UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029
4/9/2001

Mr. David E. Hess, Acting Secretary
Pennsylvania Department of Environmental Protection
Rachel Carson State Office Building
400 Market Street
Harrisburg, PA 17101

Re: Monongahela River Total Maximum Daily Loads (TMDLs)

Dear Mr. Hess:

The U. S. Environmental Protection Agency (EPA) Region III is pleased to approve the Monongahela River Total Maximum Daily Loads (TMDLs), submitted to EPA by the Pennsylvania Department of Protection (PADEP) by letter dated March 9, 2001. The TMDLs were established and submitted in accordance with Section 303(d)(1)(c) and (2) of the Clean Water Act. The TMDLs were established to address impairment of water quality as identified in Pennsylvania's 1996 Section 303(d) list. Pennsylvania identifies the impairment for this water quality limited waterbody based on a fish consumption advisory for Polychlorinated Biphenyls (PCBs) and chlordane. The Monongahela River segments from the Maxwell Lock & Dam (RMI 19.8) to Lock & Dam 4 and Lock & Dam 2 (RMI 11.2) to the mouth (RM 0.0) are located in Fayette, Washington and Allegheny Counties, Pennsylvania.

In accordance with Federal regulations found in 40 CFR §130.7, a TMDL must: be designed to meet water quality standards; include, as appropriate, both wasteload allocations for point sources and load allocations for nonpoint sources; consider the impacts of background pollutant contributions; take critical stream conditions into account (the conditions when water quality is most likely to be violated); consider seasonal variations; include a margin of safety (which accounts for any uncertainties in the relationship between pollutant loads and instream water quality); and be subject to public participation. The enclosure to this letter describes how the Monongahela River TMDLs satisfy each of these requirements.

Following the approval of the TMDLs, PADEP shall incorporate it into the state's Water Quality Management Plan pursuant to 40 CFR §130.7(d)(2). As you know, any new or revised National Pollution Discharge Elimination System permits with applicable effluent limits must be consistent with the TMDL's wasteload allocation pursuant to 40 CFR §122.44(d)(1)(VII)(B)(2).

Any such permit should be submitted to EPA for review consistent with EPA's letter dated October 1, 1998. Please note that PADEP determined there are currently no permitted PCBs or chlordane point source dischargers to the Monongahela River. If you have any questions or concerns, please call me or have your staff contact Mr. Thomas Henry, the TMDL Program Manager, at (215) 814-5752.

Sincerely,

/S/

Rebecca W. Hanmer, Director
Water Protection Division

Enclosure

cc: Mr. Lawrence Tropea, Jr., PADEP
Mr. Terry Fabian, PADEP
Mr. Fred Marrocco, PADEP
Mr. Edward Brezina, PADEP

Decision Rationale
Total Maximum Daily Loads
Polychlorinated Biphenyls (PCBs) and Chlordane
Monongahela River
Fayette, Washington and Allegheny Counties, Pennsylvania

I. Introduction

This document will set forth the Environmental Protection Agency's (EPA) rationale for approving the Total Maximum Daily Load (TMDL) for PCB's and chlordane in the Monongahela River in Fayette, Washington and Allegheny Counties, Pennsylvania. The document was submitted by the Pennsylvania Department of Environmental Protection (PADEP) for final Agency review, by letter dated March 9, 2001 and received by EPA on March 9, 2001. Our rationale is based on the TMDL document and information contained in Appendices to the document to determine if the TMDL meets the following eight regulatory conditions pursuant to 40 CFR §130.

1) The TMDLs is designed to implement applicable water quality standards.
2) The TMDLs includes a total allowable load as well as individual waste load allocations (WLA) and load allocations (LA).
3) The TMDLs considers the impacts of background pollutant contributions.
4) The TMDLs considers critical environmental conditions.
5) The TMDLs considers seasonal environmental variations.
6) The TMDLs includes a margin of safety.
7) There is reasonable assurance that the TMDLs can be met.
8) The TMDLs has been subject to public participation.

II. Summary

The Monogahela River was listed on Pennsylvania's 1996 303(d) list of impaired waters as impaired by PCBs and chlordane, with the source of the impairment listed as a fish consumption advisory. This TMDL applies to two segments of the Monongahela River (Stream Code 37185): from the Maxwell Lock and Dam (L&D) at Monessen (river mile 61.2) to L&D 4 (river mile 41.5); the second segment extends from L&D 2 at Braddock (River Mile 11.2) to the mouth at Pittsburgh (river mile 0.0). The Maxwell to L&D 4 segment was included on the 1998 Section 303(d) list in State Water Plan SWP) 19-C (ID 9921) as a high priority for TMDL development. This segment appears to have been inadvertently omitted from the 1996 Section 303(d) list. The L&D 2 to mouth segment was included on the 1998 list in SWP 19-A (ID 9916) as a high priority. This segment was also on the 1996 Section 303(d) list, but it was listed incorrectly as stream code 18025 (Monongahela Creek, tributary to Penns Creek in the Susquehanna River basin).

A consumption advisory ("Do Not Eat") for carp due to chlordane at 0.96 ppm in the Maxwell to

L&D 4 segment was first issued through a statewide press release on June 26, 1986. The same advice was added for channel catfish due to chlordane at 0.24 ppm in June 1987. This advice was reissued several times in the late 1980s and early 1990s, and remained in place until the development of the 1998 advisory which used the Great Lakes protocol as a basis for determining PCB levels. Currently, channel catfish remain "Do Not Eat", smallmouth bass are listed as one meal per week (Group 2), and carp are included at one meal per month (Group 3).

The initial advisory for the lower Monongahela River (L&D 2 to mouth) was also included in the June 26, 1986 release. "Do Not Eat" advice was given for carp due to chlordane at 1.7 ppm and for channel catfish due to chlordane at 0.66 ppm and PCB at 4.46 ppm. Data for this segment are collected in cooperation with the Ohio River Valley Sanitation Commission (ORSANCO), and these advisories remained in place until 1998. At that time, carp and channel catfish advice remained "Do Not Eat" for the consistency with the advice for the main stem Ohio River and with that issued by other states. Walleye and both smallmouth and spotted bass were added for PCBs in 1998 at one meal per week (Group 2), and fresh water drum was added as one meal every two months (6 meals per year, Group 4).

According to EPA regulations and guidance, TMDLs must include specific waste load allocations (WLA) to all significant point sources of a pollutant and load allocations to nonpoint sources. According to Federal regulations at 40 CFR §130.2(g), load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. The elements of the TMDLs for PCBs and chlordane developed by PADEP are summarized below. Despite the fact that EPA believes that annual loads are an appropriate measure for these TMDLs, for the sake of consistency we are breaking the annual TMDL loads down into daily loads.

The TMDLS developed by Pennsylvania for the Monongahela River segments from the Maxwell Lock & Dam (RMI 19.8) to Lock & Dam 4 and Lock & Dam 2 (RMI 11.2) to the mouth (RM 0.0) are summarized as follows:

Monongahela River Lock & Dam 2 to Mouth

Pollutant	TMDL	WLA	LA	MOS
PCBs	0.000508 lbs/day	0	0.000457 lbs/day	0.0000508 lbs/day
Chlordane	0.00635 lbs/day	0	0.00572 lbs/day	0.000635 lbs/day

Monongahela River Maxwell Lock & Dam to Lock & Dam 4

Pollutant	TMDL	WLA	LA	MOS
PCBs	0.000361 lbs/day	0	0.000325 lbs/day	0.0000361 lbs/day
Chlordane	0.00451 lbs/day	0	0.00406 lbs/day	0.000451 lbs/day

The TMDL is a written plan and analysis established to ensure that a waterbody will attain and maintain water quality standards. The TMDL is a scientifically-based strategy which considers current and foreseeable conditions, the best available data, and accounts for uncertainty with the inclusion of a "margin of safety" value. Conditions, available data and the understanding of the natural processes can change more than anticipated by the margin of safety. The option is always available to refine the TMDL for re-submittal to EPA for approval. The unassessed waters protocol, a method of conducting biological assessments of Pennsylvania's waters, was developed in 1996 and began implementation in 1997. PADEP's goal is a statewide assessment of surface waters in Pennsylvania. After completion of the initial assessments, the long-range goal is to re-assess all waters on a five-year cycle. Therefore, while the TMDL should not be modified at the expense of achieving water quality standards expeditiously, the TMDL may be modified when warranted.

III. Discussion of Regulatory Conditions

EPA finds that Pennsylvania has provided sufficient information to meet all of the eight basic requirements for establishing PCB and chlordane TMDLs for segments of the Monongahela River. EPA therefore approves the TMDLs. EPA's rationale for approval is set forth according to the regulatory requirements listed below.

1) The TMDLs are designed to implement the applicable water quality standards.

A TMDL is required to assure that appropriate water quality standards are attained and maintained. Water Quality Standards include numeric criteria, narrative criteria and designated uses. Because consumption advisories are in place the use designations are not being met in this segment of the Monongahela River. In addition, translation of fish tissue data to water column concentrations can show if the numeric standard for chlordane and PCBs are being met. Pennsylvania's calculations estimate that water column concentrations exceed applicable numeric criteria for PCBs and chlordane.

A goal of a TMDL is to outline a plan to achieve water quality standards in the water body. For this segment of Monongahela River, the TMDL goal is for levels of PCB and chlordane in the water column to be reduced to levels equal to or less than the Commonwealth's water quality criteria. The human health criteria, found in the "Water Quality Toxics Management Strategy - Statement of Policy" (PA Title 25, chapter 16 of the Department's rules and regulations) are 0.00004 ug/L (micrograms per liter, equivalent to parts per billion) for PCB and 0.0005 ug/L for chlordane. Both of these compounds are probable human carcinogens, and these are human

health criteria 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 (1×10^{-6}).

Pennsylvania searched for in-stream water quality data for PCB and chlordane levels. A sampling station in the Maxwell to L&D 4 segment is located just below the Maxwell L&D. Samples from the lower Monongahela River have been collected at Water Quality Network Station 701 (Rankin Bridge off SR0837 at River Mile 9.8). No water column data were found near Maxwell. A number of data points collected between 1975 and 1982 were found for the Rankin bridge station. All sample results were less than detection, except for one sample that showed PCB 1254 at 0.02 ug/l. Pennsylvania's TMDL report was not clear whether this data point was for PCB, chlordane or both.

In order to compare current conditions to the water quality criteria, Pennsylvania estimated water column concentrations based on existing fish tissue concentrations and bioconcentration factors. The calculation involved dividing the average fish tissue concentration by the bioconcentration factor to obtain a projected water column concentration. The equation used by Pennsylvania is:

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

Where:

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
Multiply by 1000 to obtain g/L

The average concentration was used for two main reasons: 1) the fish tissue samples are composites, and 2) 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. The chlordane BCF of 14,100 from the EPA criteria development document (EPA 440/5-80-027, October 1980) was also applied. The BCFs were used because no Bioaccumulation Factors (BAFs) are available for statewide use. The use of the BCFs is consistent with the provisions of Pennsylvania's Water Quality Toxics Management Strategy were used to derive the water quality standard for PCBs, so this method is acceptable. The average water column concentrations calculated by Pennsylvania are shown below.

Estimated column concentrations - L&D2 to Mouth Segment

Pollutant	Column Concentration	Water Quality Standard

PCB	0.03333 ug/l	0.0005 ug/l
Chlordane	0.2724 ug/l	0.00004 ug/l

Estimated Column Concentrations - Maxwell L&D to L&D4

Pollutant	Column Concentration	Water Quality Standard
PCB	0.0162 ug/l	0.0005 ug/l
Chlordane	0.0220 ug/l	0.00004 ug/l

The estimated in-stream concentrations greatly exceed the state's water quality standard for each pollutant. However, Pennsylvania notes that while the actual concentrations in the water column are not known, they are likely to be lower than the calculated estimates. The estimates still show a need for the development of a TMDL.

2) *The TMDLs include a total allowable load as well as individual waste load allocations and load allocation.*

Source Identification

In order to determine the allocations for each pollutant, significant sources must be identified. Pennsylvania conducted a source assessment using various methods. The EPA Permit Compliance System (PCS) database was searched for any major discharge permits containing PCB or chlordane as an effluent limitation but no known point sources were identified from this search.

Both PCB and chlordane have been banned for over 10 years (since 1979 for PCB and 1989 for chlordane). However, contaminated soils and water sediments may still contribute to in stream concentrations of the pollutants. There are NPDES permitted discharges that also contribute PCBs to the environment. In addition, Superfund sites may also provide a source for both chlordane and PCBs. PCB is very resistant to breakdown and thus remains in river and lake sediments for many years. Air deposition may also be a pathway for PCBs entering surface waters.

Point Sources

Two methods were employed in order to locate known sources of PCB or chlordane in these segments of the Monongahela River: 1) PADEP's Southwest Regional Field Office searched for

information on known existing or historical sources that might contribute PCB or chlordane in or upstream from the fish consumption advisory reaches, and 2) the EPA PCS database was searched. Pennsylvania found no major permitted discharges of either PCBs or chlordane in either segment. No point sources of chlordane were found.

Non-point Sources

Soil Erosion and Groundwater Migration from Uncontrolled Waste Sites: PADEP identified four sites as potential sources of PCBs from surface runoff or groundwater pathways: 1) the former South Fayette Equipment, 2) Wheeling Pittsburgh Steel, 3) Westinghouse - Trafford and, 4) Swissvale Auto Surplus. These sites are not subject to NPDES permits requirements. The intent of clean up plans for sites where statewide soil/groundwater standards are exceeded is to intercept the contaminated groundwater via wells or trenches and treat the groundwater to acceptable levels. Any discharges to a surface water from such a remediation system are subject to NPDES permit requirements.

Fayette Equipment

The Fayette Equipment site is located within the drainage area of the segment of the Monongahela River from the Maxwell Lock and Dam to Lock and Dam 4 at Monessen. In 1998 and 1999, PADEP conducted an interim response removal action at the site that included excavation, treatment, and off-site disposal of lead-contaminated soil over a large portion of the site and excavation and off-site disposal of PCB-contaminated soil from a small pit area containing empty transformers. Following excavation, existing site soil was regraded and vegetated. Some areas were covered with topsoil and additional seed the following year. The majority of soil removed from the site was contaminated with lead. Pennsylvania has indicated that based on the work performed by the state's HSCA program staff, there is no evidence of any of the PCB contamination in the stream, and the soil contamination is localized. Monitoring of groundwater and surface water is expected to continue to determine if any PCBs are migrating off site.

Wheeling-Pittsburgh Steel Allenport Plant

The Wheeling-Pittsburgh Steel Corporation (WPSC) Allenport Plant is located within the drainage area of the segment of the Monongahela River from the Maxwell Lock and Dam to Lock and Dam 4 at Monessen. The site is located in Washington County at river mile 46.2 on the Monongahela River. PADEP has identified PCB contamination at an area known as Tube Mill Building 8, an area located several hundred feet from the Monongahela River. Following building demolition conducted circa 1990, PADEP discovered a discharge of PCB through an underground pipeline – associated with a drain from within the former building - to an unnamed tributary to the Monongahela River. Subsequent investigation revealed the presence of PCB-containing oil ("product") atop the water table.

WPSC subsequently installed a soil dike surrounding the former facility to contain surface water runoff. Since 1993, WPSC has installed 13 monitoring wells and five recovery wells at the site and quarterly measures the thickness of product in monitoring wells, PCB content in product, and oil & grease in standing water within the diked area. WPSC also periodically removes

product from the wells. Through the fourth quarter of 1999, WPSC had removed approximately 872 gallons of product and water from the recovery wells. In December 1999, WPSC measured 3 feet of product in one well and between 0.02 and 0.3 feet in nine other wells. Standing water is observed within the diked area throughout the year.

Pennsylvania's TMDL report indicates that currently, PCB is being recovered from wells on the property as part of the interim and long term clean up plan in place for this site. This recovery process will ensure that there will be no additional pollution loading into the Monongahela River from this site.

Westinghouse Trafford Plant

The Westinghouse Trafford Plant is located within the drainage area of the segment of the Monongahela River from Lock and Dam 2 to Mouth in Trafford, Pennsylvania and covers approximately 117 acres. Prior to development of the site as a power circuit breaker facility, it was largely comprised of land within historical floodplains of Turtle Creek and Brush Creek. Most of the low-lying areas have been filled, rendering an overall flat topology. Surface water drainage from the site occurs towards these two streams. PCB associated with the disposal of electrical components (contained in fill material ranging from 1.0 to 29.5 feet in thickness) has been reported above medium specific concentrations (MSCs) in 72 soil samples with a maximum concentration of 590,000 mg/kg. Fifty-one surface soil samples exceeded PCB MSCs for surface-to-groundwater standards (Remedial Investigation Report, 2000).

Although the Remedial Investigation (RI) conclusions only specify immediate risks of contaminated soils to direct human contact (i.e., inhalation, ingestion, or dermal contact with fugitive soils), there does exist a potential for soil erosion during surface runoff events. This erosion can result in the migration of PCB contaminated soils from the site, to receiving surface water bodies (Turtle and Brush Creeks).

PCB concentrations of Aroclor-1242 and Aroclor-1260 were found to exceed MSCs in 10 of the 45 samples taken from 20 wells on the site. Nine samples showed Aroclor-1242 concentrations exceeding the MSC of 5.2 cg/L (ppb) with a maximum concentration of 330 cg/L. One sample resulted in an Aroclor-1260 concentration (6.6 cg/L) exceeding the MSC (1.1 cg/L). Pennsylvania has found that groundwater at this site has been determined to be hydraulically connected with both Turtle and Brush Creeks, and therefore, poses a threat to the Monongahela River (Remedial Investigation Report, 2000).

Swissvale Auto Surplus

Swissvale Auto Surplus is located within the drainage area of the segment of the Monongahela River from Lock and Dam 2 to Mouth. The facility operated a scrap metal recovery business from the 1940s until 1984. The site is located in Swissvale, Allegheny County, Pennsylvania immediately east of Pittsburgh (Identification Nos. PENNSYLVANIA-0776, PAD051129971). As part of those operations the company recycled used transformers that contained PCB. The facility incinerated used PCB oil removed from the transformers and also contained the PCB oils in drums. Sampling evidence suggests that PCB oils also were allowed to spill or drain onto the

ground. Soil sampling conducted by the EPA Region 3 Removal Section in 1984 revealed high concentrations of PCB in on-site soil (up to 32,000 mg/kg) and within a drainage ditch that carries runoff from the site (up to 1,106 mg/kg). The drainage ditch from the site flows to Tassey Hollow, a tributary to the Monongahela River.

EPA issued a Unilateral Order in 1984 that restricted access to and from the site and required the operator to cease use of the incinerator. EPA then excavated and removed approximately 6,000 tons of contaminated soil from on site, a nearby residence and garden, and drainage ditches west and south of the site. EPA also covered and regraded on-site soil with uncontaminated topsoil and/or stone. EPA used a cleanup level of 50 mg/kg when conducting soil excavation activities. EPA conducted a preliminary assessment under the Comprehensive Environmental Response, Compensation, and Liability Act (CERLCA) in 1985 that recommended the site undergo a low priority site inspection.

Under HSCA and the KEY sites program, DEP performed an interim response to address the contaminated building and three areas of soil contamination. Phoenix Land Recycling submitted an NIR and final report under Pennsylvania ACT 2 and received an ACT 2 Release of Liability after demonstrating through attainment sampling that the Swissvale site meets ACT 2 Residential standards. A copy of the release letter is available in DEP Central Files.

Atmospheric Deposition

Atmospheric deposition can contribute to background concentrations of PCB in water bodies. Studies have shown that air deposition can be a significant source of PCB load to a water. However, other studies are inconclusive and suggest that 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. The PCB TMDL study now underway for the Delaware Estuary will be looking at the role of air deposition to water bodies. Until that study is complete EPA agrees with PADEP that air sources of PCBs need not be quantified for this TMDL. However EPA recommends that Pennsylvania continue to review the impact of air deposition and, if the need arises, revisit this TMDL to consider the impacts of air sources.

TMDL Calculations

Pennsylvania utilized the water quality criteria and flow data from the U.S. Geological Survey (USGS) surface water discharge station near the Point Marion L&D (03063000) to calculate the TMDL. The segment harmonic mean flow was used in calculating the Total Daily Maximum Load (TMDL) by multiplying it by the water quality criterion and a multiplier (0.00539) to convert from cfs x ug/L to lbs/day (pounds per day). EPA agrees with this approach for calculating the TMDL. The total allowable loadings are presented below:

Monongahela River Lock & Dam 2 to Mouth

Pollutant	TMDL	% Reduction
PCBs	0.000508 lbs/day	99.88
Chlordane	0.00635 lbs/day	98.16

Monongahela River Maxwell Lock & Dam to Lock & Dam 4

Pollutant	TMDL	% Reduction
PCBs	0.000361 lbs/day	99.75
Chlordane	0.00451 lbs/day	98.16

Wasteload Allocations
Pennsylvania found no permitted point sources contributing to the load of either chlordane or PCBs to the Monongahela River. Therefore the WLA was assigned a value of 0. EPA agrees with this.

Load Allocations
Pennsylvania found that insufficient information was available for the hazardous waste sites to calculate specific allocations to the sites for PCBs. The state also concluded that because there is no way to accurately quantify loadings from groundwater or erosion from the Superfund sites, the PCB TMDL minus the margin of safety is assigned to a Load Allocation (LA) for the in-stream sediment.

Although PADEP does not specifically allocate a load to the Superfund site, Pennsylvania's TMDL, which includes an explicit margin of safety and allocation of the remainder of the TMDL to sediment, provides an implicit allocation of zero to the known PCB source. EPA finds this allocation acceptable.

Using detailed information from our Superfund site files, we have calculated the PCB loadings coming from the sites (see Appendices A, B and C) and believe an existing loading rate and required reduction for the sites in order to meet the implicit allocation of zero to the sites can be determined. Based on the information reviewed by EPA and the subsequent calculations completed by EPA, we believe an allocation of zero to the site would be feasible. The elimination of any possible erosion of contaminated soil from the sites removes the pathway for the runoff of PCBs. Therefore, the zero allocation, or 100% reduction, for the sites is reasonable.

Based on EPA's analysis of this TMDL, whereby we find an implicit allocation of zero to the sites is included in Pennsylvania's TMDL, EPA finds this TMDL for PCBs to be acceptable.

EPA believes that such an allocation for the sites serves as a goal that can be used by the Superfund program as the specific site is addressed. A TMDL is a planning tool that may change over time as the data improves and the watershed changes. If additional data are

collected and the identified sources of PCBs are re-evaluated, a determination can be made as to whether this new data is significant and a TMDL revision is necessary. While it is expected that a 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 could be reopened and the allocations re-distributed, while still meeting the total allowable load from all sources. 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.

Because there are no known sources of chlordane in this Monongahela River segment, it is also treated as a nonpoint source contaminant that may be introduced to surface water through contaminated ground water or surface runoff. The TMDL for chlordane is assigned to the LA, that portion of the load contributed by non-point sources. Chlordane also becomes associated with soil particles and enters the sediments once in a water body, and fish tissue contamination results from this sediment load. Because of this, the chlordane TMDL minus the margin of safety in this reach of the Monongahela River is assigned to a LA for the in-stream sediment. EPA agrees with this approach for chlordane.

Summary of Pennsylvania's TMDL and Allocations

The TMDL for the Monongahela River segments from the Maxwell Lock & Dam (RMI 19.8) to Lock & Dam 4 and Lock & Dam 2 (RMI 11.2) to the mouth (RM 0.0) can be summarized as follows:

Monongahela River Lock & Dam 2 to Mouth

Pollutant	TMDL (lb/day)	WLA (lb/day)	LA (lb/day)	MOS (lb/day)
PCBs	0.000508	0	0.000457	0.0000508
Chlordane	0.00635	0	0.00572	0./000635

Monongahela River Maxwell Lock & Dam to Lock & Dam 4

Pollutant	TMDL (lb/day)	WLA (lb/day)	LA (lb/day)	MOS (lb/day)
PCB	0.000361	0	0.000325	0.0000361
Chlordane	0.00451	0	0.00406	0.000451

3) *The TMDLs consider the impacts of background pollutant contributions.*

Development of TMDLs includes consideration of background pollutant contribution, appropriate and/or critical stream flow, and seasonal variation. Page 11 of Pennsylvania's TMDL report indicates that "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." EPA agrees with the assumption of zero background for chlordane and the need to further consider background concentrations for PCBs.

Pennsylvania assumed a zero background concentration for both pollutants in their calculations. Pennsylvania's assumption for use of that value is that further stream specific data needs to be developed before a background concentration can be calculated with sufficient scientific certainty for PCBs. EPA agrees that more information should be collected to determine what the background contributions of PCBs is for this water.

In order to address the pervasiveness of PCBs, Pennsylvania has committed to collecting in-stream data to support an assumption of zero concentration or some other value in the future (Commitment provided by PADEP in a letter from Mr. Frederick Marrocco to Joseph Piotrowski, April 2, 2001). The commitment which Pennsylvania has made is as follows: "PADEP will review the basis for the zero background assumption to determine if it continues to be valid. If the review determines that the zero background assumption is no longer valid, PADEP will assess available and practical options for conducting background monitoring for PCB. Factors to be considered in this assessment include, the on-going water quality monitoring program and priorities, fish tissue sampling, sediment sampling, water quality sampling, and the availability of EPA approved analytical methods. PADEP will consider the results of this assessment in establishing a plan for the conduct of additional PCB data collection efforts. Any new data collected under this plan will be assessed for possible revision to the PCB TMDL." We suggest any monitoring plan to verify the background concentration of PCBs in the water up stream of the known sources of PCB should include an appropriate number of samples collected for various stream flow regimes. In addition, the plan should include the use of the more sensitive EPA method of 1668A. This method would better allow comparison of the water column data with the state standards for PCBs.

The Toxics Advisory Committee of the Delaware River Basin Committee is now involved in the preliminary data collection program for the development of a TMDL for PCBs for the Delaware Estuary. This same committee has recommended the use of the method 1668A for data analysis. EPA Headquarters has recommended the use of this method as appropriate for a variety of PCB measurement uses under the Clean Water Act on a case-by-case basis. EPA Headquarters is prepared to assist regulatory agencies who choose to use the method.

In addition to the Delaware Estuary PCB TMDL, EPA is using the 1668A method for the development of a PCB TMDL for the Shenandoah River in Virginia. Further EPA has used more sensitive methods not yet approved for dioxin analysis in the development of

a TMDL for the Kanawha River, Pocatalico River and Armour Creek in West Virginia and for the development of a dioxin TMDL for the Ohio River. The Ohio River Valley Sanitary Commission (ORSANCO) and the states of West Virginia and Virginia have accepted these non-approved approaches in the development of TMDLs. Further, the regulated and environmental communities have accepted the final TMDLs for the Kanawha River, Pocatalico River and Armour Creek and the Ohio River based on data analyzed using these non-approved methods.

Calculating the TMDL for PCBs based on a zero background or a value greater than zero will have no noticeable impact on the reductions necessary for the various sources of the pollutant for this watershed. Therefore, we accept the state's approach to the use of a zero background for PCBs. However as will be discussed later, the consideration of background loads to this water segment may have an impact of reasonable assurances that the TMDL can be met.

4) The TMDLs consider critical environmental conditions.

EPA regulations at 40 CFR §130.7(c)(1) require TMDLs to take into account critical conditions for stream flow, loading, and water quality parameters. The intent of this requirement is to ensure that the water quality of the Monongahela River is protected during times when it is most vulnerable.

Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards.[1] In specifying critical conditions in the waterbody, an attempt is made to use a reasonable "worst-case" scenario condition. Critical conditions are the combination of environmental factors (e.g., flow, temperature, etc.) that results in attaining and maintaining the water quality criterion and has an acceptably low frequency of occurrence. For example, stream analysis often uses a low-flow (7Q10) design condition as critical because the ability of the waterbody to assimilate pollutants without exhibiting adverse impacts is at a minimum.

PCB and chlordane are probable human carcinogens. 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

[1] EPA Memorandum regarding EPA Actions to Support High Quality TMDLS from Robert H. Wayland III, Director, Office of Wetlands, Oceans, and Watersheds to the Regional Water Management Division Directors, August 9, 1999.

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 flow condition that will, when applied to the Total Maximum Daily Load, represent 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 the critical environmental conditions and seasonal variations in PCB and chlordane concentrations. EPA believes that this approach satisfies the requirement to consider critical environmental conditions.

5) The TMDLs consider seasonal environmental variations.

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 flow condition that will, when applied to the Total Maximum Daily Load, represent 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 and chlordane concentrations. EPA believes that this approach satisfies the requirement to consider seasonal environmental variations.

6) The TMDLs include a margin of safety.

This requirement is intended to add a level of safety to the modeling process to account for any uncertainty. Margins of safety (MOS) may be implicit, built into the modeling process, or explicit, taken as a percentage of the wasteload allocation, load allocation, or TMDL.

Achievement of the TMDLS will generally ensure achievement of the water quality criteria. To account for uncertainties that may be associated with the TMDL calculations, the Pennsylvania held 10% of the TMDLS in reserve. Applying this 10% margin of safety results in a PCB MOS of 0.0000508 pounds per day and a chlordane MOS of 0.000635 pounds per day for the L&D 2 to mouth segment. Similarly, applying a 10% margin of safety results in a PCB MOS of 0.0000361 pounds per day and a chlordane MOS of 0.000451 pounds per day for allocation to all sources in the Maxwell Lock & Dam to Lock & Dam 4 segment. The remaining load is available for allocation to all sources. EPA concurs with this approach to considering a MOS.

7) There is reasonable assurance that the TMDLs can be met.

There are two options for remediation of PCBs and chlordane in the stream sediment: 1) dredge and remove the contaminated sediment or 2) allow natural attenuation to remove the source.

Although not entirely clear in the Pennsylvania TMDL report, the recommended option is for natural attentuation. If the sources are removed, such as the soil erosion from the Superfund sites, eventually natural forces, such a overburden by clean sediments, will remove the threat of PCB contamination to the stream and fish.

Pennsylvania intends to continue periodic fish tissue sampling for the Monongahela River to determine if contamination continues. EPA agrees with this monitoring activity, however, we also believe that additional monitoring is necessary. The combination of removing the pathway of the PCBs from the know sources, and the natural recovery of the in stream sediments provides some reasonable assurance that the TMDL, and hence the applicable water quality standard, can be met. EPA believes that the state should undertake additional monitoring to provide some further assurances. This would include measuring background concentrations of PCBs. If it is found that PCB concentrations entering the segment are significant, natural clean-up of existing sediment contamination may not occur or may be delayed, or the incoming concentrations themselves may exceed applicable water quality standards. This needs to be addressed. In order to assure that sampling/analysis provides useful information, EPA further recommends the use of testing method 1668A. EPA also recommends that the state continue to analyze the impacts of air deposition of PCBs to this water.

8) The TMDLs have been subject to public participation.

EPA believes that the state placed a notice of the draft TMDL for the Monongahela River in the *Pittsburgh Post-Gazette*, a daily newspaper of approximately 1.2 million readers, on Friday October 6, 2000 (Section- Classifications 444 to 479) and in the *Pennsylvania Bulletin* on September 29, 2000. However, the final TMDL submitted to EPA did not confirm that the notice was placed. The Monongahela River TMDL report noted that a notice was placed for the Beaver River TMDL, not the Monongahela River TMDL.

The TMDL further describes a public meeting that was held on November 14, 2000. Because the state referenced the Beaver River, we cannot be sure if this meeting discussion refers to the Monongahela River or the Beaver River. The Response to Comments provided by Pennsylvania with the TMDL does refer to the Monongahela River TMDL. Therefore, EPA must assume that the reference to the Beaver River was in error and that the notice was indeed for the Monongahela River TMDL. EPA therefore believes that the public participation requirement was met.

APPENDIX A

EPA Calculations of TMDL/WLA/LA
Allocating to Identified Sources for PCBs and Chlordane

EPA TMDL Calculation including Superfund Sources

The calculation of the Monongahela River TMDLS utilizes the water quality criteria and flow data from the U.S. Geological Survey (USGS) surface water discharge station near the Point Marion L&D (03063000). The harmonic mean flow was calculated using the low flow yield method found in the PADEP's *Implementation Guidance - Design Stream Flows* (Document No. 391-2000-023, p 4). This method requires that the harmonic mean flow (Qhm) from the USGS gage be divided by the gage drainage area to arrive at a Unit Qhm that is multiplied by the drainage area of the segment to produce a Segment Qhm in cubic feet per second (cfs). The Segment Qhm for the Monongahela River segments are: Lock & Dam 2 to the mouth equals 2357.05 cfs and from the Maxwell Lock and Dam to Lock and Dam 4 equals 1674.06 cfs.

The TMDL is calculated by multiplying the Segment Qhm by the water quality criterion and a multiplier to convert to pounds per day (lbs/day). The conversion multiplier is calculated as follows:

$(28.3\ L/ft^3) / (10^6\ \mu g/g) / (454\ g/lb) \times (86{,}400\ seconds/day) = 0.00539$

PCB TMDL for Maxwell Lock & Dam to Lock & Dam 4:

1674.06 cfs x 0.00004 µg/L x 0.00539 = 0.000361 lbs/day.

Chlordane TMDL for Maxwell Lock and Dam to Lock & Dam 4:

1674.06 cfs x 0.0005 µg/L x 0.00539 = 0.00451 lbs/day

PCB TMDL for Lock & Dam 2 to mouth:

2357.05 cfs x 0.00004 µg/L x 0.00539 = 0.000508 lbs/day

Chlordane TMDL for Lock and Dam 2 to mouth:

2357.05 cfs x 0.0005 µg/L x 0.00539 = 0.00635 lbs/day

Background Concentrations

Development of TMDLs includes consideration of background pollutant contribution, appropriate and/or critical stream flow, and seasonal variation. 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 family of man-made products 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. Both atmospheric deposition and soil erosion contribute to background concentrations of PCB in water bodies.

Atmospheric deposition of PCB plays a dominant role in PCB cycling in many fresh water systems. Monitoring conducted under the Integrated Air Deposition Network (IADN) and the Great Waters Program indicates 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.

PCB atmospheric deposition values specific to Pennsylvania have not yet been identified, although atmospheric deposition data for southern New Jersey will be published in the near future. There are, however, readily available data related to studies recently done for Lake Michigan under the IADN and the Great Waters Program. PCB concentrations in air over Lake Michigan have been observed to range from 440 picograms per cubic meter (pg/m^3) (4.12×10^{-2} parts per trillion [ppt]) in the southern and mid region of the lake to 170 pg/m^3 (1.59×10^{-2} ppt) in the northern part of the lake (McConnell et al, 1998). Because recent studies have demonstrated that urban areas such as Chicago (located on the southwest region of the lake) observe greater concentrations of PCB in air than other areas, the average air concentration values observed over the area of Lake Michigan is more likely to reflect values observed in rural and suburban Pennsylvania.

Although this 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 possibly occurring in Pennsylvania water bodies.

Margin of Safety (MOS)

Achievement of the TMDLS will generally ensure achievement of the water quality criteria. To account for uncertainties associated with the data that were used to perform the TMDL calculations, 10% of the TMDLS are held in reserve. The TMDLS and MOS values are summarized in the "TMDL Summary" below.

Wasteload Allocations (WLAs) and Load Allocations (LAs)
No point sources of PCB or chlordane to the Monongahela River have been identified. As such, the WLA for both contaminants is zero. Nonpoint sources of PCB consist of soil erosion and groundwater migration from uncontrolled sites, and sediment release. Nonpoint sources of chlordane include only sediment release.

Soil Erosion and Groundwater Migration - Monongahela River Maxwell Lock & Dam to Lock & Dam 4 (PCB)

Prior to the removal of contaminated soil and revegetation, the Fayette Equipment site likely served as a source of PCB to the river. The site likely represents a current source of PCB to the river because a cleanup level of 30 mg/kg was used when soil was remediated at the site. Following soil excavation activities, the site was regraded and vegetated; some portions of the area were covered with topsoil to enhance vegetation. The magnitude of soil erosion from the Fayette Equipment site is estimated using the Universal Soil Loss Equation (USLE). The use of this equation is taken from the PATG Section I Erosion Prediction document (1991). The calculation of the contribution of PCB from the Fayette Equipment site is included in Appendix A and the estimated existing PCB load from the site is 0.00516 lb/day. Although the site represents a current source of PCB to the Monongahela River, the LA associated with this load is zero because the percent reduction for this source is 100% (see below).

The WPSC Allenport Plant Tube Mill Building 8 area represents both an historic and current source of soil erosion to the Monongahela River. Historic discharges from a drain that was infiltrated by floating PCB-containing oil have been documented. That pipeline discharge had since been eliminated and surface runoff from the area is now contained within a soil dike. However, the diked area has been inundated with stormwater during very heavy storm events. On February 19, 2000, DEP observed the diked area to be flooded and collected a water sample from the tributary to Outfall 005 for PCB analysis. PCB was detected at a concentration of 0.38 µg/L. Although this represents an intermittent load to the Monongahela River, the potential load associated with such releases cannot be quantified at this time because limited analytical data are available.

The WPSC Allenport Plant Tube Mill Building 8 area also represents a potential historic and current source of PCB-contaminated groundwater via interflow. Although WPSC has periodically recovered PCB-containing oil from recovery wells, up to 3 feet of product remained atop the groundwater as of December 1999. Because no analysis for PCB in groundwater has been conducted and there are limited hydrogeological data available to assess the fate of groundwater beneath the former facility, the potential PCB load to the Monongahela River via groundwater from the site cannot be quantified at this time.

Soil Erosion and Groundwater Migration - Monongahela River from Lock & Dam 2 to Mouth (PCB)

The Westinghouse Trafford Plant represents an historical and current source of PCB to the

Monongahela River through the process of soil erosion. This erosion can be contributing in a chronic manner through routine stormwater events as well as large-scale flooding events as the site is located within the 100-year floodplain. The magnitude of soil erosion from the Fayette Equipment site is estimated using the Universal Soil Loss Equation (USLE). The calculation of the contribution of PCB from the Fayette Equipment site is included in Appendix B and the estimated existing PCB load from the site is 0.203 lb/day. Although the site represents a current source of PCB though soil erosion, the LA associated with this load is zero because the percent reduction for this source is 100% (see below).

Groundwater is likely contributing to PCB migration from the Westinghouse Trafford Plant to the Monongahela River. Concentrations of up to 330 cg/L have been measured in wells within the site. Estimated in-stream concentrations of Aroclor-1242 and Aroclor-1260 are 0.09 and 0.0002 mg/L, respectively, for the Turtle Creek, a tributary to the Monongahela River that runs through this site. Discharge data do exist for a gaging station located at the confluence of Turtle Creek and the Monongahela River (Turtle Creek at Trafford, USGS Gaging Station 03084500) for the water years 1920 to 1952. The mean discharge for this period (32 years) is 76.87 cfs (S.E. = 1.33). Based on this flow, daily mass transport of PCB via this pathway can be calculated in the following manner:

76.87 cfs x 0.0902 cg/L (Total PCB) x 0.00539 = 0.0374 lb/day

Although the site represents a current source of PCB through groundwater migration, the LA associated with this load is zero because the percent reduction for this source is 100% (see below).

The Swissvale Auto Surplus Supply site also represents a historic contribution of PCB to the Monongahela as documented by the presence of significant concentrations of PCB in soil from a drainage ditch receiving flow from the site. It is possible that the site represents an ongoing source of PCB to the river, but additional research is required to make this determination.

Sediment Release (PCB and Chlordane)

There are no currently available sediment analytical data that could be used to estimate the current load resulting from in-stream sediment. For chlordane, the entire LAs for both Monongahela River segments are allocated to in-stream sediment release because the WLA is zero and no nonpoint sources of chlordane have been identified. For PCB, the entire LAs for both Monongahela River segments also are allocated to in-stream sediment release because the WLAs are zero and the allocations made to uncontrolled wastes sites (soil erosion and groundwater) are zero.

Sediment Release LAs for Maxwell Lock & Dam to Lock & Dam 4

The PCB sediment release LA is calculated as follows:

PCB Sediment release LA = TMDL – MOS - Background
PCB Sediment release LA = (0.000361 - 0.0000361 – 0.000180) lb/day
PCB Sediment release LA = 0.000145 lb/day

The chlordane sediment release LA is calculated as follows:

Chlordane Sediment release LA = TMDL - MOS
Chlordane Sediment release LA = (0.00451 lb/day) – (0.000451 lb/day)
Chlordane Sediment release LA = 0.00406 lb/day

Sediment Release LAs for Monongahela River Lock & Dam 2 to Mouth

The PCB sediment release LA is calculated as follows:

PCB Sediment release LA = TMDL – MOS - Background
PCB Sediment release LA = (0.000508 – 0.0000508 – 0.000254) lb/day
PCB Sediment release LA = 0.000203 lb/day

The chlordane sediment release LA is calculated as follows.

Chlordane Sediment release LA = TMDL - MOS
Chlordane Sediment release LA = (0.00635 lb/day) – (0.000635 lb/day)
Chlordane Sediment release LA = 0.00572 lb/day

LA Summary

Table 1 provides a summary of LAs for all PCB and chlordane sources identified for the Monongahela River from Maxwell Lock & Dam to Lock & Dam 4.

Table 1: Summary of Load Allocations for PCB and Chlordane
Monongahela River Maxwell Lock & Dam to Lock & Dam 4

Source	PCB LA (lb/day)	Chlordane LA (lb/day)
Unknown Sources	0.000180	0
Sediment Release	0.000145	0.00406
Total	0.000325	0.00406

Table 2 provides a summary of LAs for all PCB and chlordane sources identified for the Monongahela River from Lock & Dam 2 to Mouth.

Table 2: Summary of Load Allocations for PCB and Chlordane Monongahela River Lock & Dam 2 to Mouth		
Source	PCB LA (lb/day)	Chlordane LA (lb/day)
Unknown Sources	0.000254	0
Sediment Release	0.000203	0.00572
Total	0.000457	0.00572

TMDL Summary

Tables 3 and 4 summarize the TMDLS for the two Monongahela River segments. As described above the WLA for both segments is zero because no direct discharges of PCB have been identified. For both segments, the chlordane LA is allocated entirely to sediment release and the PCB LA is allocated to background concentrations and sediment release as shown in Tables 3 and 4.

Table 3: TMDL Summary Monongahela River Maxwell Lock & Dam (RMI 61.2) to Lock & Dam 4 (RMI 41.5)				
Pollutant	TMDL (lb/day)	WLA (lb/day)	LA (lb/day)	MOS (lb/day)
PCB	0.000361	0	0.000325	0.0000361
Chlordane	0.00451	0	0.00406	0.000451

Table 4 summarizes the TMDLS for the Monongahela River segment from Lock & Dam 2 to the mouth.

Table 4: TMDL Summary Monongahela River Lock and Dam 2 (RMI 11.2) to Mouth (RM 0.0)				
Pollutant	TMDL (lb/day)	WLA (lb/day)	LA (lb/day)	MOS (lb/day)
PCB	0.000508	0	0.000457	0.0000508
Chlordane	0.00635	0	0.00572	0.000635

Percent Reduction

The goal of a TMDL is to achieve the water quality standards of the receiving stream, which will protect public health. In order to achieve this, the in-stream concentrations must be reduced from the estimated current levels to the criteria. Percent reduction is calculated using the following formula:

Percent reduction = (1 - Criterion/ Existing In-stream Concentration) x 100. The percent reduction for PCB is calculated as follows:

Percent Reduction for Maxwell Lock & Dam to Lock & Dam 4

The percent reduction for PCB is calculated as follows:

% Reduction = (1 - 0.00004/0.0162) x 100
% Reduction = (1 - 0.00247) x 100 = 99.75 %

Percent reduction for chlordane is calculated as follows:

% Reduction = (1 - 0.0005/0.0220) x 100
% Reduction = (1 - 0.0228) X 100 = 97.72 %

Percent Reduction for Lock & Dam 2 to Mouth

The percent reduction for PCB is calculated as follows:

% Reduction = (1 - 0.00004/0.0333) x 100
% Reduction = (1 - 0.0012) x 100 = 99.88 %

Percent reduction for chlordane is calculated as follows:

% Reduction = (1 - 0.0005/0.0272) x 100
% Reduction = (1-0.01836) X 100 = 98.16%

For chlordane, the entire portion of these reductions is associated with reductions in sediment release achieved through natural attenuation. The nonpoint PCB loads associated with soil erosion and groundwater migration from the uncontrolled sites will be reduced by 100 percent. The remaining amount of PCB reduction is associated with reductions in sediment release that will be achieved through natural attenuation.