

YONKERS RUN SUB-BASIN

INDEX

	<u>Page No.</u>
Discussion of Sub-Basin	A-145
Water Quality Sampling Stations	A- 145
Water Quality Prior to Strip-Mining	A-148
Mines Shown on Pennsylvania Department of Health's Sketch Maps	A-150
Sources of Pollution	
AREA 15	A-152
AREA 16	A-155
AREA 27	A-158
AREA 32	A-161
AREAS Discussed in Other Sub-Basins	A-163

YONKERS RUN SUB-BASIN

Discussion of Sub-Basin

Yonkers Run has a drainage area of approximately 657 acres. Five significant sources of acid mine drainage pollution are located within the sub-basin and consist of a small portion of strip-mine Area L4, the coal refuse dumping and storage areas used by the operators of the H. C. Quinn Mine (Area L5), the H. C. Quinn Mine (Area L6), most of Area 27 strip-mine, and a coal mine refuse pile located approximately 150 feet east of Township Road 367 and 0.5 miles south of the junction of Township Road 367 and 37L (Area 32). The acid pollution of Yonkers Run SubBasin as contributed from these sources represent approximately 5 percent of the total acid mine drainage pollution in the East Branch Clarion River Watershed.

Water Quality Sampling Stations

Six sampling stations were established in the Yonkers Run Sub-Basin. The location, drainage area and summary of water quality test results for each of the sampling stations are:

Station 5969 was located on the main branch of Yonkers Run at the upstream end of a culvert under Township Road 37L which is about 300 feet upstream of the point West Fork enters the main stream.. This station was sampled five times between February L2, L969 and August L6, L969 during which time no measurable acid load was found. Minimum and maximum test values were as follows:

	<u>Minimum</u>	<u>Maximum</u>
pH	5.15	5.50
Total Acidity (mg/L)	2.5	3.0
Free Acidity (mg/L)	0.0	0.0
Alkalinity (mg/L)	0.2	1.0
Sulfate (mg/L)	8.	15,
Total Iron (mg/ L)	0.03	0.45
Flow (cfs)	0.06	0.36

Station 5970 was located on the west fork at the upstream end of a culvert under Township Road 367 at which point the drainage area was about 87 acres. This station was sampled seven times between February L2, L969 and October 24, L969. The maximum acid load was L4 lbs. per day on February L2, L969. The water quality test results for other six samples indicated acid load of 5 lbs. per day or less. Following are the minimum and maximum test values.

	<u>Minimum</u>	<u>Maximum</u>
pH	4.35	6.00
Total Acidity (mg/L)	8.5	27.0
Free Acidity (mg/L)	0.0	8.5
Alkalinity (mg / L)	0.0	7.5
Sulfate (mg/ L)	L03.	232.
Total Iron (mg/ L)	0.07	2.73
Manganese (mg/ L)	2. 7	3.4
Flow (cfs)	0.0L	0. L0

Station 5920 was located on the main branch approximately 600 feet upstream of the South Fork and under a bridge spanning Township Road 37L. The drainage area at this point is about 476 acres. This station was sampled 23 times between November 29, L968 and November 20, L969. The maximum acid load was 28L lbs. per day on April 2, L969. The water quality tests indicated the acid load was L00 lbs. per day or greater for only three of the samples and was 7 lbs. per day or less for LL of the samples. The water quality tests indicated the following minimum and maximum values.

	<u>Minimum</u>	<u>Maximum</u>
pH	4.55	4.85
Total Acidity (mg/ L)	6.5	L0. 0
Free Acidity (mg/L)	0.0	L.5
Alkalinity (mg L)	0.0	0.0
Sulfate (mg/L)	36.	77.
Total Iron (mg L),	0.03	0. 75
Manganese (mg/L)	L.2	2.4
Flow (cfs)	0.07	5.2L

Station 597L was located in the headwaters of the south fork of Yonkers Run at a point where the stream receives discharge from the south heading of the H. C. Quinn Mine. This station was sampled twice, on April 19, 1969 and May 29, 1969. The acid load on these dates was 53 and 99 lbs. per day respectively. The water quality tests indicated the following values:

	<u>April 19, 1969</u>	<u>May 29, 1969</u>
pH	3.50	3.40
Total Acidity (mg/L)	330.0	615.0
Free Acidity (mg/L)	76.0	182.0
Alkalinity (mg/L)	0.6	0.0
Sulfate (mg/L)	140.0	1800.0
Total Iron (mg/L)	13.20	
Manganese (mg/L)	115.0	
Flow (cfs)	0.03	0.03

Station 592L was located on the south fork of Yonkers Run at the upstream of a culvert under Township Road 37L which is approximately 100 feet from the mouth of the tributary. The drainage area at this point is about 140 acres. At this point the stream should be receiving all the acid mine drainage from the H. C. Quinn Mine (Area L5) in addition to some drainage from Areas L4 and L5. Station 592L was sampled 26 times between November 20, 1968 and December 19, 1969. The maximum acid load was 580 lbs. per day on March 21, 1969. Twelve of the water quality tests indicated the acid load exceeding 190 lbs. per day and for 8 of the test results, the acid load was more than 100 lbs. per day. Minimum and maximum test values were as follows:

	<u>Minimum</u>	<u>Maximum</u>
pH	3.15	3.65
Total Acidity (mg/L)	80.0	485.0
Free Acidity (mg/L)	23.0	145.0
Alkalinity (mg/L)	0.0	0.0
Sulfate (mg/L)	30.0	1547.0
Total Iron (mg/L)	0.94	3.85
Manganese (mg/L)	17.0	88.0
Flow (cfs)	0.01	1.14

Station 5922 was located near the mouth of Yonkers Run and samples all but a few acres of the entire Yonkers Run Sub-Basin. This station was sampled 25 times between November 28, 1968 and December 18, 1969. The maximum acid load was 85 lbs. per day on March 21, 1969. Seventeen of the water quality tests indicated the acid load exceeding 60 lbs. per day and 11 of these tests indicated the acid load was more than 300 lbs. per day. The range of test values were as follows

	<u>Minimum</u>	<u>Maximum</u>
pH	3.65	4.40
Total Acidity (mg/L)	19.0	120.0
Free Acidity (mg/L)	1.4	47.0
Alkalinity (mg/L)	0.0	0.0
Sulfate (mg/ L)	8.1	477.0
Total Iron (mg/L)	0.08	0.70
Manganese (mg/ L)	4.1	21.0
Flow (cfs)	0.09	7.17

The water quality test results for Stations 5920, 5969 and 5970 indicate there is little acid mine drainage being discharged into Yonkers Run above the point where the south fork enters the main stream..

Water Quality Prior to Strip-Mining

The earliest records of water quality tests for the Yonkers Run sub-basin made by the Pennsylvania Department of Health are dated May, 1951. At this time, strip-mining in Area 27 was completed and the strip-mining of Area L4 was in progress. An analysis of the water quality data shows Yonkers Run was probably a polluted stream prior to the start of strip-mining because of the number of abandoned deep mines in this sub-basin, but it became more polluted with acid mine drainage as the result of strip-mining. If all the pollution sources were cleaned up. Yonkers Run would have a pH between 6 and 7 and the stream would be alkaline.

The Pennsylvania Department of Health's water quality test results are as follows:

1) West Branch of Yonkers Run at Township Road 367 -
Same Location as Station 5970

<u>Date</u>	<u>pH</u>	<u>Total Acidity</u>	<u>Sulfates</u>	<u>Total Iron</u>
5/01/51	6.2	2.0		
5/16/57	4.72	14.0	88.	
9/09/59	6.7	0.0	56.	

2) Yonkers Run at Township Road 371, Upstream of the South
Fork - Same Location as 5920

<u>Date</u>	<u>pH</u>	<u>Total Acidity</u>	<u>Sulfates</u>	<u>Total Iron</u>
5/01/51	5.7	2.0		
7/19/56	5.7	2.0	13.	
9/19/59	6.15	0.0	8.	

3) H. C. Quinn Mine Compare with Station 5971

<u>Date</u>	<u>pH</u>	<u>Total Acidity</u>	<u>Sulfates</u>	<u>Total Iron</u>	<u>Acid PPD</u>	<u>Remarks</u>
4/11/51	3.3	110.0	240.	39.0	63.	South heading
4/11/51	3.6	30.0	50.	5.6	4.	North heading
3/12/53	2.95	220.0	300.		127.	Combined
7/23/53	2.65	480.0	630.	104.0	332.	Combined
9/08/59	3.0	300.0	700.		47.	South heading
9/08/59	3.4	134.0	1890.	1.1	7.	North heading

4) South Fork of Yonkers Run at Township Road 371 - Same
Location as Station 5921

<u>Date</u>	<u>pH</u>	<u>Total Acidity</u>	<u>Sulfates</u>	<u>Total Iron</u>
5/01/51	3.78	32.0		
3/12/53	3.38	110.0	190.	
7/23/53	3.11	190.0	200.	8.96
8/15/56	3.68	70.0	110.	2.24
9/09/59	3.05	340.0	660.	

5) Yonkers Run Near the Mouth - Compare with Station 5922

<u>Date</u>	<u>pH</u>	<u>Total Acidity</u>	<u>Sulfates</u>	<u>Total Iron</u>
5/01/51	4.7	6.0		
3/12/53	4.11	16.0	30.	
7/23/53	3.82	48.0	100.	
7/19/56	4.26	16.0	50.	
4/03/59	5.28	4.0		
9/05/59	3.72	74.0	241.	
9/09/59	3.7	78.0	262.	
8/30/60	3.63	126.0	454.	

Mines Shown on Pennsylvania Department of Health's Sketch Map

In addition to the H. C. Quinn Mine, four other mines are shown on the Pennsylvania Department of Health's sketch map as being in the Yonkers Run sub-basin. They are as follows:

No. 2 Mine

The Pennsylvania Department of Health in their August L953 report to the Sanitary Water Board reported this mine to be 225 feet west of a point on Township Road 37L which is 0.5 miles southeast of the junction of Township Roads 367 and 37L. During investigations for this report this mine could not be located either in the field or on aerial photographs. It may have been farther up the slope and in the area later strip-mined as part of the Area L4 operation.

No. 3 Mine

This mine was reported to be located 50 feet east of a point on Township Road 367 which is 0.45 miles south of the junction of Township Roads 367 and 37L. The mine heading was caved and no seepage from the mine was reported. The coal refuse bank (Area 32) belonging to this mine was located about 150 feet east of Township Road 367 and was adjacent to the strip-mined area. The mine workings were stripped during the Area L4 strip-mining operation.

No. 5 Mine

This mine had two headings and was reported to be located 1750 feet east of a point on Township Road 367 which is 0.7 miles south of the junction of Township Roads 367 and 37L. According to the Pennsylvania Department of Health, the headings were caved and there was no seepage from the mine. Again, this mine could not be located during this investigation either in the field or on aerial photographs. The location given would place the mine just above the Area L5 refuse storage area. It may be in the area covered by mine refuse or it may have been farther up the slope in what is now the Area L4 strip-mine.

No. 7 Mine

This mine was reported to be located 100 feet west of a point on Township Road 367 which is 0.475 miles south of the junction of Township Roads 367 and 37L. No drainage was reported from the opening which was stripped by the Mahoning Corporation. The trail that led to this mine was located during this investigation which indicated the area was later stripped.

Source of Pollution

AREA L5

Area L5 was connected to the H. C. Quinn Mine by a railroad spur line and was used as a storage area and site for dumping coal mine refuse from the mine. There are also indications of a deep mine in this location, but the heading of the mine was not found as it was probably covered by mine refuse. The deep mine would be in the Clarion Coal and is possibly the No. 5 Mine shown on the Pennsylvania Department of Health's sketch map of the deep mines and strip-mines in the East Branch Clarion River Watershed. The area affected by mine waste deposits is about 8 acres and is considered a significant source of pollution. The thickness and the extent of the mine waste deposits vary from place to place, but it is estimated that the volume is about 30, 000 cu. yds. The total area affected by these deposits is about 8 acres.

Recommended Abatement Measures - The average acid discharge from this source is estimated, on the basis of water quality tests performed over a one year period, to be approximately 45 lbs. per day or less than L percent of the total average daily acid load contributed by pollution sources in the East Branch Clarion River Watershed.

It is recommended that the coal mine waste be removed and the area planted to trees and grass. The reclamation requirements are as follows:

Reclamation Requirements

Earthwork

Removal of coal mine waste material (Estimate
30, 000 C. Y.)

Soil Treatment

Standard Ground Limestone 6 Tons per Ac.
(Total application to contain a minimum of 240 lbs. magnesium per Ac.)

50-200-200 in lbs. N-P₂O₅-K₂O per Acre

Planting

Black locust	900 per Ac.
Creeping red fescue	20 lbs. per Ac.
Weeping lovegrass	3 lbs. per Ac.

Mulching

Hay	2 Tons per Ac.
-----	----------------

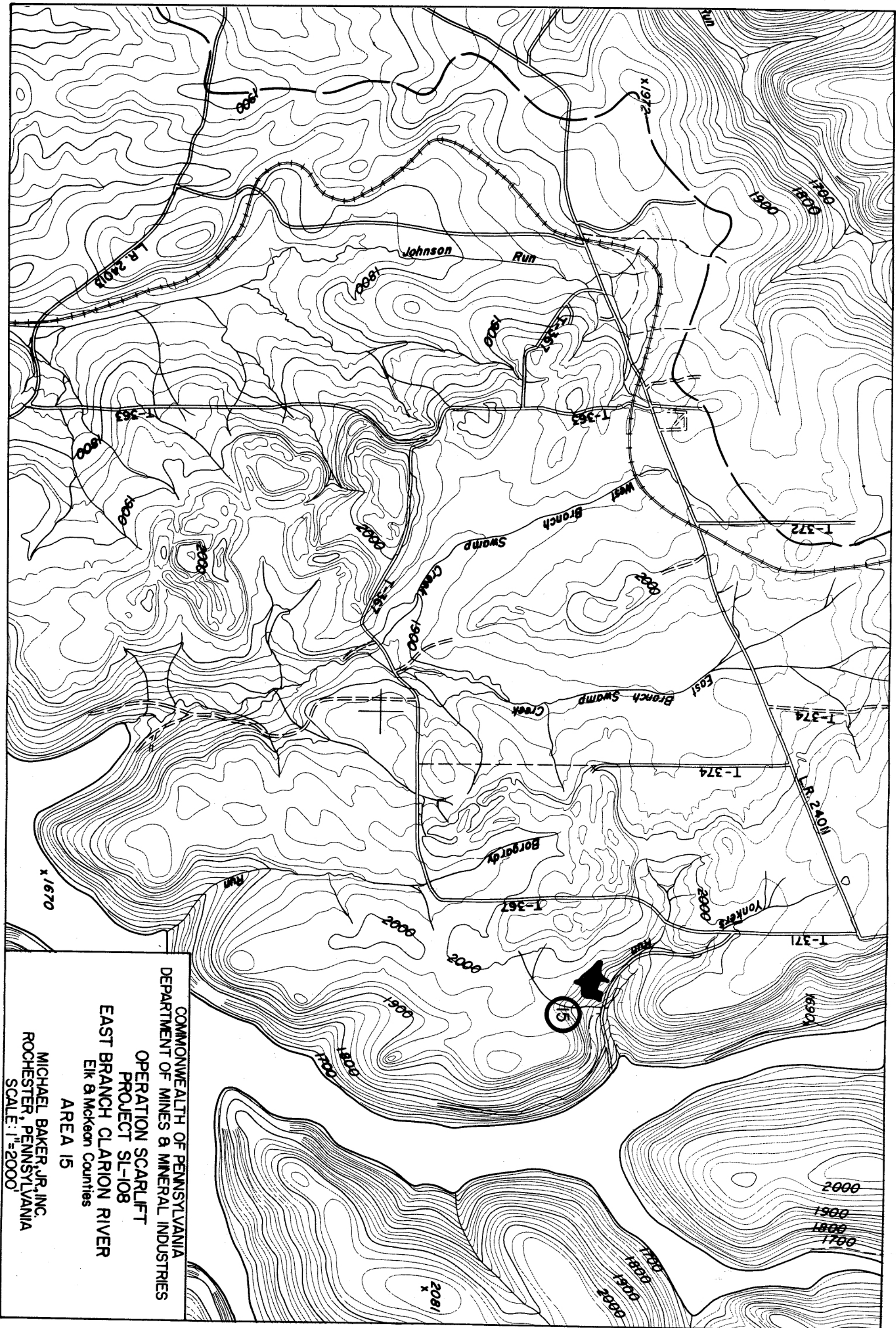
Special Requirements

The coal mine waste shall be dumped into the pit in the northeastern part of the Area 11 Strip-Mine.

Limestone and fertilizer in separate applications shall be spread and incorporated into the soil to a minimum depth of 4 inches. Seed shall be applied by disc drill or comparable method. Tree planting shall be done with a minimum disturbance to the seed bed.

Cost of Methods of Abatement

<u>Description</u>	<u>Estimated Percent Abatement</u>	<u>Estimated Cost</u>
<u>AREA 15</u>		
Remove coal waste material, soil treatment and planting	100%	\$102,000



COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF MINES & MINERAL INDUSTRIES
 OPERATION SCARLIFT
 PROJECT SL-108
 EAST BRANCH CLARION RIVER
 Elk & Mckean Counties
 AREA 15
 MICHAEL BAKER, JR., INC.
 ROCHESTER, PENNSYLVANIA
 SCALE: 1"=2000'

Source of Pollution

AREA L6

Area L6 is the location of the twin headings of the H. C. Quinn Mine, a significant source of acid mine drainage pollution in the Yonkers Run sub-basin. There is no direct method of measuring the total-acid discharge from the mine because there is seepage from two caved headings and from the ground surface. There may be ground water flow from the Area L4 strip-mine into the workings of the mine.

Coal Production - The coal production records for this mine are not available but it is estimated that the extent of the underground mining operation covered about 11 acres and the coal production was about 36, 000 tons.

The estimates are based on the following assumptions:

- L)
- 1) The mine headings were connected to the Area L5 storage and mine waste dumping site by a railroad spur line.
 - 2) The strip-mine operators stripped all the mines on this side of the hill except the H. C. Quinn Mines, probably because most of the coal was removed.
 - 3) The area in between the southern limits of the Area L4 strip-mine and the crop line of the Lower Kittanning Coal is about 11 acres.
 - 4) If the average thickness of the Lower Kittanning Coal is three feet, each acre would contain about 5, 500 tons of coal in place. The coal recovery in mining at this location was 60 percent.

Therefore: 5, 500 tons x .60 x 11 acres = 36, 000 tons.

Recommended Abatement Measures -The average acid discharge from this source is estimated, on the basis of water quality tests performed over a one year period, to be approximately 150 lbs. per day or 2.7 percent- of the total average daily acid load contributed by pollution sources in the East Branch Clarion River Watershed.

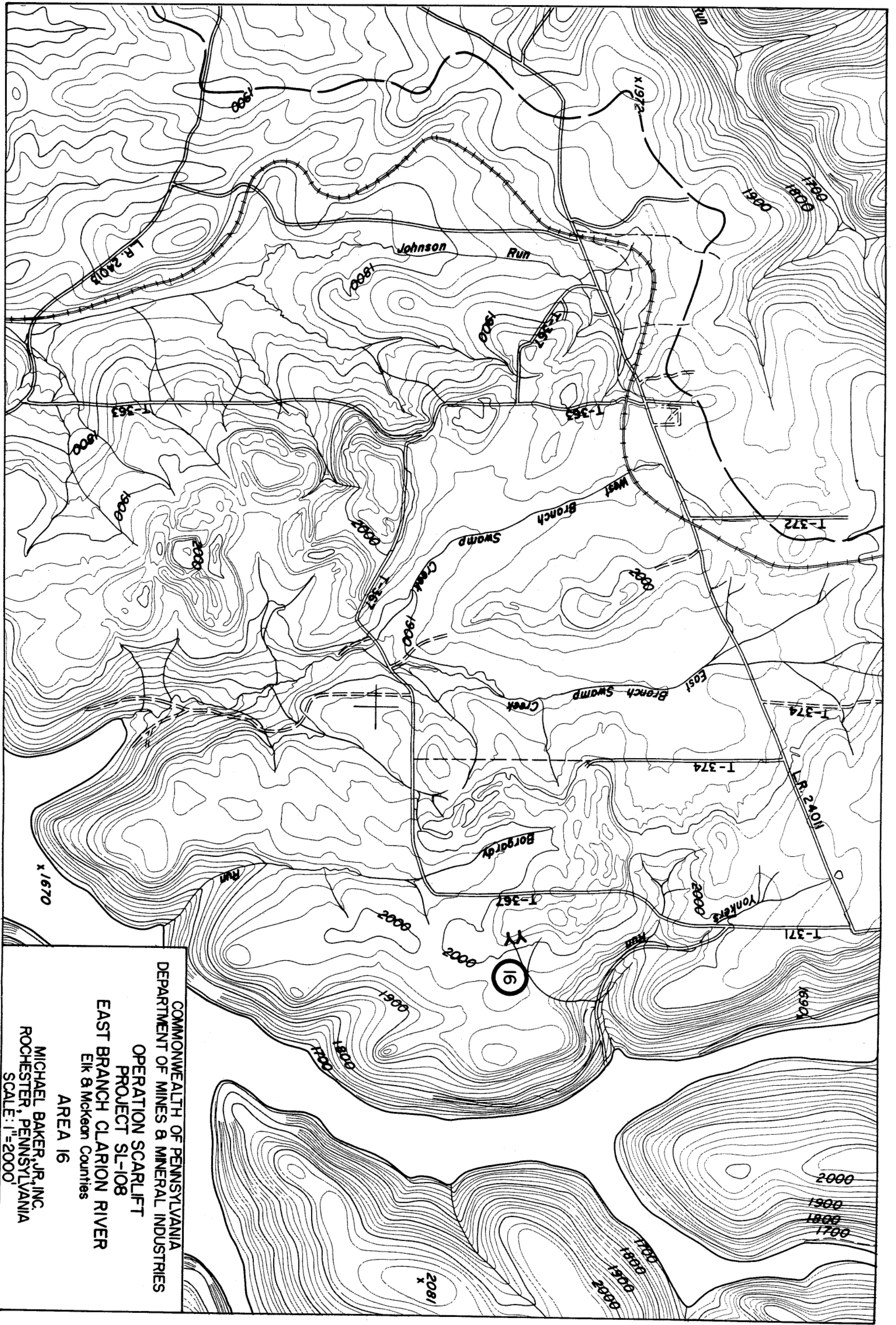
It is recommended the H, C, Quinn Mine be sealed. Double bulkhead grout seals should be constructed at the two headings. A grout curtain should be constructed across the area between the headings and for a distance of 150 feet on the outside of each heading, i. e. , a distance of 150 feet north of the north heading and 150 feet south of the south heading. The reclamation requirements are as follows:

Reclamation Requirements

1. Construction of two (2) double bulkhead grout seals.
2. Construction of a grout curtain with an estimated length of 450 feet.

Cost of Methods of Abatement

<u>Description</u>	<u>Estimated Percent Abatement</u>	<u>Estimated Cost</u>
<u>AREA 16</u>		
Construct two double bulkhead seals and grout curtain	95%	\$69,000



COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF MINES & MINERAL INDUSTRIES
 OPERATION SCARLIFT
 PROJECT SL-108
 EAST BRANCH CLARION RIVER
 Elk & Mckean Counties
 AREA 16
 MICHAEL BAKER, JR., INC.
 ROCHESTER, PENNSYLVANIA
 SCALE: 1"=2000'

Source of Pollution

AREA 27

Area 27 is a small strip-mined area stripped for the Lower Kittanning Coal by the Juliette Coal Company. Most of the stripmine is in the Yonkers Run sub-basin and the total area is 8.7 acres. According to the records of the Pennsylvania Department of Health the area was illegally stripped about twenty years ago. This is a minor source of acid mine drainage pollution. However, there is little vegetation growing on the spoil material,

Recommended Abatement Measures - The average acid discharge from this source is estimated, on the basis of water quality tests performed over a one year period, to be approximately 10 lbs. per day or less than 0.2 percent of the total average daily acid load contributed by sources in the East Branch Clarion River Watershed.

It is recommended that contour grading be done and the area planted to trees and grass. The reclamation requirements are as follows:

Reclamation Requirements

Earthwork

Contour grading (estimate 20,000 C. Y.)

Soil Treatment

Standard Ground Limestone 6 Tons per Ac.
(Total application to contain a
minimum of 240 lbs. magnesium
per Acre)

50-200-200 in lbs. N-P₂O₅-K₂O per Ac.

Planting

Black locust 900 per Ac.
Creeping red fescue 20 lbs. per Ac.
Weeping lovegrass 3 lbs. per Ac.

Mulching

Hay

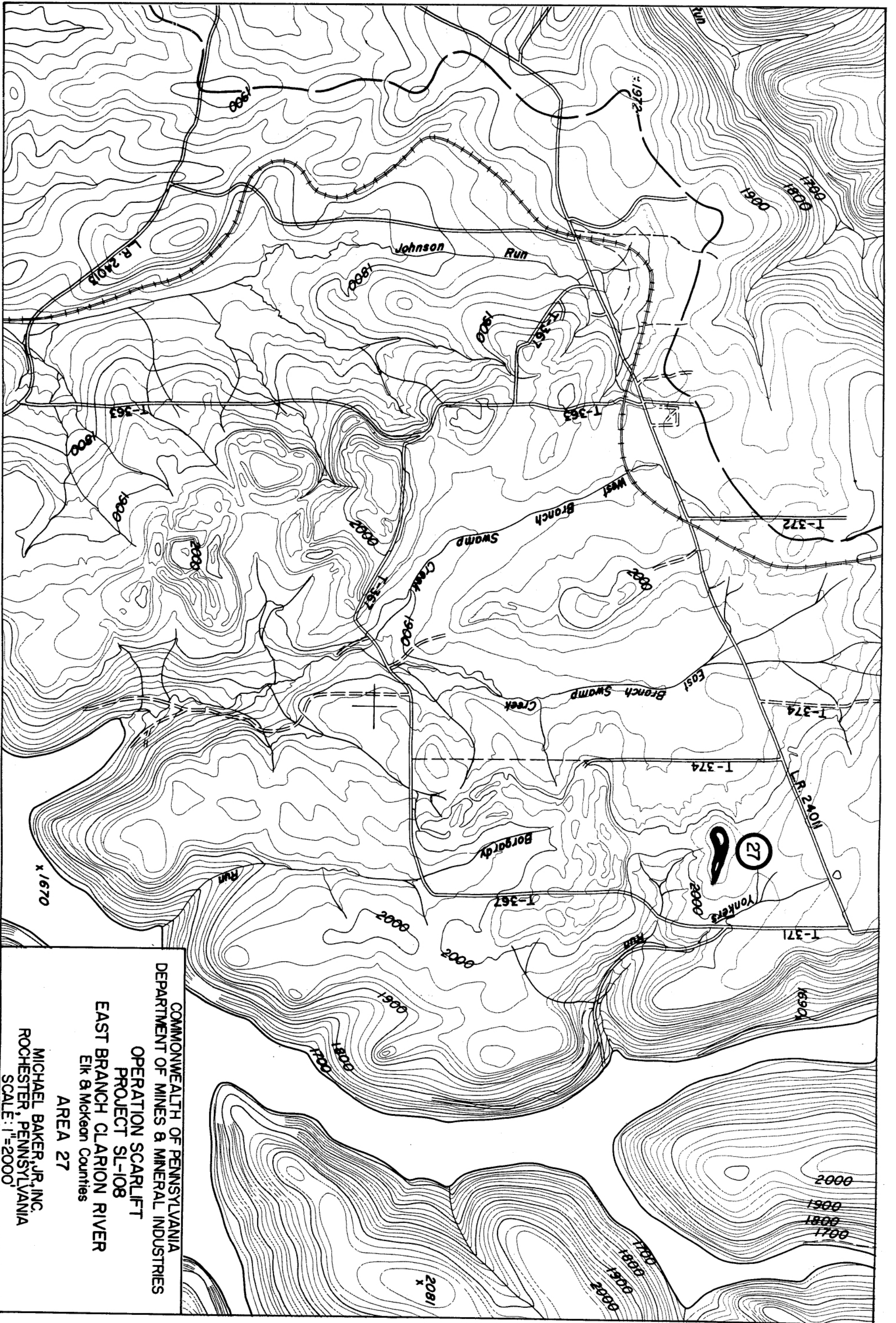
2 Tons per Ac.

Special Requirements

Limestone and fertilizer in separate applications shall be spread and incorporated into the soil to a minimum depth of 4 inches. Seed shall be applied by disc drill or comparable method. Tree planting shall be done with a minimum disturbance to the seed bed.

Cost of Methods of Abatement

<u>Description</u>	<u>Estimated Percent Abatement</u>	<u>Estimated Cost</u>
<u>AREA 27</u>		
Contour grade to improve drainage, soil treatment and planting	65%	\$15,000



COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF MINES & MINERAL INDUSTRIES
 OPERATION SCARLIFT
 PROJECT SL-108
 EAST BRANCH CLARION RIVER
 Elk & Mckeon Counties
 AREA 27
 MICHAEL BAKER, JR., INC.
 ROCHESTER, PENNSYLVANIA
 SCALE: 1"=2000'

Source of Pollution

AREA 32

Area 32 is a coal mine refuse bank adjacent to the north end of the Area L4 strip-mine. The drift mine from which this material was derived was stripped as part of the Area L4 mining operation.

Recommended Abatement Measures - The average acid discharge from this source is estimated, on the basis of water quality tests performed over a one year period, to be approximately 10 lbs.

per day or less than 0.2 percent of the total average daily acid load contributed by pollution sources in the East Branch Clarion River Watershed.

It is recommended that the coal mine waste be removed. The reclamation requirements are as follows:

Reclamation Requirements

Earthwork

Removal of coal mine waste
(Estimate 750 C. Y.)

Special Requirements

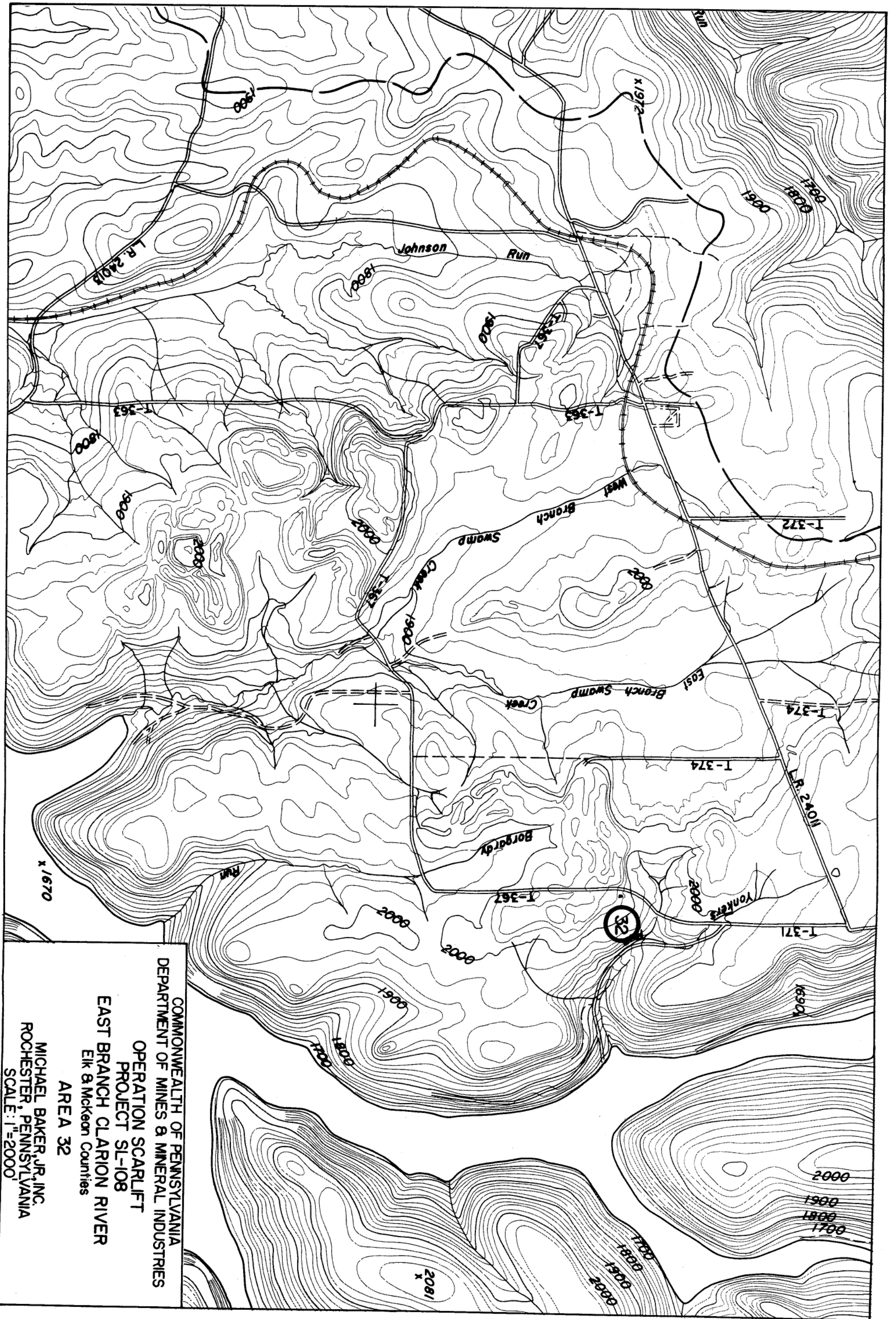
The coal mine waste shall be buried in the bottom of a pit in the northern part of the Area 14 strip-mine.

Cost of Methods of Abatement

<u>Description</u>	<u>Estimated Percent Abatement</u>	<u>Estimated Cost</u>
--------------------	------------------------------------	-----------------------

AREA 32

Remove coal waste material	95%	\$1,700
----------------------------	-----	---------



COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF MINES & MINERAL INDUSTRIES
 OPERATION SCARLIFT
 PROJECT SL-108
 EAST BRANCH CLARION RIVER
 Elk & Mckeon Counties
 AREA 32
 MICHAEL BAKER, JR., INC.
 ROCHESTER, PENNSYLVANIA
 SCALE: 1"=2000'

Source of Pollution

AREA Discussed in Other Sub-Basins

AREA L4

Area L4 is the largest strip-mine in the East Branch Clarion River Watershed and approximately 89 percent of the area is in the Swamp Creek and Borgardy Run Sub-Basin. Within the Yonkers Run Sub-Basins, the average acid discharge from this source is estimated, on the basis of water quality tests performed over a one year period, to be approximately 60 lbs. per day or about 7 percent of the total average daily acid load produced by this source. Area L4 is discussed in the Swamp Creek section of the report, page A-58.