

DEVELOPMENT OF A TOTAL PHOSPHORUS TMDL FOR CHENOWETH RUN (PHASE I)

Problem Identification

Chenoweth Run, a tributary of Floyd's Fork lies entirely within Jefferson County, Kentucky. The stream flows through a densely developed industrial park, past the City of Jeffersontown, then through a lower-density urban area, and the last three miles through a mostly rural area.

Nutrient enrichment has been a problem in Chenoweth Run and in Floyds Fork below Chenoweth Run. Chenoweth Run was placed on the 1992 and 1994 303(d) lists as a water body not meeting water quality uses. Organic enrichment and nutrients were identified as causes of use impairment. Dense algal mats have formed in Chenoweth Run and in downstream water bodies as a result of excessive phosphorus discharge to the stream acting as a fertilizer and promoting algal growth. 401 KAR 5:031 Section 2 states that "...surface waters shall not be aesthetically or otherwise degraded by substances that produce undesirable aquatic life or result in the dominance of nuisance species." Algal activity also affects the pH of a stream. The pH of a stream is important because of its relationship to ammonia toxicity. At high summer temperatures and high pH (considered greater than about 8.5 units), ammonia becomes toxic to aquatic life. This again points to the importance of nutrient control to reduce algal biomass.

Endpoint Identification

Chenoweth Run is classified as a surface water supporting warmwater aquatic habitats. This use (and other uses) specify that "... surface waters shall not be aesthetically or otherwise degraded by substances that produce undesirable life, or result in the dominance of nuisance species."

Source Analysis

In a riverine water body such as Chenoweth Run, the growth of nuisance algal mats has been observed during summertime conditions. Generally, stream flow is low to moderate and temperatures are warm making conditions suitable for stimulating algal production. Under low-flow conditions most of the stream flow comes from wastewater discharge. An analysis of in-stream water quality data showed a significant increase in TP concentration downstream of the major discharger, Jeffersontown WWTP. At moderate stream flows, stormwater runoff contributes nutrients to the receiving waters.

Other factors exacerbating the problem is the fact that development in the watershed has resulted in the clear-cutting of trees in the riparian zone around Chenoweth Run. Also, stormwater runoff has increased dramatically.

Linkage of Endpoints and Sources

A water quality assessment of Chenoweth Run resulted in the recommendation of limiting total phosphorus (TP) to 1 mg/l at the Jeffersontown WWTP. The critical period of time where algal production occurs is during summer months when stream flows are low and dominated by effluent discharge. Thus, this recommendation of limiting the Jeffersontown WWTP, the major point source discharging to Chenoweth Run, to 1 mg/l TP constitutes Phase I of this TMDL. Phase II will entail more in-depth study of Chenoweth Run including development of a computerized watershed-simulation model that can be used for optimizing management decisions relating to water quality and quantity in the Chenoweth Run drainage basin. Both point and non-point sources of pollution will be fully evaluated for their effects during low-flow and storm flow scenarios.

Allocation of Responsibilities

Wasteload Allocation (Phase I)

Facility	Flow (MGD)	TP Concentration (mg/l)	TP Loading (lbs/day)
Jeffersontown	4.0	1	33.38

The TP concentration limit will be placed in the KPDES permit at permit reissuance (June 2000) unless the Phase II study documents another limit.

Load Allocation (Background Stream Loading):

The Phase I study of Chenoweth Run evaluated the low flow event in Chenoweth Run as the critical period for algal production. The 7Q10 (low flow event) for Chenoweth Run is 0 cfs. The Phase II study will evaluate storm flow events and determine if additional controls are needed during rainfall events. Thus, the load allocation for Chenoweth Run during the low flow event is:

Total Phosphorus: 0 lbs/day

Margin of Safety (MOS):

The margin of safety will be incorporated into Phase II of this study.

Total Maximum Daily Load @ 7Q10 = 0 cfs:

Total Phosphorus = 33.38 lbs/day + 0 lbs/day = 33.38 lbs/day

Reduction of TP discharged to the stream will result in a reduction of algal biomass produced in Chenoweth Run and at the

confluence with Floyd's Fork.

Additional measures are needed to achieve solutions to these problems. Along with point source controls creation of riparian zones and tree planting to provide shade along Chenoweth Run will aid in water quality recovery. Storm water runoff controls would also be helpful.

Public Availability

A community workgroup was formed as a public outreach component for the project. Membership on this workgroup consisted of concerned citizens, local agencies, state and federal agencies, and environmental groups. The initial plan of study was developed with their assistance and the final work product was reviewed by the workgroup.

Approval

This TMDL is hereby approved as meeting the requirements of Section 303(d) of the Clean Water Act.

Virginia Buff 8-27-97
Virginia Buff
Technical Reviewer

Jim Greenfield 9/2/97
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Robert F. McGhee 9/4/97
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9-4-97

Date