

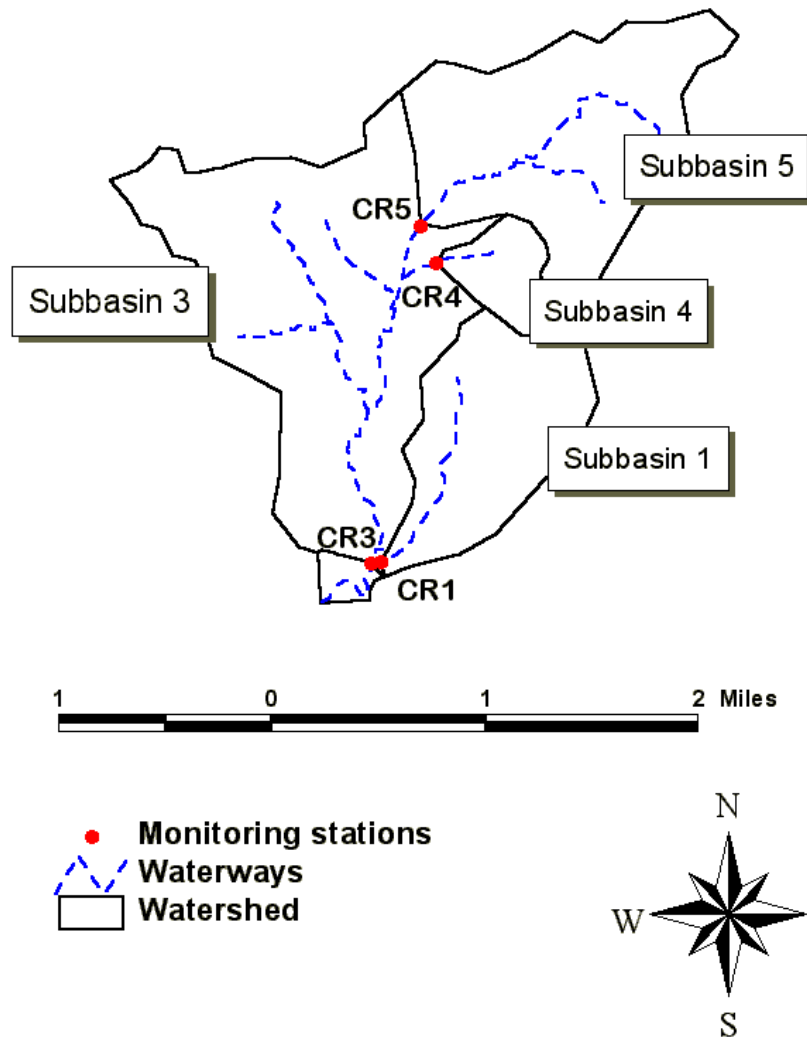
Cane Run, Kentucky

TMDL Fact Sheet

Project Name:	Cane Run
Location:	Hopkins County, Kentucky
Scope/Size:	Cane Run, watershed 2474 acres (3.87 mi ²) The listed segment is from river mile 0.0 to 3.4
Land Type:	Forest, agricultural, barren/spoil
Type of Activity:	Acid Mine Drainage (AMD) caused by Strip/Abandoned Mines
Pollutant(s):	H ⁺ Ion mass (Low pH)
TMDL Issues:	Non-point sources
Water Quality Standard/Target:	pH shall not be less than six (6.0) or more than nine (9.0) and shall not fluctuate more than one and zero-tenths (1.0) pH unit over a 24-hour period. This standard is found within regulation 401 KAR 5:031.
Data Sources:	KPDES Permit Historical Sampling Data, Murray State University Sampling Data
Control Measures:	Kentucky non-point source TMDL implementation plan, Kentucky Watershed Framework
Summary:	Cane Run was determined as not supporting the designated uses of primary and secondary contact recreation (swimming and wading), and warm water aquatic habitat (aquatic life). Therefore, the creek was placed on the 1998 and 2002 303(d) list for Total Maximum Daily Load (TMDL) development. The creek segment is characterized by a depressed pH, the result of acid mine drainage from strip and abandoned mining sites. The period of lowest pH is at low-flow conditions; however, the period of greatest hydrogen ion load has been determined at a critical flow condition for selected subbasins of Cane Run. For pH violations on such streams, the Kentucky Division of Water has determined that maximum daily mean flow having a 3-

year exceedance frequency be used for setting the appropriate TMDL and associated load reduction. However, for this TMDL the critical flow was defined from the observed data. This flow will be used for this TMDL.

Cane Run Watershed



TMDL Development:

Total maximum daily loads in grams H^+ ions per day were computed based on the allowable minimum pH value (6.0) for creeks and streams to meet primary and secondary contact (swimming and wading) and aquatic life uses. The TMDL was done for grams of ions (subsequently converted to pounds per day) because the units for pH do not allow

for the computation of a quantitatively useful load or reduction amount.

Total TMDL for Cane Run = 0.45 lbs H+ Ions/day				
	Critical	Incremental	Maximum	Incremental
	Incremental	TMDL	Incremental	Reduction
	Flow Rate	for a pH of 6.0	Load	Needed
	(cfs)	(lbs/day)	(lbs/day)	(lbs/day)
Subbasin 1	14.50	0.088	69.80	69.71
Subbasin 3	46.50	0.282	257.40	257.12
Subbasin 4	1.00	0.006	0.08	0.07
Subbasin 5	12.00	0.073	28.95	28.88
Total	74.00	0.448	356.23	355.78

Permitting in the Cane Run Watershed.

New Permits:

New permits (except for new remining permits) for discharges to streams in the Cane Run watershed could be allowed anywhere in the watershed contingent upon end-of-pipe pH permit limits in the range of 7.0 to 9.0 standard units. Water quality standards state that the pH value should not be less than 6.0 nor greater than 9.0 for meeting the designated uses of aquatic life and swimming. This range of 6.0 to 9.0 for pH is generally assigned as end-of-pipe effluent limits. However, because a stream impairment exists (low pH), new discharges cannot cause or contribute to an existing impairment. A pH of 7.0 represents a neutral state between an acidic and a non-acidic condition. A discharge having a pH of 7.0 to 9.0 standard units will not cause or contribute to the existing impairment. Based on limited pH data from streams in undisturbed watersheds in the area, a pH of 7.0 is generally representative of the value of background pH. New permits having an effluent limit pH of 7.0 to 9.0 will not be assigned a hydrogen ion load as part of a Waste Load Allocation (WLA). There are no active permits in the Cane Run Watershed that would contribute to the pH impairment.

Remining Permits:

Remining permits may be approved on a case-by-case basis where streams are impaired because of low pH from abandoned mines. Permit approval is contingent on reclamation of the site after mining activities are

completed. Existing water quality conditions must be maintained or improved during the course of remining. The permittee is required to monitor in-stream conditions during remining to make sure that current water quality conditions are maintained or improved. Reclamation of the site is the ultimate goal, but water quality standards (pH of 6.0 to 9.0 standard units) may not necessarily be met in the interim if the Commonwealth issues a variance to the discharger. The variance allows an exception to the applicable water quality standard as well as the TMDL. Remining therefore constitutes a means whereby a previously disturbed and unreclaimed area can be reclaimed. The authority for remining is defined in Section 301(p) of the Federal Clean Water Act; Chapter 33, Section 1331(p) of the U.S. Code – Annotated (the Rahall Amendment to the Federal Clean Water Act); and the Kentucky Administrative Regulations (401 KAR 5:029 and 5:040).

The remediation of the remining site will result in a reduction of the non-point source ion load of the subbasin where the remining is done. When remining is completed, the remediation should result in a reduction in the load allocation (LA). Follow-up, in-stream monitoring will need to be done at the subbasin outfall to determine the effect of reclamation activities following remining on the overall ion load coming from the subbasin.

Distribution of Load:

Because there were no point source discharges during the study period, the existing Hydrogen Ion load for the watershed was defined entirely as a nonpoint source load. Because new permits (pH 7.0 to 9.0) would not cause or contribute to the existing impairment and remining permits would be exempt from the TMDL requirements, no load has been provided for the waste load allocation category.

Waste Load and Load Allocation for Each Subbasin in the Cane Run Watershed

	Critical Flow Rate (cfs)	TMDL for pH = 6.0 (lbs/day)	Waste Load Allocation (lbs/day)	Load Allocation (lbs/day)
Subbasin 1	14.50	0.088	0.000	0.088
Subbasin 3	46.50	0.282	0.000	0.282
Subbasin 4	1.00	0.006	0.000	0.006
Subbasin 5	12.00	0.073	0.000	0.073

Implementation/**Remediation Strategy:**

Remediation of pH-impaired streams as a result of current mining operations is the responsibility of the mine operator. The Kentucky Division of Field Services of the Kentucky Department of Surface Mining Reclamation and Enforcement is responsible for enforcing the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The Kentucky Division of Abandoned Mine Lands (DAML) is charged with performing reclamation to address the impacts from pre-law mine sites in accordance with priorities established in SMCRA. SMCRA sets environmental problems as third in priority in the list of AML problem types.

There are currently no planned remediation activities for the Cane Run watershed. However, reclamation activities are underway at other locations within the state where water quality is affected by acid mine drainage (AMD). Since 1985, the Kentucky Division of Abandoned Mine Lands has spent approximately \$17 million dollars on various reclamation projects in western Kentucky. These projects are summarized below.

Kentucky Division of Abandoned Mine Lands Reclamation Projects

Watershed	Project Name	Cost
Brier Creek	Brier Creek	\$522,041
	Buttermilk Road	\$403,320
Crab Orchard Creek	Crab Orchard Mine	\$1,038,203
	Zugg Borehole	\$11,974
Pleasant Run	Pleasant Run	\$2,162,085
	Pleasant Run II	\$421,384
Pond Creek	Pond Creek I	\$50,118
	Pond Creek II	\$3,801,740
	Pond Creek III	\$4,011,514
Flat Creek	East Diamond Mine	\$535,000
	Flat Creek	\$720,572
Rock Creek	Paint Cliff	\$554,623
	Rock Creek I	\$630,158
	Rock Creek II	\$760,930
Render Creek	McHenry Coop. Agreement	\$130,165
	McHenry II	\$1,075,340
	Vulcan Mine	\$585,359
Total		\$17,414,526

The success of the reclamation activities in these watersheds was to be evaluated before developing remediation strategies for other watersheds affected by AMD. The KDAML developed a reclamation project in response to documented sedimentation and flooding problems in the nearby Brier Creek Watershed. The project included reclamation of approximately 120 acres of barren or poorly vegetated areas affected by past strip mining. The project also entailed six acres of channel restoration to minimize sedimentation caused by erosion. The restoration of streams included construction of ditches and PVC coated gabion baskets utilized as velocity reducers and energy dissipaters; bale silt checks and silt trap dugouts were also utilized for sediment control. The reclamation project consisted of 67 acres of gradework to remove erosion gullies, redistribute sediment deposits, and prepare a surface to receive a soil cover. The area under consideration received a two foot soil cover layer, taken from 20 acres of watershed area designated for borrow. Gradework areas were treated with an application of agricultural limestone to neutralize acidic conditions and all areas were revegetated using a combination of seedbed preparation, agricultural limestone, fertilizer, seed, mulch, and crimping. The agricultural limestone provided a variety of particle sizes so that it dissolved at different rates and mobilized under a range of flow conditions. The strategy employed at Brier Creek is similar in some respects to a project that is currently underway on Rock Creek and a tributary, White Oak Creek in McCreary County, Kentucky. This 12-acre project is part of the Kentucky Clean Water Action Plan. It involves the removal of coal refuse from the banks of Rock Creek, the establishment of a vegetative cover on other refuse areas in the watershed, and the application of limestone sand at selected locations to neutralize the effects of AMD.

The total cost for the Brier Creek project was \$913,000.00 (i.e. \$7600/acre) while the total cost of the Rock Creek project is estimated to be approximately \$650,000 (i.e. \$54,200/acre). For 2000, the total federal Kentucky AML budget allocation was approximately \$17 million. However the bulk of these funds were used to support Priority 1 (extreme danger of adverse effects to public health, safety, welfare, and property) and Priority 2 (adverse effects to public health, safety, and welfare) projects. Based on the cost of current remediation efforts,

it would appear that a significant increase in federal funding to the AML projects, particularly Priority 3 projects, would be required in order for the AML program to play a significant part in meeting the TMDL implementation requirement associated with pH impaired streams in the state of Kentucky.

Just recently (June 2003), 319 Clean Water Action Plan funds were awarded to the KDAML. This grant is the Homestead Refuse Reclamation Project and includes reclamation of a 92-acre area of the upper Pleasant Run watershed. The total cost of the reclamation project is \$1.26 million, of which 60% is federal funds and 40% is supplied by the KDAML. The reclamation activities channel restoration, re-vegetation, and the use of agricultural limestone.