



**Numeric Target(s)**

*Submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.*

The beneficial uses of Cedar Creek are described, and the water quality standards for those beneficial uses are described. The targets are taken directly from the water quality criteria in Missouri's water quality standards. For the impairment caused by excess acid (low pH), an additional target of alkalinity was established to assure that the pH target would be attained in Manacle Creek.

**Link Between Numeric Target(s) and Pollutant(s) of concern**

*An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety that do not exceed the load capacity.*

The numeric targets are the water quality criteria for pH and sulfate/chloride. The relationship between the numeric targets and the pollutants is direct. The numeric targets apply to the discharge from the abandoned mine lands.

**Source Analysis**

*Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, non point and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered.*

The sources of acid (pH) and sulfate are described. The major contribution was determined to be abandoned mine drainage. The submittal demonstrates that all significant sources of acid (pH) and sulfate were identified and considered.

**Allocation**

*Submittal identifies appropriate wasteload allocations for point, and load allocations for nonpoint sources. If no point sources are present the wasteload allocation is zero. If no nonpoint sources are present, the load allocation is zero.*

Manacle Creek will have to meet in-stream WQS for pH (6.5-9.0 SU) and an alkalinity target of 40 mg/L or greater, as well as a chloride plus sulfate concentration of 960 mg/L.

**WLA Comment**

The WLA is zero.

**LA Comment**

The load allocation for pH is established as within the range of 6.5 to 9.0 SU. The load allocation for the second acid-related endpoint, alkalinity, is established as 40 mg/L

calcium carbonate or greater. The load allocation for sulfate plus chloride is 960 mg/L under all flow conditions.

### **Margin of Safety**

*Submittal describes explicit and/or implicit margin of safety for each pollutant. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided.*

The margin of safety is 4% of the sulfate plus chloride criterion of 1000 mg/L. This explicit MOS is based on the mean chloride concentrations found in Cedar Creek and Manacle Creek (flows directly into Cedar Creek) and best professional judgement regarding the uncertainty in the knowledge of the link between the allocation and the water quality in Manacle Creek. An implicit MOS is identified for the low pH impairment as using a secondary target of alkalinity since it is a measurable characteristic in Manacle Creek and can be linked to the pH water quality criterion; alkalinity has units of mg/L as calcium carbonate as discussed in Standard Methods for the Examination of water and Wastewater.

### **Seasonal Variation and Critical Conditions**

*Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s).*

Seasonal variation was considered, and critical conditions were identified. Since the water quality standards for pH and sulfate do not distinguish between seasons, the allocations apply year round.

### **Public Participation**

*Submittal describes public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s).*

This TMDL was placed on public notice from April 23 to May 23, 2004; two comments were received and addressed.

### **Monitoring Plan for TMDL(s) Under Phased Approach**

*The TMDL identifies the monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used).*

Manacle Creek is included in MDNR's continuous monitoring plan and is sampled twice per year.

### **Reasonable assurance**

*Reasonable assurance only applies when reduction in nonpoint source loading is required to meet the prescribed waste load allocations.*

Not required.