APPENDIX D

DESIGN CRITERIA

I. Basis of Design

		Acid Mine Drainage Facilities	Potable Water Facilities
A.	Capacity Operation	15.0 MGD or 10,500 GPM 24 hrs/day	7.0 MGD or 4,860 GPM 24 hrs/day
B.	Treatment Process	Neutralization of Acid, Oxidation of Iron & Manganese	Lime-Soda Ash Softening pH Adjustment, Filtration
C.	Filtration Rate		2.0 GPM/ft^2
D.	Upflow Rate		1.25 GPM/ft^2

II. Flash Mix Basin

Flow Rate = 10,500 GPM = 1404 CF/M
Detention = 2 minutes
Required Capacity = 2 x 1404 - 2808 CF
Provide two (2) basins, each 14' x 14' x 7.5' SWD capacity - 1470 CF
Install Flash Meters - 20 HP Motors

III. Slow Mix Chamber

Flow Rate = 10,500 GPM = 1404 CF/M
Detention = 15 minutes
Required Capacity = 15 x 1404 = 21,060 CF
Provide eight (8) chambers, each 15' x 15' x 12' SWD capacity - 2700 CF
Install Mixers - 5 HP Motors

IV. Aeration Basin

Flow Rate = 10,500 GPM = 1404 CF/M
Detention = 28 minutes
Required Capacity = 28 x 1404 = 39,312 CF
Provide two (2) basins, each 38' x 38' x 14' SWD capacity - 20,216 CF
Install Aerators - 40 HP Motors

V. Sedimentation Tank

Flow Rate = 10,500 GPM = 1404 CF/M
Detention = 4 hours
Required Capacity = 240 x 1404 = 336,969 CF
Provide two (2) tanks - each 115' diameter x 20' center depth -
Available capacity = 172,500 CF

VI. Softener Units

Flow Rate = 4,860 GPM
Up flow Rate = 1.25 GPM/SF
Required Area = 3888 SF
Provide two (2) tanks - each 56' diameter x 15' SWD Area = 1900 SF
Provide pH Adjustment Equipment

VII. Rapid Sand Filters

Flow Rate = 4,860 GPM
Filtration Rate = 2 GPM/SF
Required Area = 4860 ÷ 2 = 2430 SF
Provide six (6) filters at 24' x 20' each
Assume 2.67' channel
Total Area (24 - 2.67) x 20 x 6 = 2560 SF
Filtration Rate = 4860 ÷ 2560 = 1.90 GPM/SF

VIII. Pumping System

a. Provide pumps for lifting treated effluent to City of Altoona's high service distribution reservoirs. Use three pumps at 1200 GPM each.

Head Required = 1496 - 1366 = 130'

b. Provide low lift pumps for lifting Lake Altoona when upper reservoirs are low. Use three pumps at 1750 GPM each.

Head Required = 1420 - 1340 = 80'

IX. Backwash System

Use water from 16" Main from Kittanning Point Reservoir with Flow Regulators. Discharge backwash into backwash lagoons and overflow into Lake Altoona.

X. Sludge Disposal

Provide Sludge Thickener for additional sludge concentration. Pump sludge abandoned coal mines located above Horseshoe Curve Area. Overflow supernatent to backwash lagoons.

XI. Chemical Feed Equipment

a. 2 Chlorinators at 500# capacity each.

b. Duplicate lime feeding equipment.

c. Duplicate Soda Ash feeding equipment.

d. Duplicate Coagulant Aid feeding equipment.

e. Duplicate Permanganate and Alum feeding equipment.

f. Duplicate Phosphate feeding equipment.

XII. Control Equipment

Acid Mine Drainage Facilities	Potable Water Facilities
Use variable control based upon by-pass channel and reservoir levels and water quality	Use variable control based upon clearwell level

Lime and Soda Ash feed based upon pH monitoring control.