3/7/01

Total Maximum Daily Load

PCB and Chlordane

Beaver River

New Brighton Dam to Mouth
Beaver and Lawrence 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 U.S. Environmental Protection Agency **(**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.

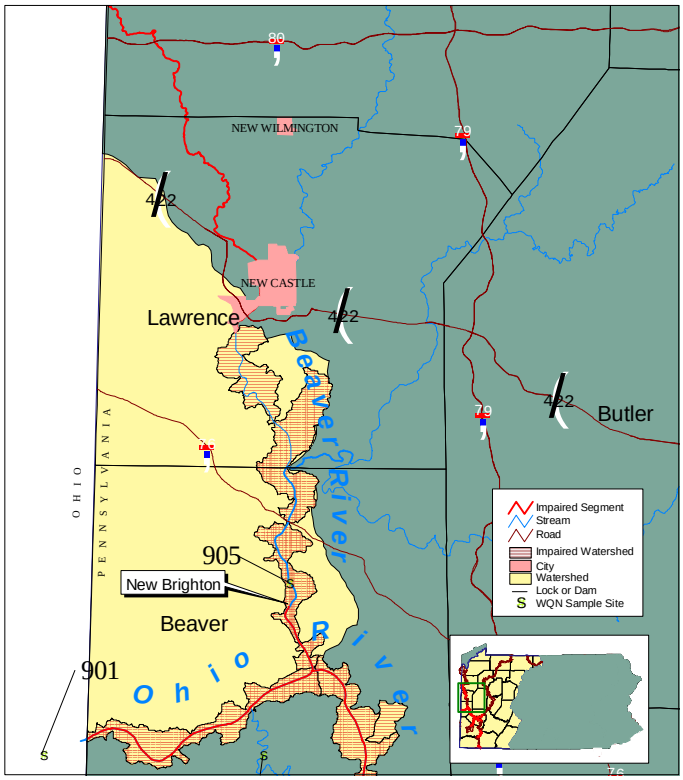
A number of Pennsylvania water bodies with fish consumption advisories were listed on the Clean Water Act Section 303(d) List of Impaired Waters for 1996. They were listed because long-term, unrestricted consumption of these fish could potentially lead to human health problems. This document addresses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

Background

This Total Maximum Daily Load (TMDL) applies to the Beaver River (Stream Code 33953), listed in Basin 20-B (River Mile 3.79) from the New Brighton Dam to the Mouth. The Beaver River was included on the 1998 Section 303(d) list [with ID 9927] as a high priority for TMDL development. The first advisory for Beaver River was issued in a statewide release on June 26,1986 due to a Chlordane concentration of 0.3 mg/kg or ppm. The most recent advisories have included both carp and channel catfish and listed both PCB and Chlordane as contaminants of concern. The advisory is written to be consistent with the advisory issued for the lower Allegheny and Monongahela Rivers and the Upper Ohio River. It was done to recognize the fact that fish can move throughout this area, so consumption advice should be consistent.

Driving Directions to the New Brighton Dam, which is the upstream boundary of the listed segment, are as follows:

1. Take I-76 West to Exit 2
2. Follow Rt. 18 South 4.5 miles to New Brighton



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 Beaver River.

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 Beaver River, 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 (1×10^{-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 Beaver River 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 stations. These stations are WQF33953-003.7 (Beaver River at Lat. 40° 44' 39" and Long. 80° 18' 59") and WQN Station #905 (Beaver River at RMI 5.4 miles; Bridge off SR0588 in Beaver County).

All samples results from the retrieval were either less than detection or no water column data could be found except for one sample in 1977 for which PCB was detected at 8 ug/l. 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 the Beaver River

Parameter	Fish Species	Number of Data Sets	Range of Years	Years
PCB	Carp	3	1985 - 1995	1985, 1994, 1995
	Channel Catfish	1	1995	1995
Chlordane	Carp	3	1985 - 1995	1985, 1994, 1995
	Channel Catfish	1	1995	1995

The average PCB levels in the Beaver River segment is as follows: Carp – 0.753 mg/kg and Channel catfish - 0.850 mg/kg. The estimated concentration of PCB in the water column is 0.02568 ug/L.

The average chlordane concentration in carp is 0.189 mg/kg and Channel catfish is 0.009 mg/kg. The corresponding estimated water column concentration for chlordane is 0.00702 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, such 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 Beaver River. 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 an effluent limitation for PCB or chlordane. No known point sources for PCB and Chlordane were found on the PCS. It is likely that the fish sampled on the Beaver River in this area migrated upstream from the Ohio River since there are no known sources of PCB and chlordane on this segment of the Beaver River.

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

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

Although analysis predicts that atmospheric deposition may provide a significant source of PCB load to the water body, volatilization from the water column and sediments is likely to result in continuing PCB loss from the water body, thereby reducing, or negating, the atmospheric load.

Hillery, et. al., (1998) found that the Great Lakes are currently experiencing a net loss of PCB. In each of the five Great Lakes, the net deposition of PCB is believed to be insignificant because gas transfer out of the lakes counteracts the flow into the lakes from wet and dry deposition. Similar processes are likely to be occurring in Pennsylvania water bodies.

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 nonthreshhold effect, an adverse impact that may occur at any exposure greater than zero. Such an effect is often related to long-term exposure to low levels of a particular chemical or compound, rather than an immediate effect due to a short duration exposure to a high level. As noted earlier, the Department's water quality toxics management program uses a cancer risk level of 1×10^{-6} to protect human health. Attainment of this risk level is predicated on exposure that includes drinking 2 liters of water and ingesting 6.5 grams of fish per day over a 70-year lifetime. The Department uses 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 Beaver River TMDLs utilizes the water quality criteria and flow data from the U.S. Geological Survey (USGS) surface water discharge station. This station is located in Beaver County "on the left bank at Beaver Falls, 200 ft upstream from pumping plant of Beaver Falls Municipal Authority, 7.0 mi. downstream from Connoquenessing Creek, and at mile 5.5". 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 (Qhm) from the USGS gage [03107500] used 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 Beaver River segment is 2175.15 cfs (calculated based on a Drainage Area of 3153 sq. miles multiplied by the Q_{HM} yield of 0.68987 cfs/mi^2).

The Segment Qhm 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 for Beaver River from the Brighton Dam to Mouth:

2175.15 cfs x 0.00004 ug/l = 0.087006 cfs x ug/l x 0.00539 = 0.000469 lbs/day.

The chlordane TMDL is calculated as follows:

2175.15 x 0.0005 ug/l = 1.0876 cfs x ug/l x 0.00539 = 0.00586 lbs/day.

The Total Maximum Daily Load of PCB for this segment of the Beaver River 0.000469 lbs/day.. The chlordane TMDL is 0.00586 lbs/day.

Percent Reduction for Beaver River (Brighton Dam 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:

% Reduction = (1 - 0.00004/0.02568) x 100
% Reduction = (1 - 0.00156) x 100 = 99.84 %

The percent reduction for chlordane is:

% Reduction = (1 - 0.0005/0.00702) x 100
% Reduction = (1-0.07123) X 100 = 92.89 %

Overall reductions of 99.84% for PCB and 92.9% 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 0.0000469 lbs/day and for chlordane of 0.000586 lbs/day. The remaining allocation applies to all sources for the Beaver River segment from Brighton Dam 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 Beaver River from the New Brighton Dam to the Mouth, and the dam provides a barrier to fish movement.

Since there are no known point sources of PCBs, the PCB load is contributed by non-point sources and may be introduced to surface water through contaminated ground water, surface runoff, or contaminated sediment. 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. Because of this and because there is no way to accurately quantify loadings from groundwater or erosion, the remaining PCB load of 0.000422 pounds per day is assigned to a Load Allocation for the instream sediment for the Beaver River segment from the New Brighton Dam to Mouth.

Because there are no known point sources of Chlordane to this segment of the Beaver River, 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 Beaver River is assigned to Load Allocation (LA) for the instream sediment. For

the Beaver River segment from Brighton Dam to Mouth the Chlordane Load Allocation (LA) is 0.00527 pounds per day.

TMDL Summary

The TMDLs for the Beaver River segment from Brighton Dam (RMI 3.79) to the Mouth (RMI 0.0) can be summarized as follows:

Beaver River Brighton Dam to Mouth				
Pollutant	**TMDL (lbs/day)**	**WLA (lbs/day)**	**LA (lbs/day)**	**MOS (lbs/day)**
PCBs	0.000469	0	0.000422	0.0000469
Chlordane	0.00586	0	0.00527	0.000586

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 Beaver River. 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 use of both PCB and Chlordane has been banned in the United States, so there should be no new point sources to which controls can be applied. PCB and chlordane present in the main stem of Beaver River 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 then 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 Beaver River segment outlined above, long-term natural attenuation is the best alternative.

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 there 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 Channel catfish and carp tissue in this reach of the Beaver River. 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 Beaver River 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. The comments centered on "implementation" issues of the TMDLs. These comments were addressed**.** 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. Notice of final TMDL approval will be posted on the Department website.

Appendix B

COMMENT AND RESPONSE ON THE PROPOSED PCB/CHLORDANE TMDL FOR THE BEAVER RIVER

EPA Region III

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

Response: The final TMDL contains a map.

Comment: TMDL Development/Endpoint Identification: 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?

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 three tissue data points for carp show little change in the concentration of PCB, but a large decline in chlordane. The current advisory is based on the PCB level, and is consistent with the advisory for the upper Ohio River because fish can move freely between the two rivers. The channel catfish advisory is based on one data point, so no trend can be discerned.

Comment: TMDL Development/Endpoint Identification: PA DEP found that insufficient STORET data were available within a five-mile radius of the fish tissue sampling stations to estimate water column concentrations for PCBs or chlordane. The TMDL should specify whether PA DEP searched for STORET data in any other portions of the listed segment to support the water column concentration estimates. Also, the TMDL should specify the analytical detection limit for those results that were reported as less than detection and whether the analytical results were only for PCBs.

Response: The 5-mile radius for the STORET search was chosen as representative of the fish advisory segment, and supplemented the file search conducted by the Southwest Field Office. .

Documentation of the search illustrates that the data are old (from 1974, 1975, 1977 and 1979) and are not representative of current conditions. The STORET retrieval request included both PCB and chlordane. Therefore, the detection limits for non-detectable PCB and chlordane are not relevant. Only one detection, for PCB, was found and it is noted in the report.

Comment: Source Assessment: PA DEP indicates that known point sources of PCBs or chlordane must obtain an NPDES permit, but does not identify these potential sources. The report notes that several potential nonpoint sources have been identified, but they are not listed. Furthermore, the report states that no data are available to quantify the potential nonpoint source loads. Non-detect readings for effluent, soil or ground water samples may not be sufficient to omit point or nonpoint sources from the TMDL analysis. Current testing techniques lack the precision necessary to accurately quantify levels that could ensure compliance with the water quality criteria for PCBs. If the point sources can demonstrate they are no longer accepting any discharge potentially containing PCBs or chlordane, their removal from the TMDL can be justified. Otherwise, the TMDL analysis and allocation should be revisited to consider the impact of point sources.

Response: The report states in at least two places that there are no known point sources of PCBs or chlordane. Non-detect readings are the readily available data supporting the TMDL. In the absence of data, it is not correct to assume non-compliance with water quality standards and attempt to refine allocations.

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

Response: The Department acknowledges EPA's assistance in looking for additional data, but no additional data on potential sites of PCBs or chlordane were found. This statement has been added to the text.

Comment: Source Assessment: The relevance of the statewide ground water and soil loading standards to the TMDL is not clear. They should have no effect on the assessment of attainment of the PCB or chlordane criteria. The relevance of the CERCLA/SARA program information is unclear. Have uncontrolled sites been identified as potential sources of PCBs or chlordane?

Response: The discussions have been deleted as irrelevant.

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: Thank you for this perspective. The Department believes implementation is best addressed under the lead of local citizen groups, following completion of the TMDL.

Comment: TMDL Implementation/Sediment Remediation: The report notes that the major fate process for PCBs and chlordane is adsorption to soil and sediment organic matter. However, only contaminants moving to lower layers of the sediment may be effectively sequestered. Otherwise, the sediments may act as an environmental reservoir, and any hydrologic processes that disturb or scour sediments also act to redistribute contaminants. The dam structures should be included in the TMDL analysis as they may act to trap the majority of sediments from reaching the downstream impaired segments of the Beaver River. In addition, given that volatilization is a significant environmental transport process for dissolved PCBs, the presence of a dam or other feature that may increase aeration rates could act to decrease PCBs in the water column prior to the impaired segment.

Response: The comment suggests that instream concentrations of the contaminants may be less than expected because of possible resuspension in the water column and volatilization. There are no data to adequately characterize the water column concentrations and the TMDL states that estimating from fish tissue concentrations (as was done) likely over-estimates the water concentration. Because movement of the fish is prohibited to upstream of the dam, there is no reason to address concentrations of PCB or chlordane (even if there were data) that may exist above the dam.

Comment: TMDL Implementation/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. This section should be revised to include only information relevant to this TMDL.

Response: The Department has revised the TMDL accordingly.

Comment: TMDL Implementation/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 amended to state that.

APPENDIX C

References

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