SECTION I

FOREWORD

On January 19, 1968 the governor of Pennsylvania approved "The Land and Water Conservation and Reclamation Act" (the Act), which authorized the issuance of bonds in the amount of $500,000,000 to be used for the conservation and reclamation of air, water, and land resources. The Act provides for the control and elimination of stream and aid pollution resulting from past coal mining operations, abatement of stream pollution by sewage from municipalities, and the development and improvement of recreational lands for the benefit of all Pennsylvanians.

The provisions of the Act are being implemented by several Commonwealth agencies, among which the Department of Mines and Mineral Industries (Department) is playing a major role. The Department is responsible for (1) eliminating air pollution from burning coal refuse banks as well as surface and underground mine fires, (2) reducing or eliminating surface subsidence above abandoned deep mine workings, (3) restoring abandoned strip mines, and (4) abating stream pollution from coal mine drainage. An amendment to the Act that will enable the Department to also use funds appropriated under the Act to construct treatment facilities for abating stream pollution from active coal mining operations has been introduced into the legislature. If the amendment is enacted, coal mine operators will probably be charged a service fee for using treatment facilities constructed by the Commonwealth.

The Beech Creek Watershed (Watershed) was one of the first areas in which the Department decided to undertake a mine drainage pollution abatement program. The Watershed is located in portions of Centre and Clinton Counties and is within the Susquehanna River Basin. Mine drainage pollution from inactive deep and strip mines originates within the Watershed. All Watershed mine drainage discharges eventually find their way into Beech Creek, which discharges into Bald Eagle Creek, a tributary of the Susquehanna River. In the past, Bald Eagle Creek both upstream and downstream from its confluence with Beech Creek was of relatively good quality. The Corps of Engineers recently completed construction of the Foster J. Sayers Reservoir (Reservoir), a flood control reservoir on Bald Eagle Creek, just upstream from its confluence with Beech Creek. Reservoir waters will be used for recreation. The Department fears that the quality of Bald Eagle Creek downstream from its confluence with Beech Creek might be seriously degraded because of decreased stream flow resulting from the reduced release of water from the Reservoir. The Watershed represents a sizable portion of the total area of the Commonwealth contributing mine drainage pollution to waters of the Commonwealth. Accordingly, the Department authorized the firm of Gannett Fleming Corddry and Carpenter, Inc. to conduct certain preliminary investigations to (1) determine the causes and extent of mine drainage pollution in the Watershed, (2) ascertain the abatement measures that could be used to reduce such pollution, (3) determine costs for various combinations of abatement measures, and (4) recommend for construction the abatement measure or combination of abatement measures determined to be most suitable for the Watershed.

The Watershed and its major features are shown on Plate I. A glossary of terms used throughout this report is presented in Appendix A.

GLOSSARY

Abatement Measure

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

Abatement Plan

A single abatement measure, or combinations of abatement measures, which when constructed will either eliminate acid mine drainage discharges, bring such discharges into compliance with current Sanitary Water Board limitations, or significantly improve stream water quality.

Affected Area of a Strip Mine (Affected Area)

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 during or following mining.

Acid Mine Drainage (AMD)

Mine drainage not completely meeting current pH, iron, and acid limitations stipulated by the Sanitary Water Board.

Annual Fixed Cost

Amortization (30-year term) plus interest at five 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 including flow equalization basins, conveyance sewers, open channels, underground channels in abandoned deep mine workings, and pumping stations.

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 Mines and Mineral Industries, Commonwealth of Pennsylvania.

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 (MD)

Mine drainage from either deep or strip mines, accumulations of acid-forming refuse resulting from such mining, and geological deposits not directly associated with coal mines or mining.

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 by 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, and engineering, legal, and miscellaneous administrative expenses attributable to the project.

Recreation Stream (Corps of Engineers Definition)

Stream or sections of a stream readily accessible by road or railroad, and with some development along its shoreline; the stream or sections may have had some impoundments or diversions in the past.

Refuse Area

An accumulation of pyritic, shaley, or other undesirable material associated with coal or clay as mined but subsequently discarded. This material is separated from coal or clay during deep or strip mining, breaking, cleaning, or processing. 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.

SWB

Pennsylvania Sanitary Water Board.

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 Sanitary Water Board limitations; includes the outfall sewer from the treatment facilities to the receiving stream.

Wild Stream (Corps of Engineers Definition)

Stream or sections of a stream free of impoundments and relatively inaccessible except by trail; the watershed or shoreline must be essentially primitive and the waters unpolluted.