



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

**Decision Rationale**  
**Total Maximum Daily Loads**  
**Bernhart Creek Watershed**  
**For Lead**  
**Berks County, Pennsylvania**

*John Armstead for*

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**Jon M. Capacasa, Director**  
**Water Protection Division**

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**I. Introduction**

The Clean Water Act (CWA) requires that Total Maximum Daily Loads (TMDLs) be developed for those waterbodies identified as impaired by the state where technology-based and other controls will not provide for attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a margin of safety (MOS) that may be discharged to a waterbody without exceeding water quality standards.

The Pennsylvania Department of Environmental Protection (PADEP) Bureau of Watershed Management electronically submitted the Bernhart Creek TMDL (TMDL Report) to the U.S. Environmental Protection Agency (EPA) for final Agency review and was received on March 9, 2007. This report includes the TMDL for lead and addresses one segment on Pennsylvania's 1996 Section 303(d) list of impaired waters.

EPA's rationale is based on the TMDL Report and information contained in the attachments to the report. EPA's review determined that the TMDL meets the following eight regulatory requirements pursuant to 40 CFR Part 130:

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

**II. Background**

The Bernhart Creek Watershed, 4.4 square miles in area, is located in southeastern Pennsylvania in central Berks County, just north of the city of Reading. The mainstem of Bernhart Creek flows through an industrial area near Reading, Pennsylvania. The watershed includes an unnamed tributary that flows through the industrial area and receives a stormwater discharge from a lead smelting facility before its confluence with Bernhart Creek. From a point near the crossing of Kutztown Road and State Route 12 to its discharge into the Schuylkill River, Bernhart Creek is piped underground through an urban area.

Table 1 presents the 1996, 1998, 2002, and 2004 Section 303(d) listing information for

the impaired segment first listed in 1996.<sup>1</sup>

**TABLE 1. SECTION 303(D) LISTINGS FOR BERNHART CREEK, PENNSYLVANIA**

STATE WATER PLAN (SWP) SUBBASIN 03-C						
Year	Segment ID	Stream Code	Stream Name	Data Source	Source	Cause
1996		01978	Bernhart Creek	TMDL Model	Industrial Point Sources	Dissolved Solids, Metals
1998	6389	01978	Bernhart Creek	SWMP	Industrial Point Sources	Salinity/TDS/Chlorides, Metals
2002	6389		Bernhart Creek	SWMP	Industrial Point Sources	Salinity/TDS/Chlorides, Metals
2004	6389	01978	Bernhart Creek	SWMP	Industrial Point Sources	Salinity/TDS/Chlorides, Metals

SWMP = Surface Water Monitoring Program

Bernhart Creek was identified on Pennsylvania's 1996 Section 303(d) list of impaired waters and counts toward the tenth year (2007) non-mining TMDL milestone commitment under the requirements of the 1997 TMDL lawsuit settlement agreement.

TMDLs are defined as the summation of the point source WLAs, plus the summation of the nonpoint source LAs, plus a MOS and are often shown as follows:

$$\text{TMDL} = \sum \text{WLAs} + \sum \text{LAs} + \text{MOS}$$

The TMDL is a written plan and analysis established to ensure that a waterbody will attain and maintain applicable water quality standards. The TMDL is a scientifically-based strategy which considers current and foreseeable conditions, utilizes the best available data, and accounts for uncertainty with the inclusion of a MOS value. Since conditions, available data, and the understanding of natural processes can change more than anticipated by the MOS, there exists the option of refining the TMDL for resubmittal to EPA.

### ***Impairment Assessment***

As part of the TMDL development process, PADEP conducted a source assessment to confirm the cause(s) of impairment as identified on the 1996 Section 303(d) List and to characterize the potential sources and contributions of those pollutant causes. In 2006, PADEP

<sup>1</sup> Pennsylvania's 1996, 1998, 2002, and 2004 Section 303(d) lists were approved by the Environmental Protection Agency (EPA). The 1996 Section 303(d) list provides the basis for measuring progress under the 1997 lawsuit settlement of *American Littoral Society and Public Interest Research Group of Pennsylvania v. EPA*.

collected instream water quality data and assessed the streamflow in Bernhart Creek and the Unnamed Tributary (UNT) to Bernhart Creek to determine the current water quality. Samples from six strategically-selected sampling locations were analyzed for metals (full metals sweep), and some samples were also analyzed for total dissolved solids, hardness and chlorides. These results, along with other data collected by PADEP, are included in Attachment A of the TMDL Report.

For the 1996 “dissolved solids” and subsequent “salinity/TDS/chlorides” listings, PADEP found that the segment is currently meeting the applicable water quality criterion and that a TMDL is no longer necessary for this pollutant cause. When Bernhart Creek was originally assessed for the 1996 Section 303(d) List, the segment was receiving an industrial wastewater discharge from the Exide Technologies Corporation facility that contained very high concentrations of CaCO<sub>3</sub>. However, this discharge has since moved to the main stem of the Schuylkill River.

In identifying the specific metals parameter(s) causing an impairment to Bernhart Creek, PADEP found that half of the 37 samples exhibited lead exceedances, and that no other metals were in violation of criteria levels. As such, PADEP developed a TMDL to address high levels of lead to address the original “metals” listing.

The *Contaminant Source Assessment* Section of the TMDL Report describes the status and operations of the potential sources within the watershed. According to PADEP, there are six National Pollutant Discharge Elimination System (NPDES) permitted discharges (three domestic and three industrial wastewater discharges) within the Bernhart Creek Watershed. Laureldale Borough has a municipal separate storm sewer system (MS4) with 6 outfalls into an unnamed tributary to Bernhart Creek. Additionally, there are historic discharges and other contamination sources from past practices that may have contributed additional loadings of lead to the watershed. Of these sources, PADEP indicates that the Laureldale Borough MS4 and the Exide Technologies lead smelting facility are the only permitted point source discharges containing metals in the watershed. Both facilities discharge stormwater runoff into the UNT to Bernhart Creek.

It is appropriate to mention that the Exide Technologies facility used to discharge industrial wastewater to Bernhart Creek, but it has since moved this discharge to the main stem of the Schuylkill River. There is also currently a stormwater outfall that discharges untreated groundwater and stormwater from the site into UNT to Bernhart Creek after the first flush (the first 277,500 gallons of water that run off from the site during a storm event) of stormwater has been collected. Water collected during the first flush is treated at the onsite wastewater treatment plant before being discharged to the Schuylkill River by way of the City of Reading storm sewer system. First flush stormwater collection is designed to reduce the total load entering the stream and was implemented because stormwater runoff from the site is contaminated with lead.

### **III. Discussions of Regulatory Requirements**

EPA has determined that these TMDLs are consistent with statutory and regulatory requirements and EPA policy and guidance.

1. *The TMDL is designed to implement the applicable water quality standards.*

Water quality standards are state regulations that define the water quality goals of a waterbody. Standards are comprised of three components: (1) designated uses, (2) criteria necessary to protect those uses, and (3) antidegradation provisions that prevent the degradation of water quality. To protect the designated aquatic life uses as well as the existing use, the chronic lead water quality criterion shown in Table 2 apply to the waterbody. The *TMDL Endpoints* Section of the TMDL Report goes into detail about the applicable criteria.

**TABLE 2. APPLICABLE WATER QUALITY CRITERION**

Parameter	Criterion Value (mg/l)	Total Recoverable/ Dissolved
Lead	$\{1.4623 - (\ln[H] \times 0.145712)\} \times e^{(1.273 \times \ln[H] - 4.705)}$	Total Recoverable
	Based on measured hardness, PADEP determined that CCC = 3.51 ug/l	
Where $\ln[H]$ = natural log of the hardness concentration expressed in mg/l E = 2.71828 PADEP determined an average hardness for Bernhart Creek to be 108 mg/l.		

Pennsylvania Title 25 §96.3(c) requires that water quality criteria be achieved at least 99% of the time. Therefore, the TMDL and allocations are expressed as long-term average daily concentrations to meet these requirements. Also, PADEP analyzed the TMDL data over a range of flows despite using a  $Q_{7-10}$  flow to develop the total allowable load. EPA finds that the TMDL will attain and maintain the applicable numeric water quality standards.

2. *The TMDL includes a total allowable load as well as individual WLAs and LAs.*

In determining the total allowable load for Bernhart Creek, PADEP used the  $Q_{7-10}$  flow. Pennsylvania Code, Title 25, Chapter 96.4(g) states that the design flow condition for the development of TMDLs involving point sources is  $Q_{7-10}$ , which Pennsylvania defines as the lowest average flow that is experienced for 7 continuous days with a recurrence interval of 10 years. The use of  $Q_{7-10}$  flows for traditional point source discharges of sewage or industrial wastewater also accounts for critical conditions, but the TMDL Report recognizes that such flows may not represent the critical condition in cases where there is stormwater runoff. Despite this recognition, the  $Q_{7-10}$  was used in order to achieve the water quality criteria in the surface water at least 99% of the time as per regulations at Chapter 96.3.

The  $Q_{7-10}$  was calculated for Bernhart Creek as 1.056 cfs or 0.68 MGD by using the unit area flow rate from the U.S. Geologic Survey Schuylkill River gauge at Bern and applying this

value to the drainage area of Bernhart Creek (the TMDL Report presents the details to these calculations). PADEP then used the Q<sub>7-10</sub> flow for Bernhart Creek with the site-specific lead criterion based on measured hardness values to determine the total maximum daily load of lead allowable to attain water quality standards. The TMDL Report notes that discharges that create additional flow in the stream may discharge total contaminant loads greater than the established total maximum daily load if the contaminant concentration in the discharge is less than or equal to the established water quality criterion for the specific contaminant.

Table 3 summarizes the elements of the TMDL as determined by PADEP. EPA notes that these TMDL and allocations were developed based on conservative assumptions and approaches. As states have the discretion to identify allowable loadings more stringent than federal requirements, EPA finds the total allowable load, WLA and LA all to be acceptable.

**TABLE 3. LEAD TMDL SUMMARY FOR THE BERNHART CREEK WATERSHED**

<b>WLA (lbs/day)</b>	<b>LA (lbs/day)</b>	<b>MOS (lbs/day)</b>	<b>TMDL (lbs/day)</b>
0	0.02	Implicit	0.02

B. Load Allocations (LAs)

According to Federal regulations, 40 CFR §130.2(g), LAs are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. For Bernhart Creek, PADEP assigned the entire allowable load to the LA portion of the TMDL, as explained in the TMDL Report.

PADEP examined the relationship between observed lead concentrations and flow conditions in Bernhart Creek and concluded that nonpoint sources were present during all flow conditions. PADEP calculated the mean flow of Bernhart Creek to be 8.8 cfs using the same methodology used to calculate the Q<sub>7-10</sub> flow. Water quality samples were collected during flows ranging from around 3 to 11 cfs, and lead violations occurred at both dry and wet weather flows. As such, the instream water quality was evaluated for both flow conditions.

The TMDL Report describes the circumstances, weather conditions, and flow conditions under which samples were collected. While PADEP collected instream water quality samples under dry weather conditions, the Exide Technologies facility was not reported to be actively discharging. Further, the Laureldale Borough MS4 generally discharges during and for a short time after rain events. However, the sample results for lead collected during dry weather conditions indicated that the instream lead concentration exceeded the lead criterion on a regular basis; violations occurred during periods of no discharge. Similarly, PADEP found that lead concentrations were above criteria in samples collected during high flow conditions at stations outside of the influence of point sources.

B. Wasteload Allocations (WLAs)

For purposes of this TMDL only, point sources are identified as permitted discharge

points or discharges having responsible parties, and nonpoint sources are identified as any pollution sources that are not point sources. As mentioned above, there are six NPDES discharges and one MS4 within the Bernhart Creek Watershed. Small MS4s are now considered point sources under EPA’s Phase II NPDES Stormwater Regulations and therefore are addressed by the WLA portion of the TMDL.

EPA interprets the absence of an individual WLA to mean zero discharge. Federal regulations at 40 CFR 122.44(d)(1)(vii)(B) require that NPDES permit effluent limits to be consistent with the assumptions and requirements of the approved WLA. Should any facility apply for NPDES expansion or coverage within the watershed, the TMDL and allocations should be revisited prior to permit issuance. The WLAs and affected permittees are listed in Table 4 below.

**TABLE 4. WLA SUMMARY FOR THE BERNHART CREEK WATERSHED**

<b>Permittee</b>	<b>NPDES Permit</b>	<b>WLA (lbs/day)</b>
Glidden Paint	PA0042137	0
Berks Products	PA0085090	0
Exide Technologies	PA0014672	0
Laureldale Borough	PAG133518	0

3. *The TMDL considers the impacts of background pollutant contributions.*

The TMDL accounts for the various sources of lead contributions within the watershed in the total load assigned to nonpoint sources. Namely, these sources may include, but are not limited to, streambed sediment leaching, contaminated groundwater, and stormwater runoff.

4. *The TMDL considers critical environmental conditions.*

The reductions specified in the TMDL apply at all flow conditions. PADEP’s use of the Q<sub>7-10</sub> flow to derive the total allowable load considers critical conditions.

5. *The TMDL considers seasonal environmental variations.*

Instream water quality data used to inform the TMDL development process was collected on days representing different seasons and different flow conditions, thereby accounting for seasonal variation implicitly.

6. *The TMDL includes a MOS.*

PADEP expressed the MOS implicitly by deriving the total allowable load from the Q<sub>7-10</sub> flow and requiring that the stated allocations apply at all flow conditions.

7. *There is reasonable assurance that the proposed TMDL can be met.*

As TMDLs represent an attempt to quantify the pollutant load that may be present in a waterbody and still ensure attainment and maintenance of water quality standards, the Bernhart Creek TMDL identifies the necessary overall load reductions currently causing use impairments and distributes those reduction goals to the appropriate sources.

For point sources, Federal regulations require effluent limitations for an NPDES permit to be consistent with the assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA. Therefore, the WLAs identified in the TMDL must be incorporated into the above-listed NPDES permits upon reissuance.

The TMDL Report also includes a *Recommendations* Section that advocates the continuation of efforts to clean up the air, soil and water within the Bernhart Creek Watershed so as to eventually eliminate nonpoint sources of lead.

8. *The TMDLs have been subject to public participation.*

Public notice of the draft TMDL was published in the *Pennsylvania Bulletin* on February 3, 2007, to foster public comment on the calculated allowable loads. A public comment period of 30 days was provided to the public, and a public hearing was held in Leesport, Pennsylvania to discuss the proposed TMDL. Comments were received from three individuals representing the Berks County Environmental Advisory Council, Berks County Agricultural Center, Berks County Environmental Advisory Counsel Applications Committee, and Exide Technologies Corporation. These comments were incorporated into the final TMDL Report as appropriate, and PADEP's responses are included as Attachment C of the TMDL Report.

Although not specifically stated in the TMDL Report, PADEP routinely posts the approved TMDL Reports on their web site: [www.dep.state.pa.us/watermanagement\\_apps/tmdl/](http://www.dep.state.pa.us/watermanagement_apps/tmdl/).