

## IX CONCLUSIONS

### A. Pollution Sources

The bulk of mine drainage pollution in the Pucketa Creek Drainage Basin is concentrated in two (2) watersheds in the same general area. The watersheds affected are Unnamed Run #1 Watershed and Unnamed Run #2 Watershed. Each of these watersheds has one (1) pollution source and both pollution sources are generally located approximately 1.3 miles southwest of Merwin, Pennsylvania.

Unnamed Run #1 Watershed contributes 69% and 78% of the total acid and iron loads respectively from pollution sources in the Pucketa Creek Drainage Basin. Unnamed Run #2 Watershed accounts for 31% and 22% of the total acid and iron loads respectively from pollution sources in the Pucketa Creek Drainage Basin. Although both of the watersheds mentioned above discharge into Pucketa Creek Watershed (Main Stem) neither watershed had an adverse effect on the Pucketa Creek Watershed (Main Stem).

Both Pucketa Creek (Main Stem) and Little Pucketa Creek Watersheds were alkaline in nature and the total iron in both creeks was in a satisfactory range. The mouth of Pucketa Creek (Station 40B) before flowing into the Allegheny River had the following average data during the survey: average flow - 985 L/gpm, pH - 7.72, acidity - 0, alkalinity - 77 mg/l, total iron - 0.75 mg/l and sulphates - 113 mg/l.

No water samples were taken on the Allegheny River. However, the discharge of Pucketa Creek would appear to have little adverse effect on the river.

B. Priorities

It is concluded that the abatement of mine drainage pollution in the Pucketa Creek Drainage Basin would best be accomplished by individual watersheds. Priority would best be given to Unnamed Run #L Watershed because of its larger pollution load and the length of stream it pollutes. Abatement of Unnamed Run #2 Watershed will be given a lower priority even though it contains a major source of pollution because the main stem of this watershed is unpolluted. Therefore, the recommended priority arrangement for the individual polluted watersheds in this study will be:

1. Unnamed Run #L Watershed
2. Unnamed Run #2 Watershed.

C. General

Due to the fact that the coal bed has been so frequently opened in this basin, reasonable estimate of the openings that did exist could not be made. Approximately all of the outcrop has been surfaced mined and in some instances partially backfilled making it impossible to determine where deep mine workings have been intercepted.

## X RECOMMENDATIONS, ABATEMENT MEASURES AND COST

The ultimate pollution discharge points are indicated under "Source Description" in the table beginning on page 37. These are the points where attention should be devoted to abate pollution. Each known source is given, its pollution load, proposed method of abatement, and the estimated cost of abatement.

Cost estimates were computed on bid experiences of the Department for similar types of projects and abatement measures. Practically all of the pollution of the waters in the Pucketa Creek Drainage Basin is the result of mine drainage. This drainage is from abandoned surface and deep mines. In the recommendations it will be noted that emphasis has been put on mine seals and channeling these areas. A description of these abatement measures is as follows:

1. Mine Sealing - the construction of a barrier within a mine entry sometimes extended into the adjacent strata by means of grout curtain. The barrier is usually intended to impede the movement of water from the mine so that the ground water level will rise to an elevation sufficient to inundate the pyritic strata associated with and above the coal seam. The method recommended shown on Plate 7, page 39, has been successfully used on other projects.

2. Channeling - the draining, grading and excavation of strip spoil in a manner as to provide a constructed channel for rapid flow of water unabated out of the strip cut. (See Plate 8, page 40).

It is suggested to improve the natural drainage through the strip cuts by means of highwall rounding and channeling. This method will reduce the flow of water

entering the deep mines and improve the drainage through the strip cuts. The unpolluted water to the streams should increase the natural alkalinity and neutralize some of the acidity. Additional abatement methods are being considered and may be introduced in the future as conditions in the field warrant. The following is a summary of the data contained on pages 37 and 38. The total pounds per day are calculated from each individual source of pollution. Estimated

	<u>Abatement Cost</u>	<u>No. of Sources</u>	<u>Acid #/day</u>	<u>Alk . #/day</u>	<u>Iron #/day</u>	<u>Sulphates #/day</u>	<u>Abatement Cost/# Acid</u>
Unnamed Run #1	\$120,000.00	1	1391	0	272	1762	\$86.00
Unnamed Run #2	\$30,000.00	1	614	0	75	843	\$49.00
Total	\$150,000.00	2	2005	0	347	2605	\$75.00

These recommendations are based on the limited information available at this time and additional information will be needed before final recommendations are proposed. This is particularly true in the case of deep mine sealing in that many of the mine complexes may be interconnected and in addition intersected by strip mines.

UNNAMED RUN #1 WATERSHED

Source No.	Priority No.	Source Description	Recommended Abatement Measures	Cost
18C	1	Gravity discharge of AMD from drift of unknown mine: acid load = 1391 lbs/day - alkalinity = 0 total iron - 272 lbs/day sulphates = 1762 lbs/day	Construction of 2 remote watertight mine seals - 81' head	\$120,000.00

UNNAMED RUN #2 WATERSHED

Source No.	Priority No.	Source Description	Recommended Abatement Measures	Cost
25C	2	Gravity discharge of AMD from backfilled strip mine: acid load = 614 lbs/day - alkalinity = 0 total iron = 75 lbs/day sulphates = 843 lbs/day	Grade, channel, cover with soil and revegetate 2 acres of strip	\$30,000.00

BULKHEAD DRILL HOLES 6" DIA. ON 30" CENTER

OBSERVATION HOLE LOCATION TO BE DETERMINED IN THE FIELD

INJECTION HOLES FOR CTR. PLUG AREA. MINIMUM TWO (2) HOLES. ADDITIONAL HOLES MAY BE REQUIRED

BULKHEAD DRILL HOLES 6" DIA. ON 30" CENTERS

Existing Ground

Mine Portal

Front Bulkhead COURSE AGGREGATE

Grout CONCRETE PLUG

Rear Bulkhead COURSE AGGREGATE

# TYPICAL DEEP MINE SEAL

( DOUBLE BULKHEAD )  
No Scale



