

RECOMMENDATIONS

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The basis of the program recommended for mine drainage control in the Slippery Rock Creek Watershed is source abatement. Based on our detailed study and analyses of specific conditions in the watershed, it is our judgement that the proposed abatement methods can be applied in most cases with the assurance of achieving reasonable success. Treatment methods (neutralization) have not been given first consideration in any of the problem areas and should, we feel, be employed only if needed after carrying out the source abatement plan. It should be pointed out that the recommended abatement plan is concerned exclusively with the control of mine drainage and does not include a consideration of hazardous conditions or aesthetics, even though some improvements in these areas may result from the abatement work.

The following pollution abatement projects have been or are being planned in the watershed area. Each of these individual projects should have a surveillance program indicating the various parameters examined before, during and after the remedial work.

1. Deep Mine Sealing

These projects will consist of the construction of deep mine "wet" seals and pressure grouting operations in the adjacent strata. These seals will be installed in the deep mine openings with the mine workings to the rise and with acid mine water discharges. Plans and specifications have been prepared for Deep Mine Sealing Project SL-110-1BD, Argentine and Whiskerville Areas for a total of 34 mine seals. Similar deep mine sealing projects are being planned for the remaining 122 applicable deep mine openings in the Slippery Rock Creek Watershed.

2. Strip Mine Reclamation

The strip mine reclamation projects will include backfilling abandoned strip mine areas, soil treatment and planting. This work will also include the construction of required diversion ditches and slope drain flumes. In certain areas, lime injection will be employed. The backfilling will be both approximate original contour and terrace type restoration depending on conditions. There are a total of 13,700 acres of strip mine areas in the watershed; however, only 2,700 acres (approximately 20%) have acid discharges. Only the areas having acid discharges are being considered for

reclamation work. Plans and specifications have been prepared for Strip Mine Reclamation Mine Drainage Project SL-110-1A, Moniteau Area. This project consists of terrace type restoration and planting of 63 acres of strip mine areas in State Game Lands #95. Additional projects are being planned for other applicable strip mine areas.

3. Refuse Pile Abatement

These projects will consist of the removal of mine refuse piles and burial of this material in strip mine areas or the grading and leveling of mine refuse piles and subsequent covering, soil treatment and planting. Several of these projects are now in the planning stage and will be ready for bidding and construction in the near future.

4. Surface Sealing

These projects will include sealing mine drifts, slopes and air shafts with clay and other suitable material where the body of the mine workings lie to the dip.

5. Miscellaneous

These projects will include abatement work to control pollution from sources other than those discussed under items 1 through 4, such as pollution caused by abandoned oil and gas wells.

Evaluation studies associated with the mine drainage abatement projects are recommended. These studies should include an investigation as to the effectiveness of the abatement work and an evaluation of the costs involved in performing the abatement work.

For the convenience of report size, the portion of the watershed involved in the abatement program has been divided into 37 project areas. The section of this report dealing with proposed abatement, discusses the specific types of abatement projects applicable to conditions in each area.

In addition to the conventional methods already mentioned, the benefit of further investigation may reveal special localized conditions which would justify utilizing one or more of the following mine drainage control techniques:

1. Installation of limestone seals.
2. Mass fly ash injection.
3. Construction of settling and/or impoundment basins.
4. Construction of limestone stream barriers.

Three priority levels have been designated for implementation of the mine drainage abatement plan. Each of the 37 project areas was considered on the basis of certain selectivity factors and given a priority classification. In general, the criteria used to assign priorities were the acid load intensity, the collective effect of mine drainage on stream quality, and practical considerations for the proximity of work.

The acid load criteria was applied as follows:

<u>Priority</u>	<u>Acid Load Lbs./Day</u>
First	Greater than 350
Second	100 - 350
Third	Less than 100

Areas with second and third priority in terms of acid load were moved up to first priority if by abating the pollution a significant improvement in stream quality would result. Higher priorities were also assigned if by combining the abatement work in adjacent project areas, a complete cleanup could be accomplished

The estimated cost for the total abatement plan in the Slippery Rock Creek Watershed, including design, supervision of work, and inspection, is \$9,867,000. The breakdown of this estimate on a basis of priority levels is given below.

Estimated Costs for Proposed Mine Drainage Abatement Program

<u>Priority</u>	<u>Estimated Cost</u>
First	\$5,816,000
Second	2,293,000
Third	<u>1,758,000</u>
Total	\$9,867,000

We recommend implementation of the total abatement plan as proposed, in the order of priorities given. Completion of the remedial action program, resolved by our study and set forth in this report, should accomplish an 80% reduction in source acid load in the watershed.