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

Decision Rationale
Total Maximum Daily Load
For Sediment and Nutrients
Little Cacoosing Creek Watershed

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Jon M. Capacasa, Acting Director
Water Protection Division

Date: ________________

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Berks County, Pennsylvania

I. Introduction

This document will set forth the Environmental Protection Agency's (EPA's) rationale for approving the Total Maximum Daily Load (TMDL) for nutrients and sediment in the Little Cacoosing Creek Watershed in Berks County, Pennsylvania. TMDLs for sediment and phosphorus were developed for the Little Cacoosing Creek watershed. The document was submitted by the Pennsylvania Department of Environmental Protection (PADEP) and received by EPA on March 10, 2003 for final review. Our rationale is based on the TMDL document and information contained in Appendices to the document to determine if the TMDL meets the following eight regulatory conditions pursuant to 40 CFR §130.

1) The TMDL is designed to implement applicable water quality standards.
2) The TMDL includes a total allowable load as well as individual waste load allocations (WLA) and load allocations (LA).
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 margin of safety (MOS).
7) There is reasonable assurance that the TMDL can be met.
8) The TMDL has been subject to public participation.

II. Summary

The Little Cacoosing Creek watershed encompasses 7.9 square miles. Landuse in the watershed is dominated by agriculture (71%) with the remainder of the land forested. The entire basin, including its tributaries, is designated as a Warm Water Fisheries (WWF) as listed in 25 PA Code Chapter 93, Section 93.9f.

As a result of a special Non-point Source Survey that included one time chemical and biological sampling, 4.1 miles of the Little Cacoosing Creek basin was placed on the 1996 Clean Water Act (CWA) Section 303(d) list of water quality impaired water bodies. The 1998 list showed a slight change in mileage due to a GIS based recalculation. Additional sampling in the form of an aquatic biological survey using kick-screen analysis and habitat surveys, was conducted in June 2001 as part of PADEP's Unassessed Waters Program, and in anticipation of TMDL development found designated use impairments in the entire Little Cacoosing Creek Watershed, including several un-named tributaries.

Streams and the impairments addressed by the TMDLs for the Little Cacoosing Watershed are listed in Table 1.

Table 1. Indication of Waters for which TMDLs were Developed in the Little Cacoosing Watershed are Represented on the 1996, 1998 and 2002 303(d) List

Stream Name (stream code)	GIS Key	Miles	Year of 303(d) List	Source	Cause
Little Cacoosing (1853)	--	4.4	1996	Agriculture	Nutrients
Little Cacoosing (1853)	375 (segment ID)	4.69	1998	Agriculture	Nutrients
Little Cacoosing	20010629-0930-JPH	12	2002	Agriculture	Sediment and Nutrients

Section 303(d) of the CWA and its implementing regulations require a TMDL to be developed for those water bodies identified as impaired by the state where technology-based and other controls did not provide for attainment of water quality standards. These TMDLs were developed to address the impairments caused by excess sediment and nutrients in waters of the Little Cacoosing Creek basin.

According to Federal regulations at 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. Table 2 summarizes the elements of the TMDLs for phosphorus and sediment developed by PADEP. Despite the fact that EPA believes that annual loads are an appropriate measure for these TMDLs, for the sake of consistency we are breaking the annual TMDL loads down into daily loads.

Table 2. Summary of TMDLs for the Little Cacoosing Creek Watershed

Watershed	Pollutant	LA	WLA	MOS	TMDL		Existing Load	% Reduction
		lbs/yr	lbs/yr	lbs/yr	lbs/yr	lbs/day		
Little Cacoosing Creek	Phosphorus	1697.00	0	188.56	1,886	5	3,411	45%
	Sediment	914,372.55	0	101,596.95	1,015,967	2,783	1,406,126	28%

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

III. Discussion of Regulatory Conditions

EPA finds that Pennsylvania has provided sufficient information to meet all of the eight basic requirements for establishing phosphorus and sediment TMDLs for tributaries in the Little Cacoosing Creek basin. EPA therefore approves the TMDLs and information contained in the appendices for phosphorus and sediment in the Little Cacoosing Creek basin. EPA's rationale for approval is set forth according to the regulatory requirements listed below.

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

Water Quality Standards consist of three components: 1)designated and existing uses; 2) narrative and/or numerical water quality criteria necessary to support those uses; and 3) an antidegradation statement. The designated use of the entire Little Cacoosing Creek basin is Warm Water Fishery. Pennsylvania does not currently have numeric water quality criteria for nutrients (nitrogen or phosphorus) or sediments. Therefore, Pennsylvania utilized it's general water quality criteria, which states "water may not contain substances attributable to point or nonpoint source waste discharges in concentrations or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant, or aquatic life"[1], to establish an endpoint for phosphorus and sediment such that the designated uses of the Little Cacoosing Creek watershed are attained and maintained.

In order to numerically express this endpoint consistent with the general water quality criteria, PADEP uses a Reference Watershed approach in combination with the AVGWLF[2] watershed loading model. The reference watershed is representative of the conditions required for the impaired watershed to meet is designated uses. This representative condition is analyzed to determine an appropriate level of nutrient and sediment loading to the water body. The Reference Watershed approach consists of comparing the biologically impaired watershed with a reference watershed that is meeting its designated uses for aquatic life to determine an appropriate level of nutrient and sediment loading to the water body. This approach is based on comparing the impaired watershed to one with similar designated uses, geology, landuses, physiographic province, land area, soils, and meteorological patterns. The AVGWLF model provides a powerful and accurate means of estimating the dissolved and total nutrient loadings to a stream from complex watersheds with added GIS capabilities. The model provides monthly stream flow, soil erosion, and sediment yield values and includes both surface runoff and groundwater sources as well as nutrient loads from point sources and onsite wastewater disposal (septic) systems[3]. Calibration of this model is not required, however, it has been applied and validated to an 85,000 hectare watershed in upstate New York. The rationale of this method is that achieving nutrient and sediment loadings in the impaired watershed similar to those loadings of the reference watershed will ensure that the impaired watershed will attain and maintain it's designated uses and general water quality criteria.

An upper portion of the Cacoosing Watershed is used as the reference watershed for comparison with the Little Cacoosing Creek Watershed to develop the sediment and phosphorus TMDLs. Table 3 below compares these watersheds. EPA finds the use of the upper portion of the Cacoosing Creek Watershed as reference watersheds to be reasonable for these TMDLs.

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[1] Pennsylvania Code, Title 25., Environmental Protection, Chapter 93. Water Quality Standards, Section 93.6(a).

[2] Arcview Generalized Watershed Loading Function model, the Environmental Resources Research Institute of Pennsylvania State University's Arcview based version of the GWLF model developed by Cornell

[3] Haith, D.A., R. Mandel and R.S. Wu, Generalized Watershed Loading Functions, Version 2.0, Cornell University, Dec. 15, 1992.

Table 3. Comparison Between Little Cacoosing Subwatersheds and Reference Watersheds

ATTRIBUTE	LITTLE CACOOSING	REFERENCE
Physiographic Province	Ridge and Valley 92.1% New England 7.9%	Ridge and Valley 57% Piedmont 39% New England 5%
Area (square miles)	7.9	9.3
Predominant Land Use	Agriculture 71% Forested 26% Development 2% Wetlands/water bodies 1%	Agriculture 41% Forested 46% Development 12% Wetlands/water bodies 1%
Predominant Geology		
Carbonate (%)	53%	43%
Average Precipitation (in)	42.4	43.5

Using the continuous simulation AVGWLF model, PADEP modeled the nutrient and sediment loads originating from nonpoint sources in the reference watersheds. As previously mentioned, AVGWLF has the ability to estimate dissolved and total monthly nutrient loads to streams from watersheds including surface runoff, groundwater sources, point sources, septic systems, monthly streamflow, soil erosion and sediment yield values. In order to make these estimates, AVGWLF requires daily precipitation and temperature data, runoff sources and transport and chemical parameters. The AVGWLF model is a combined distributed/lumped parameter watershed model. In terms of surface loading, this means that the model allows the user to distribute multiple landuse/cover scenarios in the watershed, however, the loads originating from the watershed are lumped and spatial routing of nutrient and sediment loads is not available. In terms of sub-surface loading, the load contributions from sub-surface areas are not distinct and are considered lumped using a water balance approach. The AVGWLF model relies on the Soil Conservation Service Curve Number (SCS-CN)to estimate surface runoff and the Universal Soil Loss Equation (USLE) to estimate erosion and sediment yield. Monthly estimates of nutrient and sediment loadings, applicable to each watershed, are generated by using watershed specific local daily weather inputs and USLE factors[4]. The following average existing load values for sediment, illustrated in Table 4, were determined for upper portion of the Cacoosing Creek reference watershed, and the Little Cacoosing Creek Watershed using watershed specific data**.**

[4] Local daily weather inputs include temperature and precipitation. The USLE factors are KLSCP; K=changes in soil loss erosion, LS=length slope factor, C=vegetation cover factor, P=conservation practices factor.

Table 4. Existing sediment loading values for the reference watersheds and the Little Cacoosing Creek watershed

	Area (acres)	Sediment Load lbs/yr	Unit Area Sediment Loading Rate lbs/acre/yr
Little Cacoosing Creek Watershed	4,962	1,406,126	283.38
Upper Cacoosing Creek Watershed	5,876	1,203,156.40	204.75

Table 5 illustrates the average existing load values for phosphorus as determined for the reference watersheds and the Little Cacoosing Creek watershed using watershed specific data.

Table 5. Existing phosphorus Load Values for the Reference Watersheds and the Little Cacoosing Creek Watershed.

	Area (acres)	Total Phosphorus lbs/year	Unit Area P Loading Rate lbs/acre/yr
Little Cacoosing Creek Watershed	4,962	3,411.62	.69
Upper Cacoosing Creek Watershed	5,876	2,226.55	.38

Although both nutrients (phosphorus and nitrogen) are listed as the causes of impairment and are subsequently modeled, only a TMDL for phosphorus is being established to help restore the designated uses of the Little Cacoosing Creek basin. This is due to PADEP's finding that phosphorus is the limiting nutrient in all waters of the Little Cacoosing Creek basin. Phosphorus is often the major nutrient in shortest supply and is frequently a prime determinant of the total biomass[5]. It is also the most effectively controlled using existing engineering technology and landuse management[6]. EPA finds this to be a reasonable determination.

The final step in the process is to determine the appropriate pollutant loading for each water. For the Little Cacoosing Creek watershed the values generated for sediment and phosphorus loading were based on those found in the reference upper portion of the Cacoosing Creek Watershed. In the

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[5] U.S. EPA. 1980. Modeling Phosphorus Loading and Lake Response under Uncertainty: A Manual and Compilation of Export Coefficients. EPA 440/5-80-011.

[6] Id.

process of determining the total phosphorus and sediment loadings in the reference watersheds, a unit area loading coefficient for the parameter of concern was calculated. Those aerial loading coefficients were applied to the Little Cacoosing Creek watershed to determine the allowable (TMDL) sediment and phosphorus loadings. EPA finds this application reasonable to implement the applicable water quality standards.

Table 6 illustrates the sediment TMDL calculations. The target TMDL value for sediment is determined by multiplying the unit area loading value of the reference watershed by the total area in acreage of the impaired watershed.

Table 6. Sediment TMDL Calculations

Watershed	Unit Area Loading Rate in Reference Upper Portion of the Cacoosing Watershed (lbs/acre/year)	Total Watershed Area in Impaired Little Cacoosing Creek (acres)-	TMDL Value for Sediment (lbs/year)
Little Cacoosing Creek	204.75	4,962	1,015,969.50

Table 7 illustrates the phosphorus TMDL calculations. The target TMDL value for phosphorus is determined by multiplying the unit area loading value of the reference watershed by the total area in acreage of the impaired watershed.

Table 7. Phosphorus TMDL Calculations

Watershed	Unit Area Loading Rate in Reference Upper Portion of the Cacoosing Watershed (lbs/acre/year)	Total Watershed Area in Impaired Little Cacoosing Creek (acres)	TMDL Value for Phosphorus (lbs/year)
Little Cacoosing Creek	.38	4,962	1,885.56

2) The TMDLs include a total allowable load as well as individual WLAs and LAs.

Tables 2, 6, and 7 indicate the total allowable loads for phosphorus and sediment as determined using the Reference Watershed approach and the AVGWLF model.

Waste Load Allocations

Pennsylvania indicates that there are no known point source discharges of sediment in the Little Cacoosing Creek watershed. Therefore, the WLA is set at zero for both the nutrient and sediment TMDLs.

Load Allocations

The TMDLs include LAs for nonpoint sources. According to Federal regulations, 40 CFR §130.2(g), load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. The AVGWLF process enables the LA to be distributed to sources based on landuse type.

The process of allocating phosphorus and sediment loads to distinct landuses in the Little Cacoosing Creek basin begins by subtracting 10% from the TMDL value for the MOS. For example, the allocable load for sediment in the Little Cacoosing Creek Watershed of 1,015,969 lbs/year is reduced by 101,596 lbs/year to 914,372.55 lbs/year (1,105,969 lbs/year x 0.1 = 101,596 lbs/year). The allocable load for phosphorus is also reduced by 10% to allow for a MOS. See below for further discussion on the application of a MOS in TMDLs.

As discussed earlier, LAs for phosphorus and sediment were determined by multiplying the unit area loading rate for phosphorus of the reference upper portion of the Cacoosing Watershed by the total area in the Little Cacoosing Creek Watershed. To determine the distribution of the sediment and/or phosphorus LA between contributing land based sources, PADEP uses a method called the Equal Marginal Percent Reduction (EMPR)[7]. This method equitably assigns the largest contributing source, the greater reduction requirements. Table 8 shows the LAs of sediment in the Little Cacoosing Creek Watershed. The table shows the overall average reductions in sediment for each landuse and is useful in demonstrating the EMPR method employed by PADEP to distribute the allocable loads of phosphorus and sediment in these TMDLs.

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[7] Pennsylvania Department of Environmental Protection. June 1986. Implementation Guidance for the Water Quality Analysis Model 6.3. Document 391-2000-007.

Table 8. Summary of Load Allocations for Sediment in the Little Cacoosing Creek Watershed

Landuse	Sediment (lbs/yr)						
	Acres	Existing Load	Baseline Reduction	Baseline Load	EMPR Reduction	TMDL Load Allocation	% Reduction
Hay/pasture	1,210.	71,400	0	71,400	14,403	56,997	20%
Cropland	2,359.	1,152,200	268,428	883,772	178,277	705,496	39%
Coniferous	108.7	400	0	0	0	400	0
Mixed Forest	173	1,000	0	0	0	1,000	0
Deciduous	988.4	23,600	0	0	0	23,600	0
Transitional	2.5	3,400				3,400	0
Low Intensity Development	89	1,800	0	0	0	1,800	0
High Intensity Development	29	400	0	0	0	400	0
Streambank erosion	--	151,926	0	151,926	30,646	121,279	20%
Total	4,962	1,406,126	268,428	1,107,098	223,336	914,372	36%

The total allocable load of sediment is 914,372 lbs/year after subtracting the MOS. The EMPR method is then used to distribute the remaining sediment load and works in the following manner. PADEP allocated certain landuse loadings similar to their existing loads. In the Little Cacoosing Creek Watershed, those landuses are forested, low intensity development, high intensity development and transitional landuses. Reasons that the loads for these landuse types remain constant include an extremely limited ability to affect the sediment loading processes or insufficient reasonable assurance to make substantial reductions. This is appropriate because sediment loading from intact forested lands represent the natural condition that would be expected to exist. It was appropriate to make these allocations for low intensity development and high intensity development because these loads are small in comparison to the total loading and would not significantly improve water quality even if completely eliminated. Therefore, the allocable load for sediment of 914,372 lbs/yr is further reduced by 30,600 lbs/yr to 883,772 lbs/yr. The value of 30,600 lbs/yr is the sum of the sediment load from low intensity development (1,800 lbs/yr), high intensity development (400 lbs/yr), deciduous forest (23,600 lbs/yr), mixed forest (1,000 lbs/yr) and coniferous forest (400 lbs/yr). The remaining "active land use" current loads (hay/pasture and cropland) are then compared with the remaining allocable load of 883,772 lbs/yr to determine if any one contributor would exceed this load by itself. If the remaining allocable load is exceeded by any landuse, it will be reduced to the allocable load value of 883,772 lbs/yr. If the allocable load is not exceeded, the existing load becomes the baseline load. In Table 7, only the 'cropland' landuse with an existing load of 1,152,200 lbs/yr exceeds this value. Therefore, 'cropland' is reduced to 883,772 lbs/yr, which becomes the baseline load. The actual value of the reduction is represented in the 'Baseline Reduction' column of Table 8. The baseline loads are then summed to determine the equal percent reduction that must occur in the "active landuses" to achieve the allocable load value of 883,772 lbs/yr. The total baseline load is 1,107,098 lbs/yr, which must be reduced approximately 20.1 percent to equal 883,772 lbs /yr. This reduction can be seen in the 'EMPR Reduction' column of Table 8, which is then subtracted from the baseline load value to determine the TMDL LA value for each landuse.

This same method was used to determine the phosphorus reductions in each of the sub-watersheds. EPA finds that PADEP appropriately applied the EMPR method for phosphorus and sediment in the Little Cacoosing Creek Watershed TMDLs. According to Federal regulations at 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. While it is not necessary to specifically approve an allocation method, EPA believes that the EMPR method used by PADEP is acceptable because it supports 3 main objectives: 1) to assure compliance with the applicable water quality standard; 2) to minimize the overall cost of compliance and; 3) to provide maximum equity among competing discharges.

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

The state has included natural background as a component of the LAs, as required by 40 CFR §130.2(g). There are two separate considerations of background pollutants within the context of these TMDLs. First, there is the inherent assumption of the Reference Watershed approach that because of the similarities between the reference and impaired watershed, the background pollutant contributions will be similar. Therefore, the background pollutant contributions will be considered when determining the loads for the impaired watershed which are consistent with the loads from the reference watershed. Secondly, the AVGWLF model implicitly considers background pollutant contributions through the groundwater component of the model process.

4) The TMDLs considers critical environmental conditions.

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

Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards.[8] In specifying critical conditions in the water body, an attempt is made to use a reasonable “worst-case” scenario condition. Critical conditions are the combination of environmental factors (e.g., flow, temperature) that results in attaining and maintaining the water quality criterion and has an acceptably low frequency of occurrence. For example, stream analysis often uses a low-flow (7Q10) design condition as critical because the ability of the water body to assimilate pollutants without exhibiting adverse impacts is at a minimum.

Within the context of the Reference Watershed approach, the assumption is that the reference watershed is achieving its designated use even during critical environmental conditions. Thus, achieving sediment and/or phosphorus loadings in the impaired watershed consistent with that of the reference watershed will effectively consider critical conditions. To account for different flow conditions, the AVGWLF model uses daily average temperature, daily time step and total precipitation values for each year simulated. PADEP modeled each watershed for a period of up to 20 years to develop the existing loading values for each watershed. The length of the model time period will also effectively consider critical environmental conditions. EPA finds that Pennsylvania adequately considered critical conditions in the TMDL analysis of the Little Cacoosing Creek basin.

5) The TMDLs consider seasonal environmental variations.

Seasonal variations involve changes in streamflow as a result of hydrologic and climatological patterns. In the continental United States, seasonally high flow normally occurs during the colder period of winter and in early spring from snowmelt and spring rain, while seasonally low flow typically occurs during the warmer summer and early fall drought periods[9]. The model considers seasonal changes requiring specifications of the growing season, hours of daylight for each month, the months in which manure is applied to the land and by using daily time steps for weather data and water balance calculations. EPA finds that both the AVGWLF model and the assumptions of the Reference Watershed approach effectively consider seasonal environmental variations.

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

[9] U.S. EPA. 1997. Technical Guidance Manual for Developing Total Maximum Daily Loads, Book 2, Part 1, Section 2.3.3. EPA 823-B-97-002.

6) The TMDLs include a MOS.

This requirement is intended to add a level of safety to the modeling process to account for any uncertainty. A MOS may be implicit, built into the modeling process, or explicit, taken as a percentage of the WLA, LA, or TMDL.

PADEP reserves 10% of the TMDL value for both phosphorus and sediments as the MOS. This accounts for uncertainty in the data and computational methodology used in the analysis. Table 2 indicates the actual value of the MOS for each TMDL. EPA finds this explicit MOS acceptable.

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

The proposed reductions in phosphorus and sediment loadings all come from agricultural areas. PADEP believes that the implementation of Best Management Practices (BMPs) throughout the Little Cacoosing Creek Watershed will allow the TMDL to be achieved.

The pollutant reductions in the TMDLs are allocated entirely to agricultural activities in the watershed. Implementation of BMPs in the affected areas should achieve the loading reduction goals established in the TMDLs. Substantial reductions in the amount of sediment reaching the streams can be made through the planting of riparian buffer zones, contour strips, and cover crops. These BMPs range in efficiency from 20% to 70% for sediment reduction. Implementation of BMPs aimed at sediment reduction will also assist in the reduction of phosphorus. Additional phosphorus reductions can be achieved through the installation of more effective animal waste management systems and stone ford cattle crossings. Other possibilities for attaining the desired reductions in phosphorus and sediment include streambank stabilization and fencing. Further ground truthing should be performed in order to assess both the extent of existing BMPs in the Little Cacoosing Creek Watershed, and to determine the most cost-effective and environmentally protective combination of BMPs required to meet the nutrient and sediment reductions outlined in this TMDL.

Funding assistance for the types of projects described above include Pennsylvania's Growing Greener funding which has provided more than $65 million dollars to environmental initiatives through out the Commonwealth. Additionally, annual Section 319 grant funding, supported by the Unified Watershed Assessment and the Watershed Restoration Action Strategies, is designed to focus resources towards the implementation of BMPs for nonpoint source pollutants. Pennsylvania has staffed watershed coordinators in each Regional office who are available to provide grant application assistance to stakeholders as well as technical assistance on the installation of management practices.

8) The TMDLs have been subject to public participation.

Pennsylvania published a notice of availability for the Little Cacoosing Creek basin TMDLs for public review and comment in the *Pennsylvania Bulletin on August 10, 2003* and *Lebanon Daily*

News on August 22, 2003. A public meeting was held on August 26, 2002 at Berks County Agricultural Center in Leesport, Pennsylvania.

A 60-day comment period was provided for the submittal of comments. No comments were received during this time. EPA did submit comments after the comment period concluded. EPA finds that PADEP has addressed our comments on the Little Cacoosing Creek TMDL and have conducted adequate public participation.

Although not specifically stated in the TMDL Report, PADEP routinely posts the approved TMDL report on their web site at: http://www.dep.state.pa.us/watermanagement_apps/tmdl/default.asp