little Valley Creeks is 2.128 mg/kg. White suckers average 2.177 mg/kg. The estimated concentration of PCB in the water column is 0.069 µg/l. This estimated concentration exceeds the water quality criterion.

Source Assessment

The production and use of PCB in the United States was banned in July of 1979. While it is now illegal to manufacture, distribute, or use PCB in the United States, these synthetic oils were used in the past as insulating fluids in electrical transformers and other products, as cutting oils, and in carbonless paper. PCB was introduced into the environment while use was unrestricted, and occasional releases still occur. In addition, some permitted discharges and Superfund sites contribute PCB to surface water. Once in a waterbody, PCB becomes associated with solids particles and enters the sediments. PCB is very resistant to breakdown and thus remains in river and lake sediments for many years.

The EPA Permit Compliance System (PCS) database was searched for any major discharge permits containing PCB as an effluent limitation. While no major dischargers for PCB were found on PCS, the Southeast Field Office identified the Paoli Rail Yard site as a source of PCB contaminated soil which, over time, has eroded off the site into nearby streams which drain to Little Valley Creek and, ultimately, Valley Creek.

The Paoli Rail Yard site is located north of the town of Paoli in Chester County, PA. The twenty-eight acre rail yard, which dates back to 1915, includes a car shop where cars were repaired. In the 1950's, oils containing PCB were used to cool the transformers in the trains. Operation records, although limited, indicate that maintenance and repair practices at the rail yard resulted in PCB soil contamination. Over time, the PCB contaminated soils eroded off the site and entered Little Valley Creek by way of three small tributaries. These tributaries are identified as the Cedar Hollow Road tributary, the Hollow Road tributary, and the North Valley Road tributary.

Atmospheric Deposition: Development of the TMDLs for the Monongahela River considers background pollutant contributions. The natural in-stream background concentration of chlordane is assumed to be zero because chlordane is a man-made product and there are no natural sources. PCB is also a man-made product and no natural sources of PCB load exists in the environment. Nonetheless, due to the pervasive use of PCBs prior to their ban in the late 1970s and their slow degradation rates, PCBs are now widespread in the environment. This pervasive distribution of PCBs in air, soil, and water effectively creates a background load of PCB in all water bodies. Atmospheric deposition can contribute to background concentrations of PCB in water bodies.

Atmospheric deposition of PCB plays a dominant role in PCB cycling in many freshwater systems. Monitoring conducted under the Integrated Air Deposition Network (IADN) and the Great Waters Program indicate that wet and dry deposition of PCB can vary greatly both regionally and by season. According to EPA's Lake Michigan Mass Balance (LMMB) Study, atmospheric transport and deposition of PCB provides about 82 percent of the total PCB load to Lake Michigan. Because PCB is no longer produced, the major source of PCB to the atmosphere is volatilization from sites where they have been stored, disposed, or spilled; from incineration of PCB-containing products; and, to a lesser extent, from PCB formation during production processes.

Although analysis predicts that atmospheric deposition may provide a significant source of PCB load to the water body, volatilization from the water column and sediments is likely to result in continuing PCB loss from the water body, thereby reducing, or negating, the atmospheric load. Hillery, et. al., (1998) found that the Great Lakes are currently experiencing a net loss of PCB. In each of the five Great Lakes, the net deposition of PCB is believed to be insignificant because gas transfer out of the lakes counteracts the flow into the lakes from wet and dry deposition. Similar processes are likely to be occurring in Pennsylvania water bodies.

TMDL Calculation

Development of TMDLs includes consideration of background pollutant contribution, appropriate and/or critical stream flow, and seasonal variation.

Monitoring for Background Concentrations of PCBs

PCB concentrations in surface waters may be greater than zero in waters where no specific source, either point or nonpoint source, can be identified. Only site-specific data can be used for the TMDL calculations. However, because sufficient data does not exist for this particular waterbody segment that would allow the selection of such a background value for TMDL calculation purposes, a value of zero was used. In order to verify this assumption, or to properly select a background concentration for calculating a TMDL, site-specific water quality monitoring for PCBs may be conducted at this site some time in the future.

If future background sampling were to identify PCB levels greater than zero for this segment, Pennsylvania would review and appropriately revise the TMDL. Currently, there is no approved and widely available analytical method for analyzing water column samples at the ultra low levels at which PCBs may be present. EPA method 1668-A may offer such capability, but is currently only approved for use in analyzing sewage sludge, is very expensive to run and of limited availability.

PCB is a probable human carcinogen. Carcinogenesis is a nonthreshold effect, an adverse impact that may occur at any exposure greater than zero. Such an effect is often related to long-term exposure to low levels of a particular chemical or compound, rather than an immediate effect due to a short duration exposure to a high level. As noted earlier, the Department's water quality toxics management program uses a cancer risk level of 1×10^{-6} to protect human health. Attainment of this risk level is predicated on exposure that includes drinking 2 liters of water and ingesting 6.5 grams of fish per day over a 70-year lifetime. The Department uses harmonic mean flow as the appropriate design condition for dealing with exposure to carcinogens. This is a long-term average exposure. Because seasonal increases and decreases in concentration are less important than the long-term exposure to a carcinogen, use of harmonic mean flow adequately considers seasonal variations in PCB concentrations.

The calculation of the Valley and Little Valley Creeks PCB TMDL uses the water quality criterion and flow data from the U.S. Geological Survey surface water gauging station located on Valley Creek at the Pennsylvania Turnpike bridge near Valley Forge, PA (USGS Station # 01473169). The harmonic mean flow (Qhm) was calculated by dividing the flow at the gauge by the drainage area at the gauge and applying the yield (in cubic feet per second per square mile, or cfsm) to the drainage area of the TMDL segment, as described in the Department's "Implementation Guidance – Design Stream Flows" (Document No. 391-2000-023). The segment Qhm for Valley and Little Valley Creeks is 25.5 cfs.

The Segment Qhm is used in calculating the Total Maximum Daily Load by multiplying it by the water quality criterion and a multiplier to convert from cfs x µg/l to lbs/day (pounds per day). The TMDL for PCB is calculated as follows:

25.5cfs x 0.00004 µg/l = 0.00102 cfs x µg/l x 0.00539 = 0.0000055 lbs/day

The Total Maximum Daily Load of PCB for Valley Creek and its tributary, Little Valley Creek, is 0.0000055 lbs/day.

Percent Reduction

The goal of this TMDL is to achieve the water quality criterion in order to protect public health. In order to achieve this, the instream concentration must be reduced from the estimated current level to the criterion.

Percent reduction is calculated using the following formula:

% Reduction = (1 – TMDL Goal / Existing concentration) x 100

The percent reduction for PCB is calculated as follows:

% Reduction = (1 – 0.00004 / 0.069) x 100
% Reduction = (1 – 0.000579) x 100 = 99.9 %

An overall reduction of 99.9 % for PCB is needed to achieve the TMDL goal.

Margin of Safety

Achievement of the TMDL will generally ensure achievement of the water quality criterion. To account for uncertainties that may be associated with the TMDL calculations, the Department proposes to hold 10 % of the TMDL in reserve. Applying this 10 % margin of safety results in a PCB TMDL of 0.00000495 pounds per day for allocation to all sources.

Wasteload Allocations (WLAs) and Load Allocations (LAs)

The only recent data on PCB concentrations in Valley and Little Valley Creeks is contained in the "Draft Remedial Investigation (RI) Report" for the Paoli Rail Yard. As previously discussed, PCB was undetected or estimated well below the analytical detection limit for all but one sample result. The validity of the one detectable result was also questionable. For this reason, and because PCB is a man-made compound and there are no other known sources in the watershed, natural and background concentrations are assumed to be zero.

A wasteload allocation (WLA) is the portion of the TMDLs allowable pollutant load allocated to a point source of a pollutant. No known point sources of PCB to Valley and Little Valley Creeks were found during development of this TMDL. As a result, the WLA is set to zero.

The load allocation (LA) is the portion of the TMDLs allowable pollutant load allocated to nonpoint sources of a pollutant. The Paoli Rail Yard is the only known source of PCBs in Valley and Little Valley Creeks. The Paoli Rail Yard site represents an unquantifiable source of PCB in the watershed, as it has entered the stream sediments through transport of contaminated soils from the site. Also, because Valley and Little Valley Creeks are urbanized watersheds, a potential exists for the introduction of PCB to surface water through contaminated groundwater or surface runoff from other unknown sources. For this reason, to account for nonpoint sources of PCB, 100% of the remaining TMDL, or 0.00000495 lbs/day, is assigned to the load allocation (LA).

TMDL Summary

The PCB TMDL for the Valley Creek basin, including Little Valley Creek, from the headwaters to the mouth, can be summarized as follows:

TMDL Summary for Valley Creek

Pollutant	TMDL	WLA	LA	MOS
PCB	0.0000055 lbs/day	0 lbs/day	0.00000495 lbs/day	0.00000055 lbs/day

Because Hollow Road tributary, Cedar Hollow Road tributary and North Valley Road tributary serve as primary transport pathways for PCB contaminated sediment into Little Valley and Valley Creeks, allowable TMDL loadings were also calculated for these tributaries. Using the same methodology as above, the PCB TMDLs for these tributaries are summarized below:

TMDL Summary for Hollow Road Tributary

Pollutant	TMDL	WLA	LA	MOS
PCB	0.00000004 lbs/day	0 lbs/day	0.000000036 lbs/day	0.000000004 lbs/day

TMDL Summary for Cedar Hollow Road Tributary

Pollutant	TMDL	WLA	LA	MOS
PCB	0.000000099 lbs/day	0 lbs/day	0.00000009 lbs/day	0.000000009 lbs/day

TMDL Summary for North Valley Road Tributary

Pollutant	TMDL	WLA	LA	MOS
PCB	0.000000056 lbs/day	0 lbs/day	0.000000051 lbs/day	0.000000005 lbs/day

TMDL Verification

The stated goal of this TMDL is to meet the PCB water quality criterion for the protection of public health in Valley and Little Valley Creeks. Another way to state the goal is to reach a point where fish consumption advisories are no longer needed because tissue levels of PCB are no longer above levels of concern.

The three agencies involved with the issuance of fish consumption advisories in Pennsylvania currently apply the "Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory" (commonly referred to as the Great Lakes protocol) for issuance of consumption advisories due to PCB. Following this method, meal-specific consumption advice is issued by species. The first level of consumption advice, "eat no more than one meal per week," is issued when the tissue PCB concentration is 0.06 to 0.2 mg/kg. The upper limit for unrestricted consumption is 0.05 mg/kg. In order to verify the protectiveness of the proposed TMDL for PCB, the estimated fish tissue oncentration that would be expected to accumulate at a water column concentration of 0.00004 µg/l was calculated. Reaching the PCB criterion would result in an estimated tissue concentration of 0.001 mg/kg, well below the 0.05 mg/kg level for unrestricted consumption.

This TMDL analysis estimates, based on back calculations from fish tissue concentration, that the concentration of PCBs in the receiving water exceeds water quality standards. The TMDL analysis also shows that the existing loads of PCBs need to be reduced. The source analysis identifies various sources of this contamination including the Paoli Rail Yard, a Superfund site. For this TMDL and the specific superfund site identified, it was assumed that controls associated with remediation of the identified sites will result in the removal of the pathway that is associated with sediment loading to the water. This elimination of the surface runoff and sediment loading pathway may reduce the associated runoff of soil-bound PCBs.

The TMDL focuses on the amount of PCBs that the water body can receive and still maintain water quality standards while the Superfund/CERLA programs focus on meeting environmental goals by eliminating the pathways of exposure of pollutants. Together, these programs can meet the allocations/goals set in this TMDL. The collaboration of the Superfund program and the TMDL program to address the impacts of legacy pollutants, such as PCBs, is the next step in an on-going and complex process of meeting water quality standards through the remediation of contaminated sediments. The integration of two often-separate programs is necessary in situations such as this where a land-based source contributes to the contamination of a waterbody. The goal of the TMDL is to reduce PCBs in the water column to water quality standards levels. This is separate from the Superfund goal which is to eliminate the pathway of contamination and not necessarily the elimination of the pollutant. Superfund balances remediation with risk determinations of human health and feasability. The TMDL program does not - it is absolute in its goal to meet standards.

A TMDL is a planning tool that may change over time as the data improves and the watersheds change. As additional data are collected the identified sources of PCBs are confirmed, a determination will be made as to whether this new data is significant and a TMDL revision is necessary. In some instances the final decision on remediation methods at the Superfund sites have not yet been made. While it is expected that this TMDL will serve as a decision tool for those remediation plans, it may be found that the removal of the sediment/runoff pathway may not be feasible or acceptable for other reasons. If this should be the case, the TMDL would be reopened and the allocations re-distributed, but still meeting the total allowable load from all sources, to take into consideration the final remediation plan. However, it is important at this time to provide a goal that is based on the need to meet water quality standards to serve as a focal point for site plan development.

Recommendations

Based on readily available information, the Paoli Rail Yard site is the only known source of PCB in the Valley and Little Valley Creek basins. According to the "Remedial Action Work Plan for Offsite Soil and Sediment" (Draft 9/93), EPA initially became aware of the PCB contamination at the site as a result of investigations conducted pursuant to the Toxic Substances Control Act (TSCA), 15U.S.C.§§2601 to 2671. As a result of their investigation, the United States and the responsible parties entered into several consent decrees (CDs) which addressed various clean-up activities at the site and in thesurrounding community. These activities included construction of sedimentation and erosion control facilities, including stormwater collection basins, and the excavation of 3500 cubic yards of contaminated soils. Also, as a result of TSCA regulations, a retro-fill program was conducted from 1983 through 1986, which involved the replacement of PCB fluids with alternative coolants. As part of the remedial investigation, groundwater was tested for various contaminants including PCB and fuel oil constituents such as benzene, toluene, and xylene. The primary concern in the groundwater is fuel oil contamination and a fuel oil recovery system was installed in 1990. PCB was not detected in the groundwater outside of the rail yard. It was determined to be present

below the level of quantification in wells contaminated with fuel oil, which may have been due to cross contamination with the fuel oil. Removal of any PCB that may be present in the groundwater will be incidental through the recovery of the fuel oil. Monthly monitoring results from the groundwater recovery system reveal no detectable levels of PCB. As part of the Record of Decision (ROD), additional excavation of site and area soils are planned. As soon as practicable, additional stream sediments will be removed in an effort to achieve an ultimate clean-up standard of 1 ppm (part per million) and, where necessary, the stream channel will be restored. This level is based on recommendations of the U.S. Department of the Interior, the Pennsylvania Fish and Boat Commission, and a compilation of technical documents published by the U.S. Department of Commerce, Ocean Assessments Division, entitled "A Discussion of PCB Target Levels in Aquatic Sediments". It is also consistent with EPA OSWER Directive Number 9355.4-01, dated August 1990 and entitled "Guidance on Remedial Actions for Superfund Sites with PCB Contamination". This will be done in a phased approach. In the first phase, stream sediments with PCB concentrations in excess of 10 ppm will be excavated. Environmental monitoring will be conducted and if levels do not decrease sufficiently, then additional sediments will be considered for removal. Natural deposition areas will be identified and, where necessary, sediments will be removed on a regular basis as a means of achieving the 1 ppm clean-up standard. This approach was selected because of the dynamic processes of sediment transport and the need to balance the benefits of active removal of contaminated sediments with the desire to minimize the destruction/disturbance of the existing habitat.

According to the "Paoli Rail Yard Remedial Action Workplan for Offsite Soil and Sediment" (Final 4/94), pg. 1-34, "The excavation of stream sediments will reduce aquatic toxicity and bioconcentration of PCBs through exposure to contaminated sediment or consumption of aquatic organisms. Environmental damage which may occur during stream sediment excavation will be mitigated through a restoration program. All the stream remediation will be conducted in accordance with the following to the extent applicable or relevant and appropriate: the Fish and Wildlife Coordination Act, 16 U.S.C. §§ 661 et seq.; the Endangered Species Act of 1973, 16 U.S.C. §§ 651 et seq.; the Pennsylvania Erosion Control Regulations, 25 PA Code §§ 102.1 to 102.5, 102.11 to 102.13,102.22 to 102.24; the Pennsylvania Dam Safety and Encroachments Act of 1978, P.L. 1375, as amended, 32 P.S. §§ 693 et seq.; and the Pennsylvania Dam Safety and Waterway Management Regulations, 25 PA Code §§ 105.104, 105.106, 105.111, 105.121; the Pennsylvania Clean Streams Law, 35 P.S. §§ 691.1 to 691.1001, and the National Pollution Discharge Elimination System, 25 PA Code 92, and the Pennsylvania Water Quality Standards, 25 PA Code 93."

Pg. 1-33 of the same document states, "During implementation of the remedy, steps shall be taken to minimize the destruction, loss, and degradation of natural habitat and to minimize habitat alterations in the stream channels and riparian zones. A restoration program will be implemented upon completion of the remedial activities in areas adversely affected by the remedial action and ancillary activities. In particular, a less destructive method of stream excavation such as vacuum dredging shall be considered to the maximum extent practicable. Any wetland areas impacted by sediment removal

and/or associated activities shall be restored and/or enhanced, to the maximum extent practicable.

"The restoration program shall be developed in detail during remedial design of the selected remedy. This program shall identify the factors which are key to a successful restoration program. Factors shall include, but are not limited to, replacing and regrading soils and vegetative re-establishment. The restoration program shall include monitoring requirements to determine the success of the restoration. Periodic maintenance (e.g. plantings) may also be necessary to achieve effective restoration."

PCB present in Valley and Little Valley Creeks is believed to reside primarily in the sediment due to historical use and improper disposal at the Paoli Rail Yard site. In addition to the remediation activities described, PCB levels are expected to decline over time due to bans on use through natural attenuation. Examples of processes in natural attenuation are covering of contaminated sediments with newer, less contaminated materials, and flushing of sediments during periods of high stream flow. Natural attenuation also involves less habitat disturbance/destruction than the active removal of contaminated sediments. For Valley and Little Valley Creeks, removal of contaminated sediments to a level of 1 ppm, coupled with long term natural attenuation, provide reasonable assurance that the TMDL will be implemented.

Monitoring

Pennsylvania will continue to monitor PCB levels in brown trout and white sucker in Valley and Little Valley Creeks. Samples will be collected once every two years. The data will be used to evaluate the possible threat to public health and to determine progress toward meeting the TMDL. The consumption advisories will remain in place until the water quality criterion for PCB is achieved and advisories are no longer needed.

Public Participation

Notice of the draft TMDL for Valley and Little Valley Creeks was published in The Suburban & Wayne Times, a weekly newspaper of general circulation, on February 17, 2000 and in the PA Bulletin on February 12, 2000. A public meeting was held on March 16, 2000 at DEP's Southeast Regional Office, located in Lee Park, Suite 6010, Conshohocken, PA 19428, to discuss and accept comments on the proposed TMDL. The public comment period closed on April 17, 2000. Notice of final TMDL approval will be posted on the Department website.

Appendix B

Comment and Response Document

Total Maximum Daily Load (TMDL)

PCB

Valley and Little Valley Creeks

Comments Received From:	Date Received:
Widener University School of Law on behalf of Delaware Riverkeeper Network	4/20/2000
Trout Unlimited, Valley Forge Chapter	4/17/2000
West Chester Fish, Game & Wildlife Association, Inc.	4/11/2000
Carl E. Dusinberre	4/22/2000
Rodney Horton	4/17/2000
James M. Leonard	4/17/2000
Howard Sheller	4/18/2000
Suzanne F. Kaplan	4/11/2000
Maurice W. Kring	4/10/2000
Ernest E. Holling	4/10/2000
A. Joseph Armstrong	4/18/2000

Many of the letters contained similar comments. The following is a summary of the comments. Following each comment is the Department's response.

1) **The Valley Creek watershed is designated "Exceptional Value" (EV) by DEP, affording it the highest level of protection. Its nationally recognized wild brown trout population provides an important recreational and economic resource, generating approximately $250,000 annually in economic activity from the 6800 people who fish in Valley Forge National Park.**

   Response: The Department agrees that Valley Creek is an important local resource warranting the highest degree of protection towards maintaining its Exceptional Value status.

2) **The biggest threat to Valley Creek is ineffective stormwater management. Efforts should be directed towards retrofitting existing stormwater detention basins and promoting and developing stormwater management techniques to reduce runoff volumes and to recharge groundwater and preserve baseflow.**

Response: Uncontrolled stormwater runoff poses a threat to many streams and, independent of the TMDL program, the Department is developing wa ys to address water quality impacts from this source. This TMDL was developed to address PCB contamination which is the impairment for which Valley and Little Valley Creeks are currently listed under Section 303(d) of the federal Clean Water Act.

3) **There is a consumption ban in Valley Creek; therefore, people do not eat the fish, eliminating any health threat. There is also no evidence that PCBs are harmful to the aquatic life and other organisms that make up the ecology of the watershed.**

Response: 25 PA Code Ch. 93.4(a) sets forth the statewide water uses applicable to Pennsylvania's surface waters, which includes fishing. Because the entire Valley Creek basin is designated a "No Kill" zone due to elevated PCB concentrations in fish tissue, the water use is not being achieved. This constitutes a violation of water quality standards, necessitating Valley Creek's listing under Section 303(d) and the need to develop a TMDL to address the impairment.

4) **Excavating the creek bed to remove sediments containing PCBs in excess of an "arbitrarily designated" acceptable level would have no measurable health benefit and would do irreparable damage to the ecology of the stream. Construction of roads required for equipment will destroy open space, wetlands, and floodplains. Costs will be extremely high in both dollars and damage to the environment in return for little, if any, real benefit.**

Response: The ultimate clean-up standard of 1 ppm (part per million) for the stream sediments is based on recommendations of the U.S. Department of the Interior, the Pennsylvania Fish and Boat Commission, and a compilation of technical documents published by the U. S. Department of Commerce, Ocean Assessments Division, entitled "A Discussion of PCB Target Levels in Aquatic Sediments". It is also consistent with EPA OSWER Directive Number 9355.4-01, dated August 1990 and entitled "Guidance on Remedial Actions for Superfund Sites with PCB Contamination".

The need to balance the benefits of active removal of contaminated sediments with the desire to minimize the disturbance of the existing habitat is recognized. For this reason, a phased approach is to be implemented in an effort to achieve the

clean-up standard. In the phased approach, areas where the stream sediment levels exceed 10 ppm and natural deposition areas where sediment levels exceed 1 ppm will be identified and excavated. Environmental monitoring will be conducted and only if levels do not sufficiently decrease will additional sediments be considered for removal.

As described in the "Paoli Rail Yard Remedial Action Workplan for Offsite Soil and Sediment" (Final 9/94), steps will be taken to minimize the destruction/ degradation of the stream channel and surrounding habitat. Upon completion of remedial activities, a restoration program will be implemented. A position has also been created by the Pennsylvania Fish and Boat Commission for an environmental planner who will be responsible for developing a plan to restore resources and recreational use damaged by the PCB contamination.

5) **PCBs are undoubtedly found in the entire floodplain as a result of the frequent flood events in the watershed. Addressing only the stream bottom will not permanently remove the PCBs from the stream and the prospect of removing all of the material in the watershed is inconceivable.**

Response: Because of their complex nature and global presence in various media, the elimination of all traces of PCBs from the environment may be an unrealistic goal. However, it is the Department's position that reducing PCBs in the aquatic environment to the maximum extent practicable such that consumption bans and advisories can be lifted is an achievable, albeit long term, goal. As described in the "Remedial Design Work Plan for the Stream Sediment Portion of the Remedy" (revised August 22, 2000), floodplain (streambank) areas are included in the sampling plan.

6) **Hurricane Floyd, as well as other major storm events, redistributed vast amounts of rocks and soil so that PCB "hot spots" would not be in their last known position.**

Response: In the "Remedial Design Work Plan for the Stream Sediment Portion of the Remedy" (revised August 22, 2000), it is recognized that the tributaries and streams are dynamic systems subject to constant erosion and deposition activities and that the analytical results acquired in 1995 may not reflect current conditions. As such, additional surveying and sampling of the stream will be conducted prior to initiation of any remedial activities.

7) **Current sources of PCB are inadequately identified and accounted for. DEP's assessment of sources should include both contaminated soils still present at the site and stream sediments from the rail yard. The TMDL should account for the distinct sources of PCBs known to exist today and**

different remedial strategies for these sources. DEP needs to estimate the PCB loads currently emanating from each of these sources and establish a TMDL that accounts for and allocates a future load to each source. DEP could conduct testing of stream sediment and soil at the Paoli Rail Yard (PCB "fingerprinting") to verify whether the contamination is all from the Rail Yard or some other sources.

Response: In addition to searching the EPA Permit Compliance System database for any major discharge permits containing PCB as an effluent limit, experts within DEP were also consulted in an effort to obtain information on potential sources of PCBs in the watershed. Furthermore, no additional data was brought to DEP's attention during the public comment period. DEP's assessment of all existing and readily available information indicates that the Paoli Rail Yard is the only known "historical" source of PCBs in the Valley Creek watershed. No current sources were identified.

8) **Remediation activities at the Paoli Rail Yard included the construction of stormwater management facilities. These facilities are point source discharges. The TMDL should include a wasteload allocation for these facilities and it should be implemented through a Clean Water Act section 402(p) NPDES industrial stormwater discharge permit.**

Response: The existing three basins were constructed in 1988 and were designed to trap sediment from the Rail Yard property. Significant modifications to the stormwater management system are planned as part of the remedial activities at the site, including the elimination of one of the basins. The spillways will be designed in accordance with the Pennsylvania Erosion and Sediment Control Manual and will consist of a perforated riser to pass the design storm while providing sufficient detention time for settling of the sediments. Because PCB gets bound up in soils and sediments it is not anticipated that discharge of stormwater that may occur from the basins is likely to contain PCBs. Furthermore, areas of the rail yard are being prepared to accept non-rail yard soils, including stream sediments that are excavated from the watershed as part of the stream sediment portion of the remedy. Since these stream sediments may be brought back to the rail yard, DEP believes and EPA agrees that an allocation to the basins is unnecessary since the stream sediments are included under the "umbrella" of the load allocation.

9) **Contaminated stream sediment locations should be identified and load allocations assigned. The proposed TMDL fails to identify specific locations of contaminated stream sediments for which remedial activities are planned and fails to establish load allocations for each of these individual sites, both for the long term and for the period of proposed remedial activities. To provide "reasonable assurance" of TMDL implementation, DEP needs to**

analyze how much PCB loading occurs from contaminated stream sediment sites now, how much loading will occur during excavation activities, and how much is expected after remediation is complete.

Response: Because of the dynamic nature of streams and the constant forces of erosion and deposition, attempting to allocate to individual stream sediment locations would be unrealistic. The Department believes that since PCBs have already entered the stream sediments, the load allocation should apply to the total stream sediments as opposed to individual sites. The Department believes that removal of contaminated sediments to an ultimate clean-up goal of 1 ppm, coupled with long term natural attenuation, will implement the TMDL in Valley and Little Valley creeks.

10) **The remedial activities for contaminated stream sediments include the excavation of sediments and stream channel restoration. They also include "natural attenuation" and "flushing of sediments during periods of high stream flow". The proposed TMDL, however, presents no analysis of any downstream impacts of either process, nor does it provide any description of how "environmental damage which may occur during stream sediment excavation will be mitigated through a restoration program" beyond a listing of a number of applicable state and federal statutes.**

Response: Implementation of this TMDL will be carried out in an environmentally protective manner and results will monitored to the extent of available resources .

11) **By calculating the TMDL directly from the water quality criterion and calculating it only for the harmonic mean flow, the Department has provided a TMDL for PCB that can by definition only be applicable to mean flow or higher flow conditions. DEP attempts to justify using its "harmonic mean flow" calculation of the TMDL by saying that "seasonal increases and decreases in concentration are less important than the long-term exposure to a carcinogen, [and] use of harmonic mean flow adequately considers seasonal variations in PCB concentrations". While it may be true that long term exposure to a carcinogen is the greatest health and environmental concern, the water quality criterion of 0.00004 ppb (micrograms per liter) was presumably selected with these long term exposure concerns in mind. The Department should not effectively alter the water quality criterion for PCBs through a TMDL calculation that allows higher PCB concentrations during certain periods of the year. If the Department believes the criterion is more stringent than necessary to protect water quality, then it should use the normal rulemaking process to change the water quality criterion for PCBs; it should not do so by setting a TMDL it knows will violate the already established criterion.**

25 PA Code Ch. 96.4 (g) specifies that the harmonic mean flow is the design flow that shall be used to develop TMDLs for nonthreshold human health based criteria (carcinogens). This design condition is specified because it results in a lifetime (70 years) average exposure corresponding to a risk management level of 1×10^{-6} (one excess case of cancer in a population of one million). The criterion for PCB of 0.00004 ppb is based upon this risk level.

12) **The draft TMDL states that Pennsylvania will monitor PCB levels in two key fish species once every two years. It further states that "consumption advisories will remain in place until the water quality criterion for PCB is achieved and advisories are no longer needed". However, nowhere in the draft TMDL does the Department specify how it will know when the water quality criterion for PCB is achieved. Has the Department proposed a water quality testing plan? In addition, no detail about the fish monitoring plan is provided. Because the concentration of PCBs in fish is ultimately the most critical health issue implicated by the contamination, the commentators suggest that the Department place more emphasis on testing and monitoring the fish to ensure that remediation efforts are working, that progress is being made toward achieving the TMDL, and that achieving the TMDL results in less contamination in the fish.**

Response: The Department agrees that because PCB enters the aquatic food chain, the concentration of PCBs in fish is the most critical health issue. As such, it proposes to monitor two key species once every two years using standard EPA/DEP sampling protocol. Water concentrations will be back calculated from the fish tissue data. The TMDL will be achieved when the water quality standard is met. Because the analytical detection limits for PCBs in water exceed the criterion by orders of magnitude, a water quality testing plan is not proposed at this time

13) **The draft TMDL states that the estimated concentration of PCBs in the water column, as calculated by dividing the average PCB tissue concentration in two species of fish by the EPA bioconcentration factor, is 0.069 ppb. The report then goes on to say "this value most likely does not represent the actual existing instream concentration" and that the actual concentration of PCBs "is likely to be lower than this calculated estimate". However, the explanation provided for these latter two statements does not make sense.**

This statement and the explanation have been removed from the text.