

3/8/01

# **Total Maximum Daily Load**

## **PCB and Chlordane**

### **Chartiers Creek**

#### **Canonsburg to Mouth**

#### **Washington and Allegheny 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 water-bodies 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, the Department also began rotating sampling through its 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 at <http://www.fish.state.pa.us>. In addition, the annual list and any individual advisories needed between lists are issued using press releases.

A number of Pennsylvania water bodies 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 the Chartiers Creek, Washington and Allegheny Counties, by PCB and Chlordane.

## **Background**

This Total Maximum Daily Load (TMDL) applies to the Chartiers Creek (Stream Code 36777), and a short segment at the mouth of the Little Chartiers Creek (Stream Code 36943). The main stem of Chartiers Creek is listed, in Basin 20-F (River Mile 30.38), from Canonsburg to the mouth and 0.38 miles of the Little Chartiers Creek from the mouth upstream to the Cannonsburg Lake dam. The segment of the Little Chartiers was included in the same consumption advisory as management decision, (not based on actual fish tissue data) based on the fact that fish in the main Stem of Chartiers Creek could swim up into Little Chartiers Creek to the point where the dam is located. For this reason no loading computations or allocations will be done for the Little Chartiers Creek, and the focus of this TMDL is the main stem of Chartiers Creek. Chartiers Creek (Segment ID 9922) and the short segment of Little Chartiers Creek (Segment ID 9923) were included on the 1998 Section 303(d) list as a high priority for TMDL development. The

first fish advisory for Chartiers Creek was issued on December 12, 1979. The public was warned not to eat carp downstream from Canonsburg due to PCB contamination (5.3 ppm). The statewide release on June 26, 1986 added largemouth bass and chlordane (0.44 ppm) to the advisory. This advice was re-issued in June 1991, and the advisory was extended to include the Lower reaches of Chartiers Creek in August 1992. When the Great Lakes protocol was applied for 1998, carp remained “Do Not Eat”, but the advice for largemouth bass changed to one meal per month (Group 3). Both carp and largemouth bass are listed for PCB and chlordane.

This Total Maximum Daily Load (TMDL) applies to the Chartiers Creek (Stream Code 36777), listed in Basin 20-F (River Mile 30.38) from Canonsburg to Mouth. Chartiers Creek was included on the 1998 Section 303(d) list [with ID 9922] as a high priority for TMDL development. The first fish advisory for Chartiers Creek was issued on December 12, 1979. The public was warned not to eat carp downstream from Canonsburg due to PCB contamination (5.3 ppm). The statewide release on June 26, 1986 added largemouth bass and chlordane (0.44 ppm) to the advisory. This advice was re-issued in June 1991, and the advisory was extended to include the Lower reaches of Chartiers Creek in August 1992. When the Great Lakes protocol was applied for 1998, carp remained “Do Not Eat”, but the advice for largemouth bass changed to one meal per month (Group 3). Both carp and largemouth bass are listed for PCB and chlordane.

#### **1. Driving Directions from Philadelphia to the Former Cooper Power Systems Site:**

- 1. Take I-76 West to I-79, Exit No. 3 onto I-79 South**
- 2. Take I-79 South to Exit 10 at Canonsburg.**
- 3. Turn right off the exit ramp until you come to a T.**
- 4. Turn left at the T, go across Railroad tracks to First Street in Canonsburg**
- 5. Turn right on First Street, go two blocks to Chartiers Ave. and turn left.**
- 6. The Former Cooper Power Systems plant is at the end of Chartiers Ave.**



## 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 are in place for largemouth bass and carp for PCB and Chlordane, these goals are not being met in this segment of the Chartiers Creek.

The specific goal of a TMDL is to outline a plan to achieve water quality standards in the water body. For this segment of the Chartiers Creek, the TMDL goal is for levels of PCB and Chlordane in the water column to be equal to or less than the Commonwealth's water quality criteria. The criteria, found in the "Water Quality Toxics Management Strategy - Statement of Policy" (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 ( $1 \times 10^{-6}$ ). 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 and chlordane levels for comparison to the criteria. First, the Department's Southwest Field Office searched for PCB and chlordane data in or upstream from the Chartiers Creek fish consumption advisory segment. 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 all areas with a five-mile radius around the Department's fish tissue sampling station. This station is WQF36777-027.4 (Chartiers Creek at Van Emman) and WQN Station #914 (Chartiers Creek at RMI 9.2 miles; Bridge off LR2037 in Allegheny County). All samples results from the retrieval were either less than detection or no water column data could be found. In any event, the data from the EPA's STORET System is too old to be used and does not represent current conditions.

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

The equation is:

$$\frac{TC}{BCF} = WC \times 1000, \text{ where}$$

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 (ug/L))

The average fish tissue concentration is the mean of all samples shown in the table below. The data is 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 and the Chlordane BCF of 14,100 are from the EPA criteria development documents Ambient Water Quality Criteria for Polychlorinated Biphenyls (EPA 440/5-80-068, October 1980) and Ambient Water Quality Criteria for Chlordane (EPA 440/5-80-027, October 1980). These BCFs were used because no Bioaccumulation Factors (BAFs) are available for statewide use. The use of the BCFs is consistent with the provisions of the Department's water quality toxics management strategy. Average PCB and chlordane tissue levels were determined for each species using all samples. An estimated water column concentration was then calculated for each compound for each species. These estimated

water column concentrations were averaged for each compound in order to provide a single estimated water column concentration for each parameter for the segment.

**Fish Tissue Data Used to calculate the TMDL for Chartiers/L. Chartiers Creeks**

<b>Parameter</b>	<b>Fish Species</b>	<b>Number of Data Sets</b>	<b>Range of Years</b>	<b>Years</b>
PCB	Largemouth	4	1985 - 1996	1985, 1989, 1991, 1996
	Carp	6	1985 - 1996	1985, 1989, 1991, 1996
Chlordane	Largemouth	4	1985 - 1996	1985, 1989, 1991, 1996
	Carp	6	1985 - 1996	1985, 1989, 1991, 1996

The average PCB levels in the Chartiers Creek segment is as follows: Carp – 4.21 mg/kg and Largemouth bass - 0.469 mg/kg. The estimated concentration of PCB in the water column is 0.0750 ug/L. The average chlordane concentration in carp is 0.698 mg/kg and Largemouth bass is 0.129 mg/kg. The corresponding estimated water column concentration for chlordane is 0.0293 ug/L.

These estimated concentrations exceed the applicable water quality criteria. These values most likely do not represent the actual existing instream concentrations due to the basis for the back-calculation. The back-calculations from tissue level to water column concentration were performed using data on species for which consumption advisories have been issued, i.e., fish with elevated tissue levels of these compounds. It must also be noted that the average tissue concentrations may be artificially elevated because of the use of one-half of the detection limit for data reported as less than detection. The actual concentration could lie anywhere between zero and the detection limit. The use of one-half of the detection limit is merely a means of obtaining a reasonable value to use in calculating the average. While the actual concentrations in the water column are not known, they are likely to be lower than the calculated estimates.

**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.

Chlordane is a man-made organochlorine compound that was widely used as a broad-spectrum agricultural pesticide before its use was restricted to termite control around building foundations. All uses of chlordane have been banned since April 1988. Chlordane may be introduced to surface waters through contaminated ground water or surface runoff, and it therefore a non-point

source contaminant. Once in a waterbody, chlordane becomes associated with solids particles and enters the sediments. Fish are exposed to and accumulate PCB and chlordane from the water, through contact with or ingestion of sediments, and in the food they eat.

It should be noted that in the Southwest Region, the configuration of the listed streams (primarily the Allegheny, Monongahela and Ohio Rivers) consists of a series of Locks and Dams. Any PCB contaminated sediments tend to stay in the river pools rather than being washed out as they would be on free flowing streams. All known point source discharges of PCB or Chlordane in the Southwest region have been required to obtain an NPDES permit with water quality based effluent limits and a requirement of “not detectable” for limits lower than detection.

Two methods were employed in order to locate known sources of PCB or chlordane in these segments of Chartiers Creek. First, the Southwest 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 reach. Second, the EPA Permit Compliance System (PCS) database was searched for any major discharge permits containing PCB or chlordane as an effluent limitation. For the Chartiers Creek segment, one major discharger for PCB compound was found on the PCS that has an NPDES permit [PA 0001937]. The name of the facility is Cooper Power Systems and is located in Cecil Township and Washington County at RMI 30.19 on Chartiers Creek.

The facility was first operated by McGraw-Edison in 1956. Cooper Power Systems acquired the stock of McGraw-Edison in 1985 and continued operating the facility, which was used to manufacture and repair electrical transformers. No manufacturing operations have been conducted at the site since the early 1990s and Pennsylvania Transformer has since purchased the property.

The facility initially became permitted under NPDES in 1984. As a result of monitoring associated with the permit, it was determined that the facility was contributing PCB to an unnamed tributary to Chartiers Creek. The tributary flowed through the site within an underground concrete sewer that was infiltrated by floating PCB-containing oil beneath the property.

This facility is under Consent Order and Agreement (CO&A) with Pennsylvania that was signed on February 4, 1992 to recover and treat groundwater collected from beneath the facility and to permit and monitor all point discharges from the facility under the NPDES program. Under the CO&A, Cooper Power Systems installed a groundwater recovery system in 1992. Currently, groundwater is recovered at a tank farm area using a horizontal well system and at the Building 20/25 Area from an infiltration trench, three bedrock recovery wells, one steam tunnel recovery well, two recovery sumps, one recovery well in Building 25, and two monitoring wells. Through the first half of 2000, the combined collection system had recovered approximately 1,700 gallons of floating PCB oil from atop the groundwater table.

In 2000, the facility discovered an unpermitted discharge of stormwater runoff that is likely to contain PCB that is known as Outfall 005. Cooper Power Systems is collecting flow and chemical data for the outfall and plans to permit the outfall under a revised CO&A and NPDES permit that is currently being negotiated with DEP.

Prior to 1980, no federal legislation existed which addressed past disposals of hazardous wastes. Therefore, Congress enacted the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) to address the hazards created from past disposals. Sites identified as possible sources of PCBs are to be remediated under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), which is commonly referred to as Superfund. The act deals with environmental response, providing mechanism for reacting to emergency situations and to chronic hazardous material releases. In addition to establishing procedures to prevent and remedy problems, it establishes a system for compensating appropriate individuals and assigning appropriate liability.

CERCLA required the Environmental Protection Agency (EPA) to develop criteria for prioritizing among sites potentially needing remediation. Those sites scoring high enough on the ranking system are included on the National Priorities List (NPL). Only NPL sites are eligible for EPA remedial action. Once a site on the NPL has been selected for remediation, a formal process must be followed to determine and implement appropriate actions. A Remedial Investigation/Feasibility Study (RI/FS) is done first. The conditions at the site must be determined, including the extent of contamination, migration offsite, and potential for human and environmental exposure. A series of specific remediation alternatives must be developed, including specification of costs, technical feasibility, and environmental impacts. Based on the RI/FS, a Record of Decision (ROD) is written by the EPA, which documents and justifies the selection of a particular cleanup option. This process must include substantial public and state participation. Following the ROD, the detailed engineering plans are prepared (the Remedial Design), and implementation (Remedial Action) can begin.

The Superfund Amendments and Reauthorization Act (SARA) of 1986 provided additional guidance for determining “how clean is clean” for the level of removal during a site cleanup. Cleanups must be protective of human health and the environment, be cost-effective, and use permanent solutions, including treatment and resource recovery, as much as practicable. Land disposal is discouraged.

The decision-making framework for the management of sediments has two major components: the remedial investigation and the feasibility study (RI/FS). For a Superfund site with contaminated sediments, the remedial investigation identifies the character of the sediments and the extent of contamination, among other information. The feasibility study includes an evaluation of all reasonable remedial alternatives, including treatment and non-treatment options. No Superfund sites were identified in this area.

Pennsylvania's Hazardous Sites Cleanup Act (HSCA) was created so that Pennsylvania could effectively fulfill their statutory responsibilities under CERCLA; recover costs incurred fulfilling

those statutory responsibilities; and supplement CERCLA by creating a state program for cleanup of sites not included on the National Priorities List. No HSCA sites were identified in this area.

**Atmospheric Deposition:** Development of the TMDLs for Chartiers Creek 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.

PCB air deposition values specific to Pennsylvania have not been identified. Therefore, no definitive data exists to document this as a source of PCBs to the impaired water.

### **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 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  $1 \times 10^{-6}$  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 a 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.

The calculation of the Chartiers Creek TMDLs utilize the water quality criteria and flow data from the U.S. Geological Survey (USGS) surface water discharge station. This station is located at "center of right span at downstream side of highway bridge at Carnegie, 0.3 miles downstream from Robinson Run, and 8.9 miles upstream from mouth". The harmonic mean flow was calculated using the low flow yield method found in the Department's "Implementation Guidance - Design Stream Flows" (Document No. 391-2000-023, p 4). This method requires that the harmonic mean flow (Q<sub>hm</sub>) from the USGS gage [03085500] used be divided by the gage drainage area to arrive at a Unit Q<sub>hm</sub> that is multiplied by the drainage area of the segment to produce a Segment Q<sub>hm</sub> in cubic feet per second (cfs). The Segment Q<sub>hm</sub> for Chartiers Creek segment is 171.21 cfs (calculated based on a Drainage Area of 298.7 sq. miles multiplied by the Q<sub>HM</sub> yield of 0.573191 cfs/mi<sup>2</sup>).

The Segment Q<sub>hm</sub> is 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).

The PCB TMDL is calculated as follows Chartiers Creek from the Canonsburg to Mouth:

$$171.21 \text{ cfs} \times 0.00004 \text{ ug/l} = 0.00685 \text{ cfs} \times \text{ug/l} \times 0.00539 = \underline{0.0000369 \text{ lbs/day.}}$$

The chlordane TMDL is calculated as follows:

$$171.21 \times 0.0005 \text{ ug/l} = 0.0856 \text{ cfs} \times \text{ug/l} \times 0.00539 = \underline{0.000461 \text{ lbs/day.}}$$

The Total Maximum Daily Load of PCB for this segment of the Chartiers Creek 0.0000369 lbs/day. The chlordane TMDL is 0.000461 lbs/day.

#### Percent Reduction for Chartiers Creek (Canonsburg to Mouth) Segment

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

$$\begin{aligned} \% \text{ Reduction} &= (1 - 0.00004/0.07498) \times 100 \\ \% \text{ Reduction} &= (1 - 0.000533) \times 100 = 99.95 \% \end{aligned}$$

Percent reduction for chlordane is:

$$\begin{aligned} \% \text{ Reduction} &= (1 - 0.0005/0.02932) \times 100 \\ \% \text{ Reduction} &= (1 - 0.01705) \times 100 = 98.29 \% \end{aligned}$$

Overall reductions of 99.95% for PCB and 98.3% for chlordane are needed to achieve the TMDL goal.

#### Margin of Safety (MOS)

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 Department proposes to hold 10% of the TMDLs in reserve. Applying this 10% margin of safety results in a margin of safety for PCB of 0.00000369 lbs/day and for chlordane of 0.0000461 lbs/day. This MOS allocation applies to all sources for the Chartiers Creek segment from Canonsburg to Mouth.

#### Wasteload Allocations (WLAs) and Load Allocations (LAs)

There are no data available on PCB or chlordane concentrations upstream of the segment of the Chartiers Creek from Canonsburg to Mouth.

Although the former point sources identified in the Source Assessment Section have ceased operations in terms of process wastewater discharge, it is still viewed as a known point source of PCBs in the Chartiers Creek watershed. This NPDES source is primarily from treated discharge of PCB contaminated ground water. The Source Assessment notes that once in a water body, PCB becomes associated with soil particles and enters the sediments. Fish tissue contamination results from this sediment load.

A Wasteload Allocation (WLA) is the portion of the load contributed by point source discharges. Recent Discharge Monitoring Report (DMR) data from the Cooper Power Systems (N.D.B. as PA Transformer) site show average flows at the all the four\* Outfalls (001 to 004) in the attached Table. \*Outfall # 005 was not included, since there is no flow data available.

The existing loading for PCB from all outfalls of the point source can be estimated based on the effluent limit (WQBEL) from Part C of the permit, 0.03 ug/L. The effluent limit is calculated by multiplying the total discharge flow (0.243 cfs for the 4 outfalls) by the WQBEL by the conversion factor (0.00539) to lbs/d as follows:

$$\text{Existing Wasteload} = (0.243 \text{ cfs} \times 0.03 \text{ ug/l} \times 0.00539) = 0.0000393 \text{ lbs/d.}$$

The water quality based limit of 0.03 ug/l included in Part C of the NPDES permit was used to determine the existing waste load based on EPA methodology for estimating current allowable loads. Because the detection limit for PCB is higher than the water quality based effluent limitation calculated from the wasteload allocation, a permit limitation of "Not Detectable" is included in the permit. Since carbon is generally used for treatment of PCBs, it is likely that actual levels in the discharge are below the estimated existing wasteload. As a precautionary measure, the site has a separate CO&A that specifies stipulated penalties in the event any permit conditions, including effluent limits, are violated. Planned changes, including additional treatment, for this site may affect the discharge load. The allocation will be reviewed in the next NPDES renewal.

Typically, the remainder of the PCB load is assumed to be contributed by non-point sources and may be introduced to surface water. However, in this case, there is no assimilative capacity left. Because of this, the PCB load of zero is assigned as a Load Allocation for the instream sediment for the Chartiers Creek segment from Canonsburg to Mouth.

Because there are no known point sources of Chlordane to this segment of the Chartiers Creek, it is treated as a nonpoint source contaminant that may be introduced to surface water through contaminated ground water, surface runoff, or contaminated sediment. Chlordane also becomes associated with soil particles and enters the sediments once in a water body. Fish tissue contamination results from this sediment load. Because of this and because there is no way to accurately quantify loadings from groundwater or erosion, the entire TMDL for chlordane for the reach of the Chartiers Creek except for the margin of safety is assigned to the Load Allocation

(LA) for the instream sediment. For the Chartiers Creek segment from Canonsburg to Mouth the Chlordane Load Allocation (LA) is 0.000415 pounds per day.

TMDL Summary

The TMDLs for the Little Chartiers Creek segment from Canonsburg Lake (RMI 30.38) to the Mouth (RM 0.0) can be summarized as follows:

<b>Chartiers Creek Canonsburg to Mouth</b>				
<b>Pollutant</b>	<b>TMDL (lbs/day)</b>	<b>WLA (lbs/day)</b>	<b>LA (lbs/day)</b>	<b>MOS (lbs/day)</b>
PCBs	0.0000369	0.0000332	0.0	0.00000369
Chlordane	0.000461	0	0.000415	0.0000461

TMDL Verification

The stated goal of this TMDL is to meet the PCB and chlordane water quality criteria for the protection of public health in this reach of the Chartiers Creek. Another way to state the goal is to reach a point where fish consumption advisories are no longer needed because tissue levels of PCB and chlordane are no longer above the 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 0.20 mg/kg. The upper limit for unrestricted consumption is 0.05 mg/kg. In order to verify the level of protection the PCB TMDL would provide, the estimated fish tissue concentration expected to accumulate at a water column concentration of 0.00004 ug/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.

Pennsylvania currently uses the U.S. Food and Drug Administration (FDA) Action Level of 0.3 mg/kg for issuance of advisories due to chlordane contamination. Achievement of the chlordane water quality criterion of 0.0005 ug/l would result in an estimated fish tissue concentration of 0.007 mg/kg, much lower than the Action Level. The consumption advisory could be lifted at that level.

**Recommendations**

The Department will continue to evaluate the identified possible sources of PCB's and/or chlordane. The Cooper Power Systems site will continue to be evaluated for compliance with its

PCB effluent limitations. This will be accomplished through review of self-monitoring data (DMRs) and periodic Department inspections.

The TMDL goal can be implemented through the Consent Order and Agreement (CO&A) signed between the PADEP and Cooper Power Systems (NPDES PA0001973). Based on the CO& requirements, the PCBs present in the ground water will be removed over a period of time. Currently, the permittee is collecting contaminated ground water and treating it prior to discharge. Through the NPDES permitting process and State cleanup programs, significant progress in eliminating PCB discharges to Chartiers Creek from former process discharges, and by soil erosion and groundwater. For the purposes of TMDL development, it is assumed that all nonpoint contributions from the site are eliminated through the use of erosion controls and groundwater recovery. Monitoring under the NDPEs program will provide additional information.

The use of both PCB and Chlordane has been banned in the United States, so there will be no new point sources to which controls can be applied. There are no known additional sources of PCB and Chlordane to the Chartiers Creek segment other than the ones identified above. PCB and chlordane present in the main stem of Chartiers Creek are believed to reside primarily in the sediment due to historical use and improper disposal practices.

Generally, the levels of PCB and chlordane are expected to decline over time due to the bans on use and 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 may be the best implementation method because it involves less habitat disturbance/destruction than active removal of contaminated sediments. Mechanical or vacuum dredging removes the habitat needed by certain benthic macroinvertebrates. In addition some of these organisms will be killed during the dredging process. Suspension of sediments during dredging may also cause abrasive damage to the gill and/or sensory organs of benthic macroinvertebrates or the gills of fish. Suspended sediments can also affect the prey gathering ability of sight-feeding fish. In addition, active removal may cause resuspension of contaminated materials thus making PCB and chlordane available for additional uptake. This alternative is also the least costly option.

For the Chartiers Creek segment outlined above, long-term natural attenuation coupled with the implementation of the Consent Order & Agreement for the NPDES permit for Cooper Power Systems is the best alternative for implementation.

More than ten Federal statutes provide authority to many EPA program offices to address the problem of contaminated sediment. These statutes include: the National Environmental Policy Act; the Clean Air Act; the Coastal Zone Management Act; the Federal Insecticide, Fungicide, and Rodenticide Act; the Marine Protection, Research, and Sanctuaries Act; the Resource Conservation and Recovery Act; the Toxic Substances Control Act; the Clean Water Act; the

Great Lakes Water Quality Agreement of 1978, and the Comprehensive Emergency Response, Compensation, and Liability Act. These statutes do not include any type of sediment criteria or a cleanup standard for PCBs or chlordane. Therefore, a determination on whether to conduct remediation of contaminated sediments is not as simple as comparing the sediment concentration to a criteria or standard. Generally, areas with sediment concentrations of PCB of 50 ppm or greater are considered areas of high concentration or “hot spots” and are actively remediated.

EPA’s Contaminated Sediment Management Strategy (CSMS), indicates, “Widespread, low levels of contaminants may favor natural attenuation, while geographically limited areas containing high levels of contaminants favor active remediation.” Natural attenuation may include natural processes that can reduce or degrade the concentration of contaminants in the environment including biodegradation, dispersion, dilution, sorption, volatilization, and chemical or biologic stabilization, transformation or destruction of contaminants, and the deposition of clean sediments to diminish risks associated with the site.

There are no known sediment data for the advisory portion of the receiving stream. With the ban on the production of chlordane and PCBs, the mitigation of their release into the environment as the result of the remedial actions being conducted, and the continued natural attenuation that is occurring in the receiving stream, it is believed the criteria for these pollutants in the water column will eventually be achieved and the goal of the TMDL for the receiving stream to be “fishable” will be met.

### **Monitoring**

Pennsylvania will continue to monitor PCB and chlordane in largemouth bass and carp tissue in this reach of the Chartiers Creek. Samples will be collected once every five 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 criteria are achieved and advisories are no longer needed.

### **Public Participation**

Notice of the draft TMDL for Chartiers Creek was published 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 PA Bulletin on September 29, 2000. A public meeting was held on November 14, 2000 at DEP’s Southwest Regional Office, located at 400 Waterfront Drive, Pittsburgh, PA 15222 (Waterfront Rooms A & B) to discuss and accept comments on the proposed TMDL. The public comment period closed on November 29, 2000.

Four people attended the public meeting. They were from the Army Corps of Engineers, a local watershed group and a USX attorney. Primarily, the following concerns were noted in our discussions:

- a) Will the State be responsible for cleaning up the PCBs in the river sediment if “natural attenuation” approach is not acceptable?
- b) How long will “natural attenuation” take in order to reduce PCBs to acceptable levels?
- c) Will industries be required by EPA to sample for soils and groundwater to find any unknown existing sources of PCBs?

Additionally, “Friends of the Riverfront” furnished written comments on 11/28/00. The comments applied to Shenango River, Beaver River, Chartiers/Little Chartiers Creek, Monongahela River and the Ohio River. Their comments centered on “implementation” issues of the TMDLs. These comments were addressed separately. Please refer to Appendix B for a copy of the letter and the response.

The Department considered all comments in developing the final TMDL, which is submitted to the Environmental Protection Agency (EPA) for approval. A public meeting with the watershed residents will be held to discuss the final TMDL.

## Appendix B

### COMMENT AND RESPONSE ON THE PROPOSED PCB/CHLORDANE TMDL FOR CHARTIERS AND LITTLE CHARTIERS CREEKS

#### EPA Region III

**Comment:** General: The state should consider combining the TMDLs for the Chartiers Creek and Little Chartiers Creek because they are based on the same fish advisories and rely on the same information.

**Response:** Thank you for the suggestion. We agree and have combined the two TMDL documents into one for the final TMDL.

**Comment:** General: Additional databases could be screened for possible point sources and areas of concern. An example is electrical utilities records of PCB transformers classified in accordance with TSCA.

**Response:** Pennsylvania thanks EPA for collecting additional data, and has increased the Source Assessment discussion, as appropriate.

**Comment:** Information Sheet: The maximum allowable loading for PCBs for a combined TMDL should be the sum of the allowable loadings for the Chartiers Creek and Little Chartiers Creek, or 0.0000426 lbs./day. The maximum allowable loading for chlordane should be the sum of the allowable loadings for the Chartiers Creek and Little Chartiers Creek, or 0.00005326 lbs./day.

**Response:** The final Chartiers Creek TMDL combines the Chartiers and Little Chartiers Creeks. The document explains that the Little Chartiers is included in the advisory and TMDL because fish have access in the Little Chartiers up to the dam. There are no sources of the pollutants from Little Chartiers Creek. The TMDL for PCB and Chlordane are, therefore, only those calculated for Chartiers Creek. See the TMDL for clarification.

**Comment:** TMDL Development/Endpoint Identification: A table shows the range of years and the years of available fish tissue data for PCBs and chlordane in largemouth and carp. Please consider listing the fish tissue data that were used to back-calculate the instream water concentration of PCBs or chlordane. This would help clarify whether the tissue concentrations were determined by averaging all data for both carp and channel catfish for each of the years identified. Did the state observe any changes in fish tissue concentrations from 1985 through 1995 that would support natural attenuation as the best alternative for the TMDL? Because the time frame is over ten years, the data may show a decreasing trend. An attempt should be made to evaluate time trending of PCB and chlordane levels in fish tissue.

**Response:** Average PCB and chlordane tissue levels were determined for each species using all samples. An estimated water column concentration was then calculated for each compound for each species. These estimated water column concentrations were averaged for each compound in order to provide a single estimated water column concentration for each parameter for the segment. The report has been revised to include this explanation. A listing of the fish tissue data is included in the final TMDL as Appendix A. The back-calculation was done to provide an estimated water column concentration for comparison to the water quality criteria because no current data are available. The important point for the TMDL is that the data show the criteria are most likely exceeded making a TMDL necessary.

The Department does not believe trend information based on the limited sampling results would be meaningful in this TMDL document.

**Comment:** TMDL Development/Endpoint Identification: The table also shows that the number of data sets are more than the number of years, suggesting that in one or more of the years listed, two or more sets of analytical data are available. The table should be modified to reflect the exact number of data sets available for each listed year.

**Response:** The Department does not believe that this detail is necessary because the data were averaged to determine the water concentration. A back-calculation was done to provide an estimated water column concentration for comparison to the water quality criteria since no current data are available. The important point is that the criteria are most likely exceeded; therefore a TMDL is necessary.

**Comment:** TMDL Development/Endpoint Identification: The background section suggests that the fish advisories issued for PCBs were only for carp and that the advisories for chlordane were only for largemouth bass. If this is true, the TMDL should be revised to reflect only the species and parameters that were listed in the advisories. Largemouth bass was not included in the fish consumption advisories for PCBs according to the background section.

**Response:** In addition to PCB, the carp data for Chartiers Creek showed exceedances of the FDA Action Level for chlordane. As a result, developing estimated water column concentrations for both compounds is appropriate. The text of the section has been clarified.

**Comment:** TMDL Development/Endpoint Identification: Estimated concentration values should be reported consistent with number rounding and mathematical significant figures protocols. An estimated value reported as 0.075 micrograms per liter is essentially the same as 0.07498 micrograms per liter.

**Response:** The document has been revised consistent with this comment.

**Comment:** TMDL Development/Endpoint Identification: The report states that the Southwest Field Office “searched for information on known existing or historical sources that might

contribute PCB or chlordane as an effluent limitation” as the first of two methods to locate sources of PCB or chlordane. The TMDL should indicate the details of the research.

**Response:** This comment appears to combine the two methods noted in the report. The first method listed in the TMDL was a file search for “known or historical sources that may contribute PCB or chlordane in or upstream from the fish advisory segment.” The second method, which is clearly defined, was “the EPA Permit Compliance System (PCS) database was searched for any major discharge permits containing PCB or chlordane as an effluent limitation.”

**Comment:** Source Assessment: A search of potential sites undergoing remediation under CERCLA, SARA TSCA or Pennsylvania’s Hazardous Site Cleanup Act (HSCA) should be conducted to locate potential PCB or chlordane sources.

**Response:** The Department acknowledges EPA’s assistance in looking for additional data, but in that search no additional data on potential sites of PCBs or chlordane were found.

**Comment:** Source Assessment: It appears that the stream codes for Chartiers and Little Chartiers Creeks have been transposed in some instances. The stream codes should be verified.

**Response:** The stream codes have been revised as necessary.

**Comment:** Source Assessment: This section provides a summary of CERCLA, SARA and HSCA in an apparent attempt to define the programs under which sediment remediation could occur. The TMDL implementation, however, relies on natural attenuation, so these discussions do not appear to be relevant.

**Response:** The discussions have been deleted as irrelevant.

**Comment:** Source Assessment: The report states, “Appropriate level of cleanup is difficult to determine. Removal of all contaminants is virtually impossible and exceedingly expensive. However, cleaning up to any other level raises issues of dose response, which links an amount of a contaminate to the resultant effect, which is difficult to accurately predict.” The word “contaminate” is used here instead of “contaminant.” The entire paragraph should be clarified, and may not be appropriate for this section.

**Response:** The paragraph has been deleted.

**Comment:** General: The proposed TMDL does not include a map depicting relevant features and information.

**Response:** The final TMDL contains a map.

**Comment:** TMDL Calculation, Little Chartiers Creek: The product of 46 square miles time 0.573191 results in 26.36 cubic feet per second, not 26.56 as stated in the report.

**Response:** This has been addressed by merging the Chartiers and Little Chartiers TMDLs. See the document.

**Comment:** Wasteload Allocations and Load Allocations, Chartiers Creek: The Discharge Monitoring Reports (DMR) summary table cited was not included in the TMDL or on the DEP web site. This should be included as part of the TMDL notice.

**Response:** This has been addressed in the final TMDL

**Comment:** Wasteload Allocations and Load Allocations, Chartiers Creek: The chlordane load allocation for Chartiers Creek is given as 0.0000415 lbs/day instead of 0.000415 lbs/day. Either the chlordane load allocation is ten times smaller than calculated or the load allocation value needs to be revised to reflect the calculations shown.

**Response:** This error has been corrected.

**Comment:** TMDL Summary Table: The table shows a PCB WLA of 0.000847 lbs/day. The total WLA for the Cooper Power Systems site alone is 0.001308 lbs/day. The WLA in the summary table is not consistent with the calculations presented in earlier sections. Finally, although the hard copy of the TMDL provided to EPA presents a TMDL value for chlordane of 0.000461 lbs/day, the version available on the DEP web site does not contain a TMDL value for chlordane.

**Response:** The errors have been corrected.

**Comment:** TMDL Implementation: Implementation relies on natural attenuation of the contaminated sediment. Existing fish tissue or sediment data demonstrating that this process is ongoing would support the reasonable assurance section of this TMDL.

**Response:** The TMDL discusses the CO&A for the point source as well as natural attenuation as implementation measures that will address the TMDL. Further detail on remediation may be the next step in implementation, but are not required parts of the TMDL.

**Comment:** Sediment Remediation: This section provides background information on the federal statutes and regulations that address sediment contamination and appears to have been pasted from another document without editing. The document indicates that a number of “criteria have been evaluated in order to determine the appropriate remedial actions for the sites of concern.” Throughout the TMDL, there is no mention or description of any specific sites of concern. This section should be revised as appropriate to include only information relevant to this TMDL.

**Response:** The TMDL has been revised as necessary to address this comment..

**Comment:** Sediment Remediation: The last paragraph states that there are no known “hot spots” in the advisory segment where sediment samples exceed 50 mg/kg. This suggests that sediment samples have been collected, but there is no mention of such sampling throughout the document.

**Response:** There are no known sediment data for the advisory portion of the receiving stream. The report has been revised to state that.

**Comment:** Monitoring: This section states that fish tissue monitoring will continue once every five years. First, other EPA-approved for comment TMDLs include monitoring of fish tissue every two years. Secondly, this section does not specify which fish species will be monitored and for what parameters. It suggests that both PCBs and chlordane will be monitored in both largemouth bass and carp. The report should be revised to indicate that the state will continue to monitor PCBs in carp tissue and chlordane in largemouth bass.

**Response:** Pennsylvania’s fish tissue monitoring program is generally based on a five-year sampling rotation. Only two streams, currently under No Kill regulations, are monitored every two years. This TMDL is for PCB and chlordane. Both of these compounds are included in the parameter list for the Department’s routine monitoring program. Any monitoring will attempt to target the species for which consumption advisories are in place, although obtaining target species is not always possible.

**Comment:** This section states that the Southwest Regional Office recommends collection of additional fish tissue data downstream of the Cooper Power Systems point source discharge. Based on the description, there are at least four point source discharges associated with this site and the word “discharge” should be changed to “discharges.” The parameters to be analyzed should be specified, and EPA recommends that upstream samples also be collected.

**Response:** Additional fish tissue collection by the Department or others is subject to available resources. If the recommendation can be undertaken, a sampling protocol would be developed.

## Appendix C

### References

Delaware River Basin Commission, Estuary Toxics Management Program. *Study of the Loadings of Polychlorinated Biphenyls from Tributaries and Point Sources Discharging to the Tidal Delaware River*. June 1998.

Hillery, et al. *Atmospheric Deposition of Toxic Pollutants to the Great Lakes as Measure by the Integrated Atmospheric Deposition Network*. Environmental Science and Technology, 1998.

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U.S. Environmental Protection Agency. 2000. Lake Michigan Mass Balance Study.

Cooper. Letter from Michael J. O'Brien to Pennsylvania Department of Environmental Protection. Regarding Revised 1999 Discharge Monitoring Reports, Outfalls 001 and 002, Former Cooper Power Systems Facility. January 28, 2000.

Cooper Industries. *Compliance Monitoring System Sampling Activities, First Semiannual 2000 Monitoring Event, Building 20/25 Area, Former Cooper Power Systems Facility, Canonsburg, Pennsylvania*. June 2000.

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Commonwealth of Pennsylvania, Department of Environmental Resources. *Authorization to Discharge Under the National Pollutant Discharge Elimination System, Permit PA0001937*. February 4, 1997.