SUMMATION OF RESULTS

Preventive and corrective approaches to abatement of acid mine drainage pollution are dependent on chemistry of the pollutants, geology, extent and types of mining activities, the feasibility of various abatement techniques in selected areas of the watershed, cost effectiveness and certain socio-economic conditions of the region.

The following conclusions are the findings of an investigation which resulted from a study authorized and financed by the Pennsylvania Department of Environmental Resources under Pennsylvania Act 443 of 1968 as amended, the "Land and Water Conservation and Reclamation Act."

1. The Mahanoy and Shenandoah Creeks through their entirety, 75 percent of the Zerbe Run and 80 percent of North Mahanoy Creek, are severely polluted by acid mine drainage while Big Mine Run and Big Run consist entirely of acid mine drainage (see Figure 1).

2. There are 31 mine discharges which drain into the watershed streams, and 3 discharges which re-enter the mine pools (see Plates A and B).

3. Little Mahanoy Creek, Rattling Run, Mouse Creek, and Swaben Creek are free from acid mine water pollution (see Figure 1).

4. Two basic types of acid mine drainage have been identified in the watershed, alkaline (net Alkalinity, pH>6) and acid (net acidity, pH<4.5).

5. The two basic types of discharges were found to be dependent on the following: geology, amount of surface water entering the mine, mineralogy, time, bacteria, and the particular mine conditions. The mine discharges, however, were found to be independent of location with some alkaline and acidic discharges located within 50 feet of each other.

6. Three major sources of pollution to receiving streams were found in the watershed: acid mine drainage from abandoned mines, silt from the numerous silt and culm banks, and domestic sewage. On a local basis leachate from silt and culm banks becomes a significant source of acid mine drainage.

7. After completion of sewage treatment facilities in Shenandoah, and other towns in the watershed, the severity of acid mine drainage pollution in

the streams may increase slightly due to the removal of part of the neutralizing characteristics of the untreated sewage (i.e. ammonia).

8. A zonation in water quality of Mahanoy Creek exists, which may be important in any future abatement program downstream of the Mahanoy Creek-Zerbe Run confluence and continuing to the mouth of the Mahanoy Creek.

9. Several large areas of the watershed have been severely disturbed by surface (strip) mining. These regions include the areas south of Trevorton, west of Shenandoah, north of Girardville, north of Ashland and the area north and northwest of Mahanoy City (see Plates A and B).

10. The concentrations of chemical constituents in the acid mine waters increase as the season changes from high to low flow periods. This is shown in data included in the Appendix.

11. The numerous mine openings (shafts, air vents, access tunnels, drainage tunnels, boreholes, crop falls) combined with numerous abandoned strip mines have resulted in great amounts of water being introduced into the large underground mine pools. In addition, these mine openings have made hydraulic sealing of mines, in most cases, unsuitable as an abatement technique.

12. The major influences on water quality in the watershed include the following:

    a. North Franklin overflow (severely pollutes almost all of Zerbe Run and causes zonation and a drop in water quality of Mahanoy Creek)

    b. Doutyville Tunnel affects Mahanoy Creek

    c. Centralia Tunnel, east of Ashland affects Mahanoy Creek

    d. Packer #5, east of Girardville affects Mahanoy Creek

    e. Mahanoy City boreholes, east of Mahanoy City affects Mahanoy Creek

    f. Gilberton shaft, affects Mahanoy Creek.

13. Refuse piles contribute large amounts of silt and fine grained coal during periods of heavy rainfalls and on a local basis contribute to acid mine production through leaching processes (i.e., Hammond Bore Hole area).

14. Several deep strip pits and some mine openings pose unnecessary safety hazards in the watershed.

15. Water supply-combine need for water and AMD treatment. The need for purified water for domestic and industrial use in the area may favor the combination of acid mine drainage treatment and water treatment to result in a new source of potable water.

16. Although the danger of coal refuse impoundment failures, such as the one which ruptured on February 6, 1972, across Buffalo Creek (Logan County) in West Virginia is not as great as in West Virginia, impoundment failure as well as the compliance with stream pollution regulations indicates a need for a water recycling method. This could be accomplished by returning water through the coal preparation plant rather than the use of impoundment dams in the active collieries within the watershed and elsewhere.

17. A further study of mine pool stratification in the anthracite region should aid in the abatement plans for the area. This study would indicate future changes in water quality in the mine pools (and possible sources of potable water) due to abatement techniques which reduce the amount of water entering the mine pools, The changes in water quality may be critical to treatment systems.

18. The hydrological mine pool and reclamation investigations in this watershed suggest disturbed aquifers may be a very important source of water in some of the mine pools. This indicates that surface reclamation alone may be inadequate in the reduction of coal mine drainage; a further study is recommended.