

GENERAL ANALYTICS, INC.

**MINE DRAINAGE ABATEMENT SURVEY
PIERSONS RUN WATERSHED
ALLEGHENY COUNTY, PENNSYLVANIA INTRODUCTION**

Piersons Run, a tributary of Abers Creek, is the principal stream draining Boyce Park in Allegheny County, Pennsylvania. The area of the watershed is approximately two square miles, 13 per cent of which was underlain by the Pittsburgh Coal. The coal has been removed by both deep and strip mining methods resulting in acid mine drainage into the headwaters of Piersons Run within the boundaries of Boyce Park.

Boyce Park is located near the eastern boundary of Allegheny County in a relatively rural area, but adjacent to the Pittsburgh metropolitan area, as shown on Plate 1. "The park is wooded with the exception of recreational areas and reclaimed strip mines. The acid mine drainage polluting the streams within the park restricts its recreational capabilities and contributes to the water pollution of the region.

The purpose of this study was to evaluate the existing acid mine drainage pollution and to recommend corrective measures. In order to evaluate the problem, several steps were taken. A search was conducted to obtain all available data on mining operations. A field survey was made to provide supplementary information on deep and strip mining, locate pollution sources, and obtain samples for laboratory testing. The data was then compiled and analyzed to ascertain suitable corrective measures. The most promising corrective measures were then compared for relative cost and efficiency.

SUMMARY

Boyce Park, a 1091-acre park of the Allegheny County Regional Park System, is drained by Piersons Run. Piersons Run and its western tributaries drain the portion of the park which is most highly developed for recreational activities. The western tributaries are polluted with acid mine drainage which restricts the park's recreational capabilities and contributes to the water pollution of the region.

Two coal seams, the Pittsburgh and Upper Freeport Coals, have been mined beneath the park. The Pittsburgh Coal has been mined by both strip and deep mining methods. At present, however, there is no mining of this seam within the park. The Upper Freeport Coal, about 500 feet below stream level, is presently being mined beneath the northern half of the watershed.

The Piersons Run watershed, a triangularly-shaped drainage basin, occupies about 630 acres of the park. Ground water and surface runoff collected in this basin flow from Piersons Run into Abers Creek, and ultimately into the Monongahela River. Due to strip and deep mining of the Pittsburgh Coal seam within and around this watershed, ground water and surface water runoff have been permitted access to mine waste under conditions which favor the formation of acid mine drainage. Sinkholes and improperly graded strip mines which pond water and permit percolation of surface water into deep mines or through strip mine backfill, are the major sources of the water which flushes acid mine drainage into the drainage basin.

In order to determine the amount and type of pollutants entering the watershed in the Boyce Park area, field surveys were made. The initial survey was conducted to locate all major seeps within the watershed and to obtain preliminary information on the extent and effect of stripping and deep mining within the area. Twenty-one sampling points were selected to monitor the amount and quality of the acid mine drainage. Subsequent surveys were conducted to obtain additional information and water samples at each seep. Examination of water quality test results and flow measurements showed that all the significant information could be determined by monitoring conditions at thirteen sample points. Of these thirteen, six locations, Sample Points 12, 16, 17, 18, 20, and the abandoned watercourse upstream from Sample Point 11, are the major sources of acid mine drainage pollution in the watershed.

Chemical analyses were conducted to determine the pH and pollution load in terms of acid, iron, and sulfate concentrations. The potential maximum total of these pollutants entering the watershed at the six major sources is 366 pounds per day of acid, 12 pounds per day of iron, and 1378 pounds per day of sulfate.

Several types of corrective measures which have been successful in controlling acid mine drainage in other areas are unfeasible at Boyce Park due to extremely high initial costs. Recommendations are given to:

1. Reduce infiltration of surface water into the mine.
2. Construct a mine seal.
3. Inject fly ash to restrict flow in a portion of the mine.
4. Treat the remaining mine acid drainage.

Work to minimize the amount of surface water entering the mine includes regrading areas along the strip mine highwall where water can pond and enter the mine and filling sinkholes. The estimated cost of this work is \$68,000.

The mine seal is to prevent a small flow of mine acid drainage from one old entry. The estimated cost of the seal is \$6000.

Construction of a barrier by fly ash injection in a narrow section of the mine should reduce the amount of mine acid discharge in the developed area of the park. The cost of this work is estimated at \$10,000.

A small lime treatment plant is recommended near the headwaters of each of the two polluted tributaries (Scheme I). The estimated cost including construction spread over ten years and operating costs is \$12,200 per year. In order to avoid construction of a sludge pond in an extensively used area of the park, an alternate location of one treatment plant (Scheme II) is recommended. The piping required raises the total cost of treatment to \$15,200 per year.

The estimated total cost of the filling and regrading work, the mine seal, the fly ash injection, and the Scheme I lime treatment facilities is \$120,000. Over a ten-year period, this cost plus the yearly operating cost for the lime treatment

plants is \$20,600 per year. The estimated total cost of the project with the Scheme II treatment facilities is \$150,000. The cost of Scheme II, spreading the initial costs over ten years and adding the yearly operating costs, is \$23,600 per year.

Either of these two schemes, coupled with the regrading, filling, and sealing work in and around the mines, would provide treatment for all of the acid mine drainage that could realistically be collected. The resulting surface water in the park would have sufficiently low pollutant concentrations to permit aquatic life in the streams and additional recreational potential for the park.