COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF MINES

&

MINERAL INDUSTRIES

PRELIMINARY DESIGN REPORT

OF

OPERATION SCARLIFT PROJECT SL-116

ACID MINE DRAINAGE TREATMENT FACILITIES

CITY OF ALTOONA WATERSHED

HORSESHOE CURVE AREA

LOGAN TOWNSHIP

BLAIR COUNTY, PENNSYLVANIA

1968

GWIN ENGINEERS, INC. Consulting Engineers

Altoona Pennsylvania

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ALTOONA
MINE WATER
TREATMENT FACILITY
OPERATION SCARLIFT
COMMONWEALTH OF PENNSYLVANIA
Raymond P. Shafer, Governor
Department of Mines and Mineral Industries
H. B. Charmbury, Secretary
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ALTOONA, PA.
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CIVIL, SANITARY & MINING ENGINEERING
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CITY PLANNING, ZONING & REDEVELOPMENT
INVESTIGATIONS REPORTS VALUATIONS
DESIGN SUPERVISION OF CONSTRUCTION

December 11, 1968

Hon. H: B. Charmbury, Secretary
Department of Mines & Mineral
Industries Commonwealth of PA
Harrisburg, PA

Re: Project SL-116
Acid Mine Drainage Treatment Horseshoe
Curve Logan Township, Blair County

Dear Dr. Charmbury:

In compliance with the provisions of our contract dated August 22, 1968, we have conducted an intensive study and investigation of the water sources supplying potable water to the City of Altoona along with other streams in the general area, and have made studies and cost estimates of methods of eliminating the acid mine drainage contamination of the area and improving the supply of potable water to the Altoona Water System.

Attached herewith, in four (4) sections, is a detailed account of our study and recommendations along with estimates of capital and operating costs. As a summary, we have set forth below our general conclusions and recommendations.

I. CONCLUSIONS

A. Of the five general drainage areas west of the City of Altoona, three are used in whole or in part for water supply, one (Juniata Gap) is not used due to extensive residential development and the other, although used at one time, is no longer used due to acid mine drainage contamination.

The major sources of potable water are located at the Horseshoe Curve and it is necessary to by-pass Kittanning Run, due again to acid mine drainage contamination. The other stream in this area, Glen White Run, is used and is also contaminated with acid mine drainage but to a lesser extent than Kittanning Run. Mill Run and Homer's Gap are used for potable water and are not affected by acid mine drainage.

Detailed chemical analyses of these sources are given in Appendix B, however, a general summary of existing conditions is set forth below,

	pH	Acidity	Iron	Manganesese
		in parts per million		
Glen White	3.8	60	5.5	3.3
Kittanning Run	2.9	420	70.0	11. 0
Sugar Run	3.5	140	12.0	2.0
Mill Run	7.1	0	0.2	0

A review of the above data indicates why Kittanning Run is by-passed and why Sugar Run is no longer used as a source of supply.

B. Laboratory and field investigations were carried out on the acid impregnated streams (Glen White Run, Kittanning Run and Sugar Run) to determine methods and costs for neutralizing these flows to meet present stream quality criteria. Data as detailed in Appendix B shows that this can be accomplished with a combination of lime treatment, mixing, aeration and sedimentation. Cost data indicates that the operating cost for neutralization of a mixture of all three supplies would be approximately one and one-half (1. 5) cents per 1000 gallons exclusive of capital cost or sludge disposal but including chemicals, power and labor. Based upon an average flow of 9. 0 MGD, this would amount to an annual cost of approximately $50, 000.

C. Additional studies, as set forth in Appendix B, were carried out to determine the most feasible means of further treatment to render a potable water for use in the Altoona Water System.

Our studies indicated that there were two (2) methods available for this purpose: The Lime-Soda Softening Process or the Sodium Process Ion Exchanger System. Although cost data based on the stream analyses indicated there was very little difference between the two processes, we feel that the Lime-Soda Process has more flexibility and is more adaptable to meet changing conditions which might occur.

One problem for which no conclusion can be drawn at ,.this time is the effect of heavy runoff during the winter and spring seasons. Data obtained up to this time indicates that the bulk of the water placed in storage for subsequent treatment will be of a better quality than that studied during the course of preparing this report. This probability further reinforces our conclusion that the Lime-Soda Process should be utilized rather than the Ion Exchange.

D. Hydrological data on stream flows were studied and analyzed and indicate that with the inclusion of Sugar Run, Glen White Run, Scotch Run and Mill Run and utilizing the existing storage facilities, the potable water yield from this System should approach 8. 0 MGD and provide a stream release utilizing neutralized Kittanning Run water for the entire basin.

Further studies indicate that if the neutralization facilities are designed for a flow of 10, 000 GPM, then 90% of the time all water can be neutralized and the balance of the time the amount of water by-passed would depend upon the condition of the reservoirs at the time the flood flows occurred. In any event, the water by-passed would be in a highly diluted state and would not pose a serious downstream problem,

II. RECOMMENDATIONS

A. We recommend that a combined Water Treatment Plant be constructed providing separate facilities for neutralizing and for softening and filtering the water supply. We recommend that the neutralization facilities be designed for a capacity of 15. 0 MGD, utilizing lime as a neutralizing agent along with mixing, aeration and sedimentation. We also recommend that the softening and filtration portion be designed for a capacity of 7. 0 MGD to provide potable water, and that adequate flexibility be designed into the plant to provide for the use of potassium permanganate and alum for iron and manganese removal, instead of softening when the quality of the water permits such operation.

Based upon information available at this point, we have included costs for sludge disposal into abandoned deep mines. However, during the design we recommend continued study to determine if sludge filtration and drying could be accomplished satisfactorily. Preliminary data, using sludge from a similar facility, indicates that this might be possible.

Cost estimates for the project are summarized below:

Construction Cost	$2,272,892
Construction Contingency	227,108
	$2,500,000
Engineering Design	$100, 000
Core Borings	5, 500
Resident Inspection	15, 500
TOTAL PROJECT	$2, 621, 000

B. We also recommend that a water main be constructed from Sugar Run to discharge into the Impounding Dam for mixing with the Glen White water. The main should be designed to flow by gravity and have a capacity of 10, 000 GPM.

The point of intake should be considered very carefully so that all mine drainage can be taken, thus removing from that stream the presence of acid mine drainage pollution. Although normal stream regulations require that a certain amount of flow be released, we would recommend that an attempt be made, in this instance, to forego that requirement for the following reasons:

1. A stream quality discharge from the Proposed Treatment Plant will supply the discharge requirement for the entire area.

2. The area below the proposed intake for a distance of about two miles is unpopulated and there would be a drainage area of about two (2) square miles above the first populated areas, and this area is uncontaminated by mine drainage.

3. The new proposed relocated Traffic Route 22 will traverse the area prohibiting any development.

4. Sugar Run and Burgoon Run combine within the City at a point some three (3) miles below the point of intake.

5. If a stream release is made, it will be of a quality unsuitable for use or fish life.

6. Periodic high flows when the quality is improved would keep the stream bed flushed.

Consequently, we recommend that an attempt be made to forego the required release, thus enabling the proposed plant to neutralize all mine drainage from the area between the existing Route 22 on Cresson Mountain and the Bells Gap area, all of which flows into the upper reaches of the Beaverdam Branch of the Juniata River.

C. We further recommend that the Mill Run source be connected to the potable water portion of the Treatment Plant to reduce softening costs and provide a uniform water to the Water System customers. This will, in addition, make use of the storage available in this watershed.

D. We recommend that this proposed plant be located between the Impounding Reservoir and Lake Altoona, making use of the upper two (2) reservoirs for collection and storage of high flows and the lower reservoir for storage of neutralized water. By locating the plant at this point, the following advantages can be realized:

1. Kittanning Run can be kept separate, or added to the other supplies as required by operating conditions.

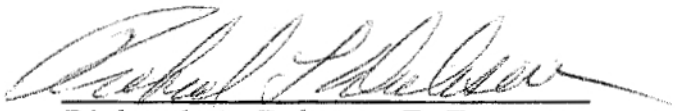
2. Mill Run can be brought to the site by gravity.

3. Water can be fed into the low pressure system by gravity.

E. And finally, we recommend that some further field investigation be made to more fully explore the possibility of sludge filtration and drying.

We wish to express our appreciation to the officials and employees of the City of Altoona for their kind consideration and help in conducting these studies.

Respectfully submitted,
GWIN ENGINEERS, INC.
Consulting Engineers



Richard T. Dobson, P.E.
Chief Engineer - Sanitary

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