# Preliminary Design Report

# ACID MINE DRAINAGE DEMONSTRATION PROJECT PHILIPSBURG, PENNSYLVANIA

# COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF MINES AND MINERAL INDUSTRIES Harrisburg, Pennsylvania

July 31, 1969



**BURNS AND ROE, INC.** 

ENGINEERS AND CONSTRUCTORS
ORADELL, N. J.



700 Kinderkamack Road • Oradell, New Jersey 07649 • Tei, N. J. (201) 265-2000 - N. Y. (212) 563-7700

TWX 710-990-6637 • Cable BURDE ORADELLNJ

July 31, 1969

Subject: Acid Mine Drainage Demonstration Project

Philipsburg, Pennsylvania

Commonwealth of Pennsylvania Department of Mines & Mineral Industries 660 Boas Street Harrisburg, Pennsylvania 17102

Attention: Dr. David R. Maneval

Director of Research & Development

Gentlemen:

In accordance with our contract dated October 10, 1968, we have completed the preliminary design of a treatment plant to demonstrate the treatment of acid drainage from abandoned coal mines in the Philipsburg, Pennsylvania area by means of an ion exchange process. Our report, covering the results of our studies and giving the basis of the proposed design, is transmitted herewith.

The studies have been sufficiently detailed to insure the technical feasibility of the project and to permit design and preparation of construction plans and specifications. Final design of the treatment plan may therefore proceed promptly in accordance with the conclusions and recommendations in the report.

We are available to review the contents of this report with you at your convenience.

(A) I

Very truly yours,

John L. Rose Project Manager

#### PRELIMINARY DESIGN REPORT

# ACID MINE DRAINAGE DEMONSTRATION PROJECT PHILIPSBURG, PENNSYLVANIA

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF MINES AND MINERAL INDUSTRIES
HARRISBURG, PENNSYLVANIA

W.O. 2674-01

July 31, 1969

### Prepared by:

- E.G. Kaup, Project Engineer P.E. Lic. No. 14952-E
- H.J. Rodriguez, Chemical Engineer
- C.R. Mazowiecki, Civil Engineer

Submitted by:

J.L. Rose, Chief Sanitary Engineer Project Manager

P.E. Lic. No. 13926-E

Approved by:

Dr. S. Baron Vice President -Engineering

# **TABLE OF CONTENTS**

	P age
REPORT Letter of Transmittal	
SUMMARY AND RECOMMENDATIONS	1
AUTHORITY FOR WORK	3
SCOPE OF WORK	3
GENERAL DESCRIPTION OF MINE DRAINAGE PROBLEM 6	
PROCESS DEVELOPMENT	15
HAWK RUN ACID MINE DRAINAGE	18
SITE AND FACILITY DESCRIPTION	22
DESCRIPTION OF PLANT AND PROCESS	24
Raw AMD Water Supply System	27
lon Exchange lon Exchange Resin Regeneration Ammonia Recovery Decarbonation, Aeration and Settling Softening Recarbonation Filtration Product Storage Waste Collection Composition of Process Streams Material Balance Hydraulic Profile Plant Operation and Manning PLANT EXPANSION TO ONE MILLION GPD	28 29 31 31 33 36 38 38 39 40 42 44 47 48 52
CAPITAL COST OF PROJECT 55 DIRECT OPERATING COSTS	58
APPENDIX Contract - Appendix,C Equipment Use Detailed Material Balance Topographical Survey	61 64 67

# **LIST OF TABLES**

<u>Page</u>

Table 1 - Mine Drainage Classes	6
Table 2 - Hawk Run Water Analyses Summary	21
Table 3 - Estimated Water Quality Throughout Treatment Process	43
Table 4 - Treatment Plant Through-put	46
Table 5 - Summary - Capital Cost of Treatment Plant Project	56
Table 6 - Itemized Capital Cost	57
Table 7 - Summary - Direct Operating Cost of Treatment Plant	
Ammonia Recovery Only	59
<u>LIST OF FIGURES</u> Figure 1 - Frequency Histogram - Sulfate Content AMD Hole #1	
Figure 2 - Frequency Histogram - Sulfate Content AMD Hole #3	
Figure 3 - Frequency Histogram - Sulfate Content AMD Confluence	
Figure 4 - Frequency Histogram - Total Iron as FE <sup>°</sup> , AMD Hole #1	
Figure 5 - Frequency Histogram - Total Iron as FE <sup>°</sup> , AMD Hole #3	
Figure 6 - Frequency Histogram - Total Iron as FE <sup>°</sup> , AMD Confluence	
Figure 7 - Schematic of Proposed Treatment Plant	
Figure 8 - Amberlite IRA-93 - Backwash Characteristics	
Figure 9 - Schematic of Proposed Treatment Plant	
Figure 10 - Hydraulic Profile	
Figure 11 - Operating Schedule	
Figure 12 - Manning Schedule	
Figure 13 - Tentative Arrangement of Future	
<u>DRAWINGS</u>	
No. 1401 - Perspective of Treatment Plant No. 1402 - Site Plan of Treatment Plant	
No. 1403 - Elevations of Treatment Plant	
No. 1404 - Section & Elevation of Treatment Plant	
No. 1405 - Floor Plan & Development of Related Areas of Treatment Plan	nt No. 1201 -
Flow Diagram of Treatment Plant	