

**RELOCATED DEEP MINE DISCHARGE D1:
 Proposed Passive Treatment System**

Justification

D1 is an abandoned underground mine discharge that is responsible for significantly degrading McKee Run, a major tributary to Crooked Creek in the Allegheny River Basin. McKee Run is classified as a Cold Water Fishery under PA Title 25, Chapter 93.

McKee Run upstream of D1 is net-alkaline water with a circumneutral pH and metals concentrations below 1 mg/l. Relocation of the D1 discharge downstream of the original point of issue will allow more than one half mile of McKee Run to recover to the upstream quality.

Installation of a passive system is expected to provide long-term treatment of relocated D1 and improve McKee Run and assist in mitigating the impacts of the heavily polluted D4A that enters McKee Run downstream.

Brief Outline of Conceptual Treatment Plan

Type & Size: Anoxic Limestone Drain: 5000 T AASHTO#1 limestone;
 primary spillway & outlet manifold 12" Sch40 PVC; overflow
 system 12" Sch40 PVC
 Settling Pond: ½-acre

Raw Water Quality:

<u>pH</u> field/lab	<u>alkalinity</u> field/lab	<u>acidity</u>	<u>iron</u> unfiltered/filtered	<u>manganese</u> unfiltered/filtered	<u>aluminum</u> unfiltered/filtered
5.2/4.4	1/ND	92	32/29	2/2	2/2

alkalinity, acidity, and metal concentrations in mg/l

Design Flow: 250 gpm

ALD discharge alkalinity: 150 mg/l (est.)

Time Schedule: one month

Monitoring Program: standard mining parameters: monthly final effluent; quarterly upstream (S1A) and downstream (S2B) McKee Run

Design Life: 25 years @ 250 gpm average

Sizing

Sizing criteria included flow rate and water quality. The flow rate was extremely variable at D1 ranging from 103 to 900 gpm (median = 275 gpm) as reported on Module 8.1A during monitoring from 03/24/97 to 09/27/01 (n = 6). Flows of about 250 gpm were also measured, as feasible, after the mine pool was recently lowered.

At “start-up” a flow of 500 gpm would have a calculated retention time of 12 hours. After 25 years, the calculated retention time for 500 gpm would be 6 hours. The design life with 12 hours of retention is 25 years at an average flow of 250 gpm.

The piping system is designed to handle flows exceeding 2000 gpm (@ one foot of head at the overflow). As proposed, the overflow will begin to discharge when the flow from the principal spillway reaches about 250 gpm (adjustable orifice). As the flow (head) increases at the overflow, the flow will also increase in the primary spillway.

Sizing was also based on the water quality. The analysis of a raw pit water sample, collected 01/03/02, was used in the sizing calculations.

pH field/lab	alkalinity field/lab	acidity	iron unfiltered/filtered	manganese unfiltered/filtered	aluminum unfiltered/filtered
5.2/4.4	1/ND	92	32/29	2/2	2/2

alkalinity, acidity, and metal concentrations in mg/l

This analysis is comparable to the water monitoring reported for D1. (See attached.)

Using the above noted flow rate and water quality, the Anoxic Limestone Drain was designed to contain 5000 tons of AASHTO#1, 90% CCE limestone aggregate. The Settling Pond, at 20 g/sm/day of iron particulates retained, is ½-acre.

Plans are attached. See also attached calculations.

Associated Features

As the system is within the existing affected Surface Mine Permit area, Erosion and Sediment Control facilities have been previously approved. (See attached plans.)

Time Schedule

The project is expected to be completed, except for seeding, etc., within one month.

Monitoring Program

The final effluent will be monitored on a monthly basis for the same parameters as D1. Upstream (S1A) and downstream (S2B) monitoring will continue on McKee Run. Monitoring is proposed through Stage II bond release.

Measurable Environmental Results

The length of McKee Run from the original to the relocated confluence of D1 is expected to recover to the quality identified at S1A, which characteristically has a 6 to 7 pH, 20 to 80 mg/l alkalinity, no acidity, and metal concentrations of 1 mg/l or less. Currently this stream segment (S1B) below the confluence with D1 is net acid with a 4 to 5 pH and with a total iron ranging from 6 to 30 mg/l with total aluminum ranging from 1 to 12 mg/l. (Monitoring data reported on Module 8.1A: n = 14; 03/24/97 to 09/27/01)

Based on the available monitoring during the preceding three years, D1 was always a net acid, metal-bearing discharge. With an expected ALD effluent alkalinity of about 150 mg/l, the combined flow of the primary spillway and the overflow upon mixing in the Settling Pond is expected to be net alkaline up to about 700 gpm. Based on 20 g/sm/day at 250 gpm, the iron concentration in the Settling Pond effluent would be 1 mg/l or less. As flows increase, the iron concentration in the effluent is expected to increase. Based on average values from the attached monitoring for point D1 and assuming recent filtered analyses of raw pit water indicate that the metals are dissolved, the passive system is expected to neutralize about 160 lbs/day (58,000 lbs/yr) of acidity and prevent 54 lbs/day (20,000 lbs/yr) of iron and 14 lbs/day (5,000 lbs/yr) of aluminum from entering McKee Run.