TMDL: Duck Creek, Ohio
Date:

DECISION DOCUMENT FOR THE APPROVAL OF THE DUCK CREEK TMDL

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. Part 130 describe the statutory and regulatory requirements for approvable TMDLs. Additional information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for EPA to determine if a submitted TMDL is approvable. These TMDL review guidelines are not themselves regulations. They are an attempt to summarize and provide guidance regarding currently effective statutory and regulatory requirements relating to TMDLs. Any differences between these guidelines and EPA's TMDL regulations should be resolved in favor of the regulations themselves. A one-page checklist of the review elements may be found on the last page of this document. The original language describing the elements for reviewing TMDLs is in standard font, and comments either by the EPA or the Ohio EPA are in *italics.*

1. Identification of Waterbody, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the waterbody as it appears on the State's/Tribe's 303(d) list. The waterbody should be identified/georeferenced using the National Hydrography Dataset (NHD), and the TMDL should clearly identify the pollutant for which the TMDL is being established. In addition, the TMDL should identify the priority ranking of the waterbody and specify the link between the pollutant of concern and the water quality standard (see section 2 below).

The TMDL submittal should include an identification of the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the NPDES permits within the waterbody. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of the natural background. This information is necessary for EPA's review of the load and wasteload allocations, which are required by regulation.

The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as:

(1) the spatial extent of the watershed in which the impaired waterbody is located;
(2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) population characteristics, wildlife resources, and other relevant information affecting

the characterization of the pollutant of concern and its allocation to sources;
(4) present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and
(5) an explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment impairments; chlorophyl *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comment:

The final Duck Creek TMDL submittal (TMDL submittal) was submitted by the Ohio Environmental Protection Agency (OEPA) on September 12, 2003, and provides the following information:

Location Description: Page 1 of Attachment 2 of the TMDL submittal describes the location of this TMDL. The Duck Creek Watershed is in southeast Ohio and occupies portions of Noble, Washington, Monroe, and Guernsey Counties. The principal drainage in the watershed is Duck Creek and its tributaries, the West, Middle, and East Forks. The watershed is mostly rural with several small towns and a portion of the city of Marietta. Duck Creek drains into the Ohio River at the eastern boundary of Marietta. The watershed is approximately 288 square miles.

Several streams are considered impaired according to the OEPA and they are listed in OEPA's impaired waters Section 303(d) list. The 303(d) list used in preparing this TMDL is provided in Attachment 2 of the TMDL submittal. (Stated as a "draft" list for 2002, it is now the partially approved 2002 303(d) list.) Segments included in this TMDL are: East Fork Duck Creek, Middle Fork Duck Creek, Whipple Run, Dog Run, Buffalo Run, Warren Run, West Fork Duck Creek Tributary (2 separate reaches), Otterslide Run, Mare Run, West Fork East Fork Duck Creek, East Fork Duck Creek Tributary (2 separate reaches), Schwab Run, Greasy Run, Elk Fork, Flag Run, Road Fork, and Barnes Run. The 303(d) list includes designated use, causes and sources of impairment. Table 1 in Attachment 2 (and attached to this Decision Document) provides a good description of these important elements of developing a TMDL and determining the waterbodies on the 2002 303(d) list.

In addition to the above, Attachment 3 of the TMDL submittal provides nutrient and Dissolved Oxygen (DO) allocations for Elk Fork, Mare Run, Whipple Run, Duck Creek Mainstem, and Wolf Run (see Sections 1.3.1 through 1.3.5 of Attachment 3).

Also in Attachment 3, Ohio assessed additional segments since the TMDLs within Attachment 2 were developed, and then used OEPA's contractor, Tetra Tech, to allocate loads for Total Suspended Solids (TSS) in Attachment 3 that had not previously been allocated. These segments include Elk Fork, Middle Fork Duck Creek, Duck Creek lower mainstem, West Fork Duck Creek RM 3.05, and Flag Run.

Topography and Land Use: Section 1.2 of Attachment 2 of the TMDL submittal states that the Duck Creek watershed is in the Allegheny Plateau, and the terrain is composed of hills, ridges, and plateaus. Land use in the Duck Creek watershed includes a mix of deciduous forest, pasture/hay, evergreen forest, and agriculture. Deciduous forest and pasture/hay collectively account for approximately 87 % of the total land cover.

Pollutants of concern include DDT, aluminum, iron, manganese, siltation, nutrients, and organic enrichment/low dissolved oxygen (DO).

Pollutant sources: The impairments occur from acid mine drainage (AMD), pasture land, stormwater runoff, habitat alterations, reservoir release, and failing septic systems.

Population and growth trends: Approximately 20,000 people live in the Duck Creek watershed, 82% live in rural areas and 18% in urban areas. The largest urban population near the watershed is Marietta, Washington County, with a population of 14,515 (U.S. Census Bureau, 2000). Population growth in the area has been relatively slow in the past 10 years.

Table 1 of Attachment 2 of the TMDL submittal lists the waters, pollutants, and impairments addressed. The Table is found on pages 19 and 20 of this Decision Document. The Duck Creek watershed was identified as a priority impaired water on the 2002 303(d) list.

EPA finds that the TMDL submittal from OEPA satisfies all requirements concerning this first element.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. (40 C.F.R. §130.7(c)(1)). EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

The TMDL submittal must identify a numeric water quality target(s) – a quantitative value used to measure whether or not the applicable water quality standard is attained. Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. The TMDL expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. Occasionally, the pollutant of concern is different from the pollutant that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as Dissolved Oxygen (DO) criteria). In such cases, the TMDL submittal should explain the linkage between the pollutant of concern and the chosen numeric water quality target.

Comment: The TMDL submittal from OEPA provides the following information:

Use Designation: Section 2.1 of Attachment 2 of the TMDL submittal describes standards and designated uses. Waters designated as Warmwater Habitat (WWH) are capable of supporting and maintaining a balanced integrated community of warmwater aquatic organisms. Waters designated as Exceptional Warmwater Habitat (EWH) are capable of supporting "exceptional or unusual" assemblages of aquatic organisms. Most streams in the watershed are designated for WWH aquatic life use support.

Narrative Standards: As stated in the Ohio Administrative Code (OAC) 3745-1-04, the following general water quality criteria shall apply to all surface waters of the state including mixing zones. To every extent practical and possible as determined by the director, these waters shall be:
"(A) Free from suspended solids or other substances that enter the waters as a result of human activity and that will settle to form putrescent or otherwise objectionable sludge deposits, or that will adversely affect aquatic life;
(B) Free from floating debris, oil, scum and other floating materials entering the waters as a result of human activity in amounts sufficient to be unsightly or cause degradation;
(C) Free from materials entering the waters as a result of human activity producing color, odor or other conditions in such a degree as to create a nuisance;
(D) Free from substances entering the waters as a result of human activity in concentrations that are toxic or harmful to human, animal or aquatic life and/or are rapidly lethal in the mixing zone;
(E) Free from nutrients entering the waters as a result of human activity in concentrations that create nuisance growths of aquatic weeds and algae;
(F) Free from public health nuisances associated with raw or poorly treated sewage."

Numeric Standards: Standards may have numeric criteria or measured biological scores in the form of "biocriteria". The Table below essentially shows the designated use in the first column, and the biota scores in the other columns. The IBI and MIwb measure characteristics in the fish community and ICI measures the aquatic insect invertebrate community. The higher the IBI scores and other categories, the better the habitat.

Site Type INDEX[a]	IBI[b] Headwaters	IBI Wading	IBI Boat	MIwb[b] Wading	MIwb Boat	ICI[b] (all sites)
EWH Habitat	50	50	48	9.4	9.6	46
WWH Habitat	44	44	40	8.4	8.6	36
MWH	24	24	24	6.2	5.8	22
LRW	18	18	18	4	4	8

[a] OEPA use designations: EWH=exceptional warmwater habitat; WWH=warmwater habitat: MWH=marginal warmwater habitat; LRW=limited resource water.
[b] IBI=Index of Biotic Integrity; MIwb=Modified Index of well being; ICI=Invertebrate Community Index.
Source: OEPA, 2001.

Numeric standards in Ohio are also constituent specific, and the standards are the maximum allowable to meet the designated use. For those constituents that do not have a numeric WQS developed, TMDL targets were developed by OEPA to meet the designated uses. For dissolved oxygen, the target is the minimum allowable to meet the designated use. The numeric targets that will be used for the Duck Creek watershed are shown in the Table below, found on page 15, Attachment 2 of the TMDL submittal. Standard values are added for this Decision Document. The target values include a Margin of Safety (MOS) which is a critical component of the TMDL and will be discussed later.

TMDL numeric targets for the Duck Creek TMDLs

Constituent	TMDL Standard	TMDL Target	Reference	Averaging Period
Total Aluminum	750µg/l	712.5 µg/L	USEPA, 1999	4-day average
Total Iron	1000µg/l	950µg/L	USEPA, 1999	Monthly average
Total Manganese	1000µg/l	950 µg/L	West Virginia TMDLs	Monthly average
Total Suspended Solids	PawPaw Creek	8.0 mg/L	Reference reach approach	Monthly average
Dissolved Oxygen	5.0mg/l	5.0mg/l	Ohio Standards	na*

*EPA's footnote: minimum value for a twenty-four-hour average

Ohio does not have numeric criteria for aluminum or iron. Therefore, the national aquatic life standard of 750 µg/L was used as a basis for the Duck Creek aluminum TMDLs, and 1,000 µg/L for iron (USEPA, 1999). Neither Ohio nor USEPA has established aquatic life criteria for manganese. A target of 1,000 µg/L was chosen based on best professional judgment. This value is the same as that used to develop numerous manganese TMDLs in mining affected watersheds in West Virginia and is believed to be protective of aquatic life.

Neither Ohio nor USEPA has established aquatic life criteria for total suspended solids. Average TSS concentrations in the upstream portions of Pawpaw Creek watershed were therefore used as a basis for the TMDL target because habitat conditions in these segments are among the best in the watershed. The average concentration of TSS in the upstream Pawpaw Creek segments was found to be 8 mg/L.

5.0 mg/L is the target for DO.

Attachment 3 of the TMDL submittal includes information on fecal coliform conversion and allocation to BOD5 and ammonia buildup for impaired sections of streams with organic enrichment/DO. The results (BOD5 and NH3-N) are then used as inputs for the MultiSMP model, a DO model for multiple point sources.
EPA finds that the TMDL submittal from OEPA satisfies all requirements concerning this second

element.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a waterbody for the applicable pollutant. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

The pollutant loadings may be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. §130.2(i)). If the TMDL is expressed in terms other than a daily load, e.g., an annual load, the submittal should explain why it is appropriate to express the TMDL in the unit of measurement chosen. The TMDL submittal should describe the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

The TMDL submittal should contain documentation supporting the TMDL analysis, including the basis for any assumptions; a discussion of strengths and weaknesses in the analytical process; and results from any water quality modeling. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

TMDLs must take into account *critical conditions* for steam flow, loading, and water quality parameters as part of the analysis of loading capacity. (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable *critical conditions* and describe their approach to estimating both point and nonpoint source loadings under such *critical conditions*. In particular, the TMDL should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

Comment:

The TMDL submittal from Ohio provides the following information:

There is a strong link between the viability of fish in relation to metals. Section 2.1 of Attachment 2 of the TMDL submittal states: "High metal concentrations that exceed thresholds, such as the Tier I Criteria and Tier II Values contained in and developed pursuant to Chapter 3745-1 of the Ohio Administrative Code or TMDL developed targets, have been found to be toxic to fish and macroinvertebrates..."

Section 2.2.3 of Attachment 2 states: "Manganese has been reported to kill fish in 8 to 18 hours at concentrations of 2,200 to 4,100 μg/L (River Assessment Monitoring Project, 2003). Other studies recommend manganese targets ranging from 790 μg/L to 1,040 μg/L (Government of British Columbia, 2001). The 1,000 μg/L is therefore believed to be protective of aquatic life."

In Section 2.2.4 of Attachment 2, OEPA further details the TSS impairment on aquatic life:

"....sediment smothers bottom dwelling (benthic) organisms, or chokes the habitat such that there is no place for aquatic organisms to live."

Section 4.1 of Attachment 2 explains that numeric targets require evaluation of magnitude, frequency, and duration of various in-stream conditions. Thresholds of a numeric measure are evaluated for frequency of exceedence; some standards require evaluation over a short period (a 4-day average), while others can be evaluated over an entire month. "The approach...must permit representation of in-stream concentrations under a variety of flow conditions to evaluate critical periods for comparison to both types of targets."

With regard to pollutant loadings, Section 4.1 of Attachment 2 further states: "Primary sources contributing to metals and siltation impairments include nonpoint and point sources/permitted discharges.... Loading processes for nonpoint sources or land-based activities are typically rainfall-driven, and thus relate to surface runoff and subsurface discharge to a stream. Permitted discharges may or may not be dependent on rainfall; however, they are controlled by permit limits. Because they are from a land-based activity, permitted mining discharges are precipitation-driven."

With regard to in-stream fate, Section 4.1 of Attachment 2 states: "Key in-stream factors include routing of flow, dilution, and transport of total metals. The primary physical driving process is the transport of total metals by diffusion and advection in the flow. Significant chemical processes are the speciation and precipitation of metals, followed by sediment adsorption/ desorption and reduction-oxidation reactions related to the precipitation reactions."

Scale of analysis and waterbody type must have the capability to evaluate watersheds at multiple scales; the Duck Creek watershed scales range from small streams to the main stem of the river. The locations of abandoned mines and point source discharges are also critical. Based on the considerations described, the Mining Data Analysis System (MDAS) was applied by OEPA to represent the source-response linkage. The MDAS is capable of representing loading from nonpoint and point sources and simulating in-stream processes. The most critical component of the MDAS to TMDL development is the Hydrological Simulation Program C++ (HSPC) model, because it provides the link between source contributions and in-stream response. The HSPC is used to simulate watershed hydrology and pollutant transport as well as stream hydraulics and in-stream water quality. (The HSPC is essentially a recoded C++ version of selected Hydrological Simulation Program–FORTRAN (HSPF) modules.)

Section 1.2.1 of Attachment 3 of the TMDL submittal explains that for DO loading from wildlife, livestock, and failing home treatment sewage systems, the FecalTool (FCLET) was used to calculate the build up of Fecal coliform (FC). FC is converted to BOD5 and ammonia buildup for impaired sections of streams with organic enrichment/DO. The results (BOD5 and NH3-N) are then used as inputs for the MultiSMP model, a DO model for multiple point sources, found in Tables 3.1, 3.2, and 3.3 (Attachment 3, p. 4 - 6) for Elk Fork, Mare Run and Whipple Run, respectively, along with the resultant load reductions necessary.

With respect to Elk Fork, Section 1.3.1 of Attachment 3 describes the critical conditions seen in the field and used in the model. "The BOD5 and ammonia buildups....and an assumed amount of rainfall (flow) were used as the loading for the discharges. The results of the preimplementation conditions in MultiSMP show very high BOD5 and ammonia concentrations and zero DOs. This is reasonable given that during field measurements in 2000 during low summer flows, field staff noted that the stream water was black, the two day DO concentration was 1.83 mg/l and biological scores showed impairments due to low DOs. The model is simulating a rainfall event which would exacerbate conditions by moving high loads of BOD and ammonia to the water."

In Mare Run there were again very high BOD5 and ammonia concentrations and zero DO. Further description is in Section 1.3.2 of Attachment 3. Storm water and septic runoff contribute to the anoxic conditions in Whipple Run from HSTSs and town runoff, with resultant low DO scores (Section 1.3.3 of Attachment 3).

Though a point source model is used for a nonpoint source problem, EPA concurs with the modifications made to the model to address the issues in this TMDL. The model then shows that changes to the riparian corridor and exclusion of cattle from steams greatly reduce the runoff. The post-implementation conditions show a resulting increase in DO.

The loading capacity is shown in the spreadsheet located at the end of this Decision Document on page 22.

EPA finds that the TMDL submittal from OEPA satisfies all requirements concerning this third element.

4. Load Allocations (LAs)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Where possible, load allocations should be described separately for natural background and nonpoint sources.
Comment:

The TMDL document submitted by OEPA provides the following information:

Load Allocation: Load allocations are provided in the OEPA's TMDL tables for aluminum, iron, manganese, TSS, and DO contained in Attachment 2. A margin of safety of 5% is included. OEPA also split the load into three allocations of recent mining, historic mining, other nonpoint sources. These categories correspond to land uses that have different potential for causing metals and/or sediment loading to the watershed. (Greater than 90 percent is forested or agriculture. There was no need to model more discreet land uses.)

The following Tables from Attachments 2 and 3 of the TMDL submittal are incorporated into this section by reference:

Aluminum	Iron	Manganese	TSS	DO
Table 12 (Att. 2)	Table 13 (Att. 2)	Table 14 (Att. 2)	Table 15 (Att. 2)	Table 3.1,3.2, 3.3 (Att. 3)
Page 34 (Att. 2)	Page 35 (Att. 2)	Page 36 (Att. 2)	P. 37 (Att. 2), P. 8 (Att.3)	P. 5 - 7, (Att. 3)

EPA finds that the TMDL submittal from OEPA satisfies all requirements concerning this fourth element.

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit.

The individual WLAs may take the form of uniform percentage reductions or individual mass based limitations for dischargers where it can be shown that this solution meets WQSs and does not result in localized impairments. These individual WLAs may be adjusted during the NPDES permitting process. If the WLAs are adjusted, the individual effluent limits for each permit issued to a discharger on the impaired water must be consistent with the assumptions and requirements of the adjusted WLAs in the TMDL. If the WLAs are not adjusted, effluent limits contained in the permit must be consistent with the individual WLAs specified in the TMDL. If a draft permit provides for a higher load for a discharger than the corresponding individual WLA in the TMDL, the State/Tribe must demonstrate that the total WLA in the TMDL will be achieved through reductions in the remaining individual WLAs and that localized impairments will not result. All permitees should be notified of any deviations from the initial individual WLAs contained in the TMDL. EPA does not require the establishment of a new TMDL to reflect these revised allocations as long as the total WLA, as expressed in the TMDL, remains the same or decreases, and there is no reallocation between the total WLA and the total LA.

Comment:

The TMDL submittal from OEPA provides the following information:

Section 3.2 in Attachment 2 of the TMDL submittal states that OEPA has issued National Pollutant Discharge Elimination System (NPDES) permits to seven facilities in the Duck Creek watershed that could discharge pollutants of concern. Six of these are mining operations and one is a sewage treatment plant. The Ohio Department of Natural Resources (ODNR) also permits the mining operations. Relevant information on these facilities is shown in Table 7 below.

Table 7. Point sources in the Duck Creek watershed.

OEPA Permit Number	ODNR Permit Number	Facility Name	Modeling Subbasin	Description	Area (acres)
OG-MO-0077	D-706	B&N Coal	54	Mining	260.5
OG-MO-0187	D-787	B&N Coal	78	Mining	262.5
OG-MO-OO78	D-807	B&N Coal	90	Mining	34.1
OG-MO-0080	D-958	B&N Coal	78	Mining	324.8
OG-MO-0287	D-1122	B&N Coal	7	Mining	282.5
OG-MO-0342	D-1194	B&N Coal	7	Mining	67.5
OH0020559	n/a	Village of Caldwell	74	Sewage Treatment	n/a

WLAs were calculated for all permitted facilities and are presented in Tables 12 through 15 of Attachment 2 mentioned in Section 4 of this Decision Document. Such tables are incorporated by reference into this section. The WLAs are presented on an annual basis (as an average annual load) because they were developed to meet TMDL targets under a range of conditions observed throughout the year. No reductions are necessary in wasteloads.

EPA finds that the TMDL submittal from OEPA satisfies all requirements concerning this fifth element.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)). EPA's 1991 TMDL Guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

Comment:

The TMDL submittal from Ohio provides the following information:

Section 5.2.3 of Attachment 2 of the TMDL submittal states: "A 5 percent explicit MOS was incorporated for the metals TMDLs by basing the allocation decisions on achieving the TMDL targets minus 5 percent. A relatively low MOS was chosen because of the low error associated with the modeling (see section 4.4.1 and Appendix C [of Attachment 2]). The model is therefore reducing the uncertainty associated with the relationship between load limitations and water quality An implicit MOS was incorporated for the TSS TMDLs by basing the target on observed conditions in a stream designated as Exceptional Warmwater Habitat (Pawpaw Creek), even though the TMDLs were developed for streams designated as Warmwater Habitat. A MOS is

incorporated because the TMDL attempts to restore water quality to better than necessary to meet the Warmwater Habitat standard."

The MOS for DO was also an explicit 5% and Tables 3.1, 3.2, and 3.3 in Attachment 3 of the TMDL submittal indicate DO levels with and without the MOS included in the calculations.

EPA allows for the uncertainty about the relationship between the pollutant loads and the quality of the receiving waterbody through both the implicit and explicit methods. For this TMDL with a variety of contaminants, each method was used appropriately.

EPA finds the explicit 5% MOS acceptable as a standard method. The implicit MOS by using an EWH standard is acceptable because the biological criteria scores for EWH are more conservative in all three values of IBI, MIwb, and ICI by greater than 5 percent when compared to the WWH values (see Habitat Table in Section 2, page 4 of this Decision Document).

EPA finds that the TMDL submittal from OEPA contains an appropriate MOS satisfying all requirements concerning this sixth element.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variations. (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).

Comment:

The TMDL submittal from Ohio provides the following information:

Section 5.2.4 of Attachment 2 of the TMDL submittal states that by using continuous simulation (modeling over a period of several years), seasonal hydrologic and source loading variability was inherently considered. The metals and TSS concentrations simulated on a daily time step by the model were compared to TMDL targets and an allocation that would meet these targets throughout the year was developed. EPA concurs with this assessment of seasonal variation.

EPA finds that the TMDL submittal from OEPA satisfies all requirements concerning this seventh element.

8. Reasonable Assurances

When a TMDL is developed for waters impaired by point sources only, the issuance of a National Pollutant Discharge Elimination System (NPDES) permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with "the assumptions and requirements of any available wasteload allocation" in an approved TMDL.

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur, EPA's 1991

TMDL Guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

EPA's August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by nonpoint sources. However, EPA cannot disapprove a TMDL for nonpoint source-only impaired waters, which do not have a demonstration of reasonable assurance that LAs will be achieved, because such a showing is not required by current regulations.

Comment:

The TMDL submittal from OEPA provides the following information:

Metals

Section 6.1 of Attachment 2 of the TMDL submittal states that "one option for metal load reduction is to encourage re-mining (mining in previously mined areas) to reclaim abandoned mine sites and eliminate public safety hazards such as dangerous highwalls and subsidence-prone areas. One advantage to re-mining is that virgin lands can be preserved. Mine operators could be required to implement best management practices (BMPs) to clean up water pollution and ensure that pollutant levels meet the TMDL targets. Successful re-mining operations have already occurred in Duck Creek (personal communications, Gary Novak, Ohio Department of Natural Resources, September 4, 2002). Specific re-mining BMPs include:

- *Passive treatment facilities.....*
- *Constructed wetlands.....*
- *Anoxic limestone drains.....*
- *Successive alkalinity-producing systems...."*

All of these methods are further described in the TMDL submittal at Attachment 2, Section 6.1, page 38. These descriptions are incorporated into this section by reference.

Siltation

Section 6.2 of Attachment 2 states that several possible BMPs can be implemented to reduce erosion and subsequent sediment loading in the Duck Creek watershed. Loads could be reduced by installing vegetated filter strips along streams to trap pollutants before they enter the stream. If vegetated buffers are designed correctly, they can prevent suspended solids and other pollutants from entering a stream.

OEPA further states that an effort should also be made to exclude livestock from riparian areas with siltation problems. This will allow the stream buffer to become more vegetated and stable, which can reduce the risk of streambank erosion, provide shade and habitat for aquatic species, and filter nutrients and sediments from runoff.

Ammonia and DO

Section 3.3.2 describes the area of the Duck Creek watershed to have almost 30 percent pasture land with cattle observed to be grazing in riparian zones and in streams and rivers. If not fenced, the cattle trample banks and deposit waste directly into the stream. Cattle grazing is suspected as the cause of impairment in Dog Run, Schwab Run, Mare Run, and Greasy Run. Section 6.2 of Attachment 2 states that livestock can be excluded from the streams by fencing them off. Several alternatives are available for providing water to animals that can no longer obtain it directly from the stream. These include pipelines, ponds, wells, troughs, and tanks. Options are also available for providing livestock stream crossings and alternative shade areas.

These control options and implementation are voluntary. The State has very good communication and interaction between stakeholders and watershed coordinators who help insure that steps to improve the watershed are taken.

EPA finds that the TMDL submittal from Ohio would satisfy all requirements concerning this eighth element.

9. Monitoring Plan to Track TMDL Effectiveness

EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur. Such a TMDL should provide assurances that nonpoint source controls will achieve expected load reductions and, such TMDL should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring and leading to attainment of water quality standards.

Comment:

The TMDL submittal from OEPA provides the following information:

In Attachment 4 of the TMDL submittal, OEPA's county-wide or watershed-wide Home Sewage Treatment Systems (HSTS) Plan must outline a long-term plan for ongoing inspection, corrective action, tracking progress and success, and monitoring of the county-wide system both during and after the funding period ends. EPA also recommends that mining and sediment issues being addressed in this TMDL have monitoring plans to evaluate the impacts of the BMPs on the watershed.

The Duck Creek watershed is also part of the five-year basin approach for monitoring, assessment, and the issuance of permits. Sampling includes biological, chemical, sediment and bioassay analysis. This was last completed for the watershed in June to October 2000.

EPA finds that the TMDL submittal from OEPA satisfies all requirements concerning this ninth element

10. Implementation

EPA policy encourages Regions to work in partnership with States/Tribes to achieve nonpoint

source load allocations established for 303(d)-listed waters impaired by nonpoint sources. Regions may assist States/Tribes in developing implementation plans that include reasonable assurances that nonpoint source LAs established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. In addition, EPA policy recognizes that other relevant watershed management processes may be used in the TMDL process. EPA is not required to and does not approve TMDL implementation plans.

Comment:

The TMDL submittal from OEPA provides the following information:

Implementation is also discussed in Section 8 of this Decision Document, in the reasonable assurance section.

Sections 1.3.1, 1.3.2, and 1.3.3 of Attachment 3 of the TMDL submittal describes measures which may be implemented to reduce BOD5 and ammonia, in order to achieve resultant DO increases needed to eliminate the DO impairment. The implementation plans differ for the subwatersheds depending on the sources of impairment. Measures include fencing of livestock, riparian revegetation, and/or repair of failing HSTSs. Attachment 4 of the TMDL submittal further discusses strategies and potential control options, including re-mining, changing animal feeding options, reducing lawn chemical usage, etc.

The Ohio Nonpoint Source Program provided a fiscal year 2001 grant to the Washington County Soil and Water Conservation District (SWCD) to hire a Duck Creek watershed coordinator. A combination of funds from the Ohio EPA 319 program and the Ohio Department of Natural Resources (ODNR) are used to fund this and six other watershed coordinator positions in Ohio watersheds with recognized nonpoint sources of water quality impairment.

To obtain Ohio EPA endorsement of a final watershed action plan, the following key items must be included: a) a watershed inventory section that provides enough information to identify and quantify the sources of pollution impairing water resource quality in the watershed; b) problem statements that link each water quality impairment cause with its source(s), the load estimate, or relative pollutant contribution from each source by stream segment; the problem statement is expected to contain an actual projected loading number and units; and c) impairment reduction goals for each stressor on each individual stream segment to move that segment towards water quality improvement.

Ohio EPA has two sources of funding available to address failing or poorly maintained HSTSs that result in water quality problems:

- *Section 319 grant funds*
- *Low interest loan funds from the Ohio Water Pollution Loan Fund (WPCLF) linked deposit loan program administered by the Division of Environmental and Financial Assistance (DEFA). Through the linked deposit system, local banks can offer interest rates that are generally 5% below market rates to credit-worthy homeowners for the upgrade or replacement of home sewage treatment systems.*

Though EPA is not required to approve the implementation plan as a condition for TMDL

approval, EPA finds that the TMDL submittal from OEPA would satisfy all requirements concerning this tenth element.

11. Public Participation

EPA policy is that there should be full and meaningful public participation in the TMDL development process. The TMDL regulations require that each State/Tribe must subject calculations to establish TMDLs to public review consistent with its own continuing planning process (40 C.F.R. §130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval should describe the State's/Tribe's public participation process, including a summary of significant comments and the State's/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment
(40 C.F.R. §130.7(d)(2)).

Provision of inadequate public participation may be a basis for disapproving a TMDL. If EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by EPA.

Comment:

The TMDL submittal from OEPA provides the following information:

The TMDL was public noticed from July 8, 2003, to August 7, 2003. Copies of the draft TMDL were made available upon request and on the Internet web site. *http://www.epa.state.oh.us/dsw/tmdl/index.html* *Public Comments were submitted and a Responsiveness Summary is in Attachment 5 of the TMDL submittal. A full record of public interaction and communication is also provided in Attachment 5. Comments were also submitted by the EPA and responses are included in Questions and Answers 1-12 in the Administrative Record dated August 20, 2003.*

EPA finds that the TMDL submittal from Ohio satisfies all requirements concerning this eleventh element.

12. Submittal Letter

A submittal letter should be included with the TMDL submittal, and should specify whether the TMDL is being submitted for a *technical review* or *final review and approval*. Each final TMDL submitted to EPA should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final review and approval, should contain such identifying information as the name and location of the waterbody, and the pollutant(s) of concern.

Comment: The TMDL submittal by OEPA provides the following information:

EPA received the Duck Creek TMDL on September 12, 2003, accompanied by a submittal letter. In the submittal letter, OEPA stated "The Total Maximum Daily Load (TMDL) report for the Duck Creek watershed (enclosed) is submitted for U.S. EPA's final review and approval under Section 303(d) of the Clean Water Act". The submittal letter included the name and location of the waterbody and the pollutants of concern. The letter states that Duck Creek was identified as a priority impaired water for Warmwater Habitat Aquatic Life Use on Ohio's 2002 303(d) list (05030201 110 and 120) due to metals, total suspended solids, habitat alteration, nutrient enrichment, and low dissolved oxygen.

13. Conclusion

After a full and complete review, EPA finds that the OEPA submittal allocates loads for a total of 55 TMDLs (addressing 55 impairments) for Duck Creek and its tributaries. The allocations satisfy all of the elements of an approvable TMDL. This approval concerns the waterbody segments, pollutants, and impairments set forth in the Tables on pages 17 and 18 below. Impairments addressed are in the final column on the right.

Waterbody segment	pollutant	impairment

Duck Creek	Siltation	siltation
East Fork Duck Creek	Aluminum Iron Manganese Siltation	metals siltation suspended solids habitat alterations
Middle Fork Duck Creek	Aluminum Iron Manganese Siltation	metals siltation suspended solids habitat alterations
Whipple Run	Siltation Organic Enrichment/Dissolved Oxygen (OE/DO)	siltation OE/DO
Wolf Run	Aluminum	metals
Dog Run	Siltation	siltation
Buffalo Run	Aluminum	metals
Warren Run	Aluminum	metals
West Fork Duck Creek Tributary (RM^d 3.05)	Aluminum Manganese Iron	metals
West Fork Duck Creek Tributary (RM 2.30)	Aluminum	metals
Otterslide Run	Aluminum Iron Manganese	metals
Mare Run	Aluminum Nutrients Siltation OE/DO	metals siltation suspended solids habitat alterations OE/DO
West Fork East Fork Duck Creek	Aluminum Manganese Iron Siltation	metals siltation suspended solids habitat alterations
East Fork Duck Creek Tributary (RM 5.73)	Aluminum Iron Manganese Siltation	metals siltation suspended solids habitat alterations

East Fork Duck Creek Tributary (RM 4.15)	Siltation Aluminum Manganese	metals siltation suspended solids habitat alterations
Schwab Run	Siltation	siltation suspended solids habitat alterations
Greasy Run	Siltation	siltation suspended solids habitat alterations
Elk Fork	Aluminum Manganese Nutrients Siltation OE/DO	metals siltation suspended solids habitat alterations OE/DO
Flag Run	Aluminum Iron Manganese Siltation	metals siltation suspended solids habitat alterations
Road Fork	Siltation Aluminum Iron Manganese	metals siltation suspended solids habitat alterations
Barnes Run	Aluminum	metals

Table 1. Impaired streams in the Duck Creek watershed as identified by OEPA .

Stream Segment	Support Status	Designated Use[a]	Cause	Source	TMDL Included in This Report
1998 Listings					
Duck Creek	Partially Supporting	LWH	Siltation	AMD[b]	
West Fork Duck Creek (Salt Run to East Fork Duck Creek)	Partially Supporting	LWH	Siltation	AMD	
West Fork Duck Creek (Headwaters to Salt Run)	Partially Supporting	WWH	Metals Siltation Organic Enrichment/Low DO	AMD AMD Point Sources	
Draft 2002 Listings[c]					
Duck Creek	Partially Supporting	WWH	DDT Flow Alterations		
East Fork Duck Creek	Partially Supporting	WWH	Aluminum Iron Manganese Siltation Ammonia	AMD AMD AMD AMD	√ √ √ √
Middle Fork Duck Creek	Nonsupporting	WWH	Aluminum Iron Manganese	AMD AMD AMD	√ √ √
Pawpaw Creek	Partially Supporting	EWH			
Whipple Run	Partially Supporting	WWH	Siltation Bacteria	Stormwater	√
Dog Run	Nonsupporting	WWH	Siltation	Pasture land	√
Wolf Run	Nonsupporting	WWH	Hydrologic Modification Low DO Ammonia Bacteria		
Buffalo Run	Nonsupporting	WWH	Aluminum	AMD	√
Warren Run	Nonsupporting	WWH	Aluminum	AMD	√
West Fork Duck Creek Tributary (RM[d] 3.05)	Nonsupporting	WWH	Aluminum Manganese Iron	AMD AMD AMD	√ √ √
West Fork Duck Creek Tributary (RM 2.30)	Partially Supporting	WWH	Aluminum	AMD	√
Otterslide Run	Partially Supporting	WWH	Aluminum Iron Manganese	AMD AMD AMD	√ √ √
Mare Run	Partially Supporting	WWH	Aluminum Nutrients Siltation	AMD Pasture land	√ √

Stream Segment	Support Status	Designated Use[a]	Cause	Source	TMDL Included in This Report
West Fork East Fork Duck Creek	Partially Supporting	WWH	Aluminum	AMD	√
			Manganese	AMD	√
			Iron	AMD	√
East Fork Duck Creek Tributary (RM 5.73)	Nonsupporting	WWH	Aluminum	AMD	√
			Iron	AMD	√
			Manganese	AMD	√
			Siltation	AMD	√
East Fork Duck Creek Tributary (RM 4.15)	Partially Supporting	WWH	Siltation	AMD	√
			Aluminum	AMD	√
Schwab Run	Partially Supporting	WWH	Siltation	Pasture land	√
Greasy Run	Partially Supporting	WWH	Siltation	Pasture land	√
Elk Fork	Nonsupporting	WWH	Aluminum	AMD	√
			Manganese	AMD	√
			Nutrients		
Flag Run	Partially Supporting	WWH	Aluminum	AMD	√
			Iron	AMD	√
Road Fork	Partially Supporting	WWH	Siltation	Pasture land	√
			Aluminum	AMD	√
			Iron	AMD	√
			Manganese	AMD	√
Barnes Run	Partially Supporting	WWH	Aluminum	AMD	√

[a] EPA Use Designations: WWH=Warmwater habitat; EWH=Exceptional warmwater; LWH=Limited warmwater habitat.
[b] AMD=acid mine drainage.
[c] Draft 2002 Section 303(d) listings for the watershed are pending approval by USEPA.
[d] RM=river mile.

In addition, Elk Fork, Mare Run, Whipple Run, Duck Creek Mainstem, and Wolf Run were Impaired for DO with a WWH designation.

Location	Subbasin	Aluminum	Iron	Manganese	TSS	BOD5(kg/d)	ammonia(kg/d)
East Fork Duck Creek	61	0.765			92662		
Middle Fork Duck Creek	25	7868.1	6764.6	7944.8	289704		
Otterslide Run	20	2520.6	775.7	7191			
	5	1496.8	1120.9	2677.9			
	91	1331.1		881.2			
MareRun	92	1667.6		2757.6	217460	175	31
Wolf Run	39	25.3					
Warren Run	45	5517.7					
Buffalo Run	48	906.8					
West Fork Duck Creek Trib. (RM3.05)	55	3655.9	3041.1	3740.5	149		
West Fork Duck Creek Tributary (RM2.30)	55	1859.3					
West Fork East Fork Duck Creek	11	7111.9	6251.8	3714.1			
Elk Fork	10	5593.9		4123.9	87850	462	51
East Fork Duck Creek Trib. (RM5.73)	90	4068.841	5661.578	3654.65	376662		
East Fork Duck Creek Trib. (RM4.15)	27	2636.3		3787	164417		
Road Fork	64	665.2	556	805.7	14320		
	86	596.1	1223.8	1403.1			
	87	9748.3	7036.6	6300.3			
Flag Run	85	3148.6	5119.5	3116.8	190422		
Unnamed Tributary	7	11381.4					
Barnes Run	8	13051.824					
Schwab Run	51				221697		
Greasy Run	9				263466		
Whipple Run	57				316691	0.0149	0.00213
Dog Run	44				20631		
Duck Creek Lower Mainstem	38				70		

Allocations in lbs/yr unless otherwise indicated

TMDL Review Checklist

State/Tribe: Ohio
§ 303(d) Segment(s): East Fork Duck Creek, Middle Fork Duck Creek, Whipple Run, Dog Run, Buffalo Run, Warren Run, West Fork Duck Creek Tributary (2 separate reaches), Otterslide Run, Mare Run, West Fork East Fork Duck Creek, East Fork Duck Creek Tributary (2 separate reaches), Schwab Run, Greasy Run, Elk Fork, Flag Run, Road Fork, Barnes Run, Elk Fork, Middle Fork Duck Creek, Duck Creek lower mainstem, West Fork Duck Creek RM 3.05, and Flag Run.
Date of EPA Action:
Pollutant(s): Aluminum, Iron, Manganese, TSS, DO

Date of Submittal: September 12, 2003
Date Entered into Tracking System:
EPA Reviewer: Jean Chruscicki, Dave Werbach, Kevin Chow

Review Element	Adequate?	Recommendations/ Comments
Submittal Letter	X	
Identification of Waterbody, Pollutant of Concern, Pollutant Sources, & Priority Ranking	X	
Applicable Water Quality Standards & Numeric Targets	X	
Loading Capacity	X	
Load Allocations (LAs)	X	
Wasteload Allocations (WLAs)	X	
Margin of Safety (MOS)	X	
Seasonal Variation	X	
Reasonable Assurances: through NPDES permits or if WLAs depend on LAs	X	
Public Participation	X	
Technical Analysis/Supporting Documentation	X	
Information entered into TMDL Tracking System		
Other Comments		