CONCLUSIONS

Conditions in the Piersons Rum watershed, with respect to accepted abatement procedures, immediately eliminate some often used measures. Limitations are imposed because of the relatively low flows, the use of the undermined area as a park, future mining beneath the area, and economic considerations. It is desirable to employ corrective measures which will disturb the existing surface conditions as little as possible, leave the headwaters of Piersons Rum suitable for aquatic life, and be economical with respect to both initial correction and long term maintenance costs.

Grouting is unfeasible as a corrective measure at the present tine. To avoid the development of new seeps and the possibility of blowouts, grouting of the entire outcrop of the Pittsburgh Coal would be required. This procedure would require a high initial cost, and, due to the possibility of future damaging subsidence as a result of mining of the Upper Freeport Coal seam, could not be guaranteed as a permanent solution.

Strip mining of the overburden and the coal left in place during the deep mining operation is a method that has been used to eliminate acid mime drainage. In order for this measure to be practical, a substantial percentage of the coal must remain so that the value of the coal offsets some of the cost of removal. Another important consideration which must be evaluated' is the use of land. In the western portion of the park (Drawings 69-209-B3 and B5), the strip mime has been totally reclaimed. Maximum development of the park has also occurred. On the westernmost hill (Drawings 69-209-B3 and B5), ski slopes have been developed. Installation of ski tows, snow-making machines, and other associated skiing equipment creates a condition which makes stripping of the remaining coal undesirable. The adjacent two hills, shown on Drawings 69-209-B1 and B3 as the areas with mine maps unavailable, have been developed as picnic and recreational areas. The maximum overburden above the mined coal in these areas is about 200 feet. The. small discharges from Sample Points 16, 17, and 18 do not warrant expenditure of the monies required to totally strip and reclaim the area. The easternmost strip mine has been partially reclaimed and occupies a portion of the park which is now undeveloped. Mine drainage discharge occurs at two locations: the watercourse northeast of Sample Point 12 and the watercourse northeast of Sample Point 11. At both of these points, the discharges are low. Stripping would involve 120. acres, most of which are covered with trees.

The maximum overburden is about 135 feet. The dense foliage of this area would result in high clearing and grubbing costs. Consideration of all of these conditions indicate stripping to be an impractical solution.

Since the cost of treatment per gallon of acid drainage increases as the amount of discharge to be treated decreases, lime or limestone treatment plants constructed at the individual sources are unfeasible because of the low flows at the sources. Because of the initial cost of construction and the continuing cost of maintenance, treatment at each individual source would result in very high total treatment costs.

An alternate plan would be to pipe the discharges from all six of the sources to one common treatment facility. The location of a common treatment facility would probably be in the vicinity of Sample Point 7. Piping of mine acid discharge from Sample Point 12 and the abandoned watercourse north of Sample Point 11 to Sample Point 7 would require about 7000 lineal feet of pipe. Piping of the sources in the eastern section of the park to Sample Point 7 would require about 3000 lineal feet of pipe. Therefore, approximately 10,000 lineal feet of pipe would be needed at an estimated installed cost of $150,000 to $200,000.

Allowing the polluted tributaries to follow their natural channels and then treating them at their confluence at Sample Point 7 does not eliminate the acid mine water within the park.

It appears that the best procedures are to:

1. Reduce the small flow of polluted water to a minimum by filling existing sinkholes and regrading those areas along the highwall where water can now pond and seep into the mine.

2. Divert water flowing within the mine away from the watershed through the use of mine seals and fly ash injection where it is safe to do so.

3. Provide a small treatment plant near the headwaters of each of the two polluted tributaries.

RECOMMENDATIONS

The following recommendations are presented to reduce and treat acid mine drainage in the Piersons Run watershed.

1. Immediate regrading of the improperly backfilled strip mines should be conducted in three areas. In the unfilled strip mine at the southwest outcrop in the eastern side of the park, shown as A on Drawing 69-209-B4, surface runoff ponds and seeps into the deep mine at the high end of the coal seam. This area is a major source of water entering the mine and is evidently the major source of acid mine water measured at Sample Point 11. Reduction of the amount of water entering the deep mine could greatly reduce the discharge of acid water. The estimated cost of the strip mine regrading in Area A is $9000.

The abandoned strip mines at the north outcrop are at the low end of the coal, and trees and other vegetation have returned to a large part of this area. Therefore, since this area is not a major source of subsurface water, and since it is presently wooded, only minor regrading is recommended. This area is shown as B on Drawings 69-209-Bl and B2. The cost of regrading is estimated to be about $4000.

The gully in the eastern half of the park, shown as C on Drawing 69-209-B2, should be regraded. The slope of this ravine causes some surface runoff to pond and percolate downward into the deep mine. The regrading required in this area is estimated to cost $1000. Thus, the total estimated cost of regrading for Areas A, B, and C is $14,000.

2. In the eastern half of the park, sinkholes exist over extensive areas, particularly along the narrow ridge immediately east of Area A, shown on Drawing 69-209-B4. It is estimated that the maximum overburden is approximately 40 feet in this area. In order to reduce water infiltration into the mine, these sinkholes should be filled. The cost of performing this work is estimated to be $21,000. In the remainder of the eastern half of the park, sinkholes occur frequently in a band extending to approximately 50 feet back from the strip mine highwall. It is estimated that an additional $30,000 is required to backfill these sinkholes.

In the western half of the park three major sinkholes exist and are shown on Drawings 69-209-Bl and B3. As the sinkholes permit air and water to enter the deep mine, they should be backfilled. It is recommended that large boulders be placed in these sinkholes to within ten feet of the ground surface. The spaces between boulders should then he choked off, using granulated slag, and the remaining depression backfilled to the existing ground surface with soil cover. The cost is estimated to be about $1000 per sinkhole. Therefore, the total cost for backfilling all sinkholes is about $54,000.

3. Construct a mine seal at Sample Point 20 which is shown on Drawing 69-209-B3. The purpose of the seal is to stop the small flow of one to two gallons per minute from this source and divert the water flow within the mine. As this seal will be parallel to the direction of mining and the dip of the coal, a large head of water is not expected to form behind the seal. The estimated cost of this seal is about $6000.

4. In the eastern part of the park the remaining mine acid discharge from Sample Points 16, 17, and 18, shown on Drawing 69-209-B3, should be neutralized by a lime treatment plant. In selecting a scheme for treating the mine acid discharge, the anticipated use of the pond in the vicinity of Sample Point 15 for aquatic life must be considered. A lime treatment plant is also recommended to treat the acid mine discharge from Sample Point 12 and the abandoned water-course north of Sample Point 11, shown on Drawings 69-209-B1 and B2. Either of the following schemes can be used.

Scheme I

Construction of a lime treatment plant north of Sample Point 15 would be sufficient to neutralize the acid mine discharge from Sample Points 16, 17, and 18. It is estimated that the construction cost of the plant would be $15,000, and that $4300 a year would be required to operate it. Dividing the cost over a ten year period would result in a cost of $5800 per year. In order to protect the pond south of Sample Point 15 from filling with sludge and becoming unsuitable for aquatic life, a sludge pond must be constructed. The cost of the. sludge pond is estimated to be $3000, which divided over a ten year period will raise the cost of treatment in the west branch of Piersons Run to $6100 per year.

A lime treatment plant should also be constructed in the vicinity of Sample Point 10 shown on Drawing 69-209-B4. The cost of construction and operation of this plant is the same as above, including a sludge pond to prevent discoloration of the channel downstream. The total cost of treatment is $12,200 per year for Scheme I.

Scheme II

In order to avoid the requirement of Scheme I of a sludge pond north of Sample Point 15 in an extensively used area of the park, an alternate approach would be to pipe the discharge from Sample Points 16, 17, and 18 to the discharge culvert from the pond in the vicinity of Sample Point 14 and treat the drainage at Sample Point 13.- This scheme would require about 1500 feet of pipe costing approximately $30,000, installed. This investment divided over ten years and added to the cost of lime treatment plants at Sample Points 10 and 13, raises the total cost of Scheme II to $15,200 per year. In considering Scheme II it is important to note that in dry periods nearly all of the water in this branch of the stream is supplied by the discharges from Sample Points 16, 17, and 18.

5. A program of fly ash injection is also recommended for the construction of a barrier as a means of altering flow patterns within the mine. Water flowing through the deep mine in the eastern half of the park which does not emerge at Sample Point 12, probably continues across to the west and emerges at Sample Points 16, 17, and 18. Therefore, construction of a fly ash barrier at the thin neck in the mine north of Sample Point 12 shown on Drawing 69-209-Bl could potentially reduce flow rates at these sources in the developed areas of the park. The cost of this measure is estimated to be $10,000 based on a three foot void over an area of 10,000 square feet.