

SECTION I

FOREWORD

The governor of Pennsylvania approved "The Land and Water Conservation and Reclamation Act" on January 19, 1968. The Act authorizes the issuance of \$500,000,000 in bonds for the conservation and reclamation of the state's air, water, and land resources. It provides for the control and elimination of stream and air pollution resulting from past coal mining operations, the abatement of stream pollution from municipal sewage, and the development and improvement of recreational lands for the benefit of all Pennsylvanians.

The provisions of the Act are being implemented by several state agencies. The Department of Environmental Resources is responsible for the (1) elimination of air pollution from burning coal refuse banks, as well as surface and underground mine fires, (2) reduction or elimination of surface subsidence above abandoned deep mine workings, (3) restoration of abandoned strip mines, and (4) abatement of stream pollution from coal mine drainage.

The Act was amended, granting the Department of Environmental Resources the authority to construct and operate treatment plants to abate water pollution resulting from mine drainage. The Act does not supersede "The Clean Streams Act" and requires that such treatment shall not be less than required under "The Clean Streams Act." The Department of Environmental Resources may permit coal mine operators to discharge their mine drainage to these plants, and may charge these operators according to their proportionate share of the capital and operating costs as well as the quantity and quality of their discharges.

The Department of Environmental Resources initiated a comprehensive program to abate mine drainage in several watersheds draining Pennsylvania's Anthracite Fields. The Shamokin Creek watershed, one of the first watersheds selected, drains part of the Western Middle Field. Extensive deep and strip mining have caused significant pollution of its headwaters. Also, several municipalities discharge untreated wastes into its waters. Shamokin Creek waters cannot, therefore, be used for beneficial purposes. The Department of Environmental Resources intends, within its resources, to restore Shamokin Creek. Accordingly, it authorized Gannett Fleming Corddry and Carpenter, Inc., to conduct certain preliminary investigations to (1) determine the causes and extent of mine drainage in the Shamokin Creek watershed, (2) ascertain the abatement measures that could be used to eliminate such pollution, (3) estimate costs for various combinations of abatement measures, including the collection and treatment of mine drainage discharges from active Shamokin Creek watershed mines, and (4) recommend for construction the abatement measure(s) considered to be suitable for the Shamokin Creek watershed.

Shamokin Creek, after passing through the area underlain with coal, flows generally northward and then westward to enter the Susquehanna River near Sunbury, Pennsylvania. The Shamokin Creek watershed and its major features are shown on Plate I. Various terms used throughout this report are defined in the following Glossary.

GLOSSARY

Abatement Measure

The method by which acid mine drainage is (1) prevented or reduced, (2) treated, or (3) discharged without treatment and in a controlled manner to surface or subsurface waters.

Abatement Plan

A single abatement measure, or combinations of abatement measures, that when constructed will eliminate acid mine drainage discharges or bring such discharges into compliance with current limitations of the Department of Environmental Resources.

Affected Area of a Strip Mine

That area disturbed by strip mining, including the excavation or strip pit, the piles of removed overburden or spoil, and any area above the highwall from which earth was removed before, during, or following mining.

Acid Mine Drainage

Mine drainage not meeting the current pH, iron, and acid limitations stipulated by the Department of Environmental Resources.

Annual Fixed Cost

Amortization (30-year term) plus interest at six percent per annum.

Annual Operating and Maintenance Cost

Cost attributable to items such as labor, chemicals, power, and replacements resulting from normal wear and tear.

Collection System

Includes all facilities necessary to deliver acid mine drainage to a treatment plant or disposal site, including mine water pool boreholes and pumps, flow equalization basins, conveyance sewers, and open channels.

Deep Mine Entry

Man-made entry constructed into or out of deep mine workings to gain access to the coal, enable its removal, or provide suitable working conditions.

Department

Department of Environmental Resources, Commonwealth of Pennsylvania.

Disposal Measure

Method by which acid mine drainage is discharged without treatment and in a controlled manner to surface or subsurface waters.

Initial Cost

First 30-year average total annual cost.

Long-Term Cost

Estimated average total annual cost associated with a particular abatement plan over a span of years sufficient to demonstrate long-term trends; 300-year period arbitrarily selected for this report; for all abatement plans studied in detail, long-term cost projections are based upon the assumption that the project cost at present price levels will be reincurred regularly throughout the 300-year period with a frequency directly related to the replacement interval of the abatement measure(s) involved.

Mine Drainage

Mine drainage from deep or strip mining or coal-processing operations, or from refuse areas resulting from such activities.

Mine Drainage Discharge Point

A point of mine drainage outflow from a strip mine, deep mine, or refuse area; for this report, a point where mine drainage outflow was gauged and sampled either by the Department of Environmental Resources or Gannett Fleming Corddry and Carpenter, Inc.

Preventive Measure

Method by which the formation of acid mine drainage is prevented or, if not prevented, its volume or pollutional characteristics (or both) reduced.

Project Cost

Includes construction contract price for physical facilities complete-in-place, purchase of lands and rights-of-way, as well as engineering, legal, and miscellaneous administrative expenses attributable to the project.

Refuse Area

A ground-surface accumulation of pyritic, shaley, or other undesirable material associated with coal as mined but subsequently discarded. This material is separated from coal during mining, breaking, cleaning, or processing. Refuse areas may also be called culm or gob piles or banks. An accumulation of such material within the affected area of a strip mine is considered in this report as part of the affected area and is not listed separately as a refuse area.

Replacement Interval

The elapsed years (estimated) after which an abatement measure will have to be reconstructed to maintain its effectiveness.

Total Annual Cost

Annual fixed cost plus annual operating and maintenance cost.

Treatment Measure

Method by which the pollutants contained in acid mine drainage are removed to the extent necessary to meet current limitations of the Department of Environmental Resources; includes the outfall sewer from the treatment facilities to the receiving stream.