

EAST BRANCH CLARION RIVER  
MAIN BRANCH

INDEX

	<u>Page No.</u>
Discussion of Main Branch	A-2
Water-Quality Sampling Stations	A-2
Water Quality Prior to Strip Mining	A-9
Headwaters of the Potato Creek Watershed	A-10
Sources of Pollution	
Areas 36 and 37	A-11
Area 38	A-12
Areas 39 and 40	A-12
Area 41	A-12

## EAST BRANCH CLARION RIVER MAIN BRANCH

### Discussion of Main Branch

The East Branch Clarion River has a drainage area of approximately 69,708 acres and the length of the main branch is about 19 miles. Tributary streams account for about 57,827 acres of drainage. The direct runoff into the main branch, including the area of the East Branch Reservoir, comes from about 11,881 acres.

Seven tributary streams of the East Branch Clarion River are polluted by acid mine drainage, but there are no significant sources of acid mine drainage pollution on the main branch. The only sources of pollution are two small clay pits (Areas 36 and 37) in the headwaters near the village of Clermont. The water quality test results indicated that the average daily acid discharge from these sources in 1969 was less than one pound per day from each source.

Most of the acid mine drainage comes from sources within the drainage areas of two tributary streams. Swamp Creek and Johnson Run accounted for approximately 86 percent of the estimated average daily acid discharge of the entire East Branch Clarion River Watershed for the year 1969. The other tributary streams polluted by acid mine drainage are Borgardy Run, Yonkers Run, Smith Run, Twomile Run and Gum Boot Run.

The acid discharges from sources within the drainage areas of the seven tributary streams have resulted in the main branch of the East Branch Clarion River being polluted for the entire length below the point where Twomile Run enters the main branch.

### Water Quality Sampling Stations

Fifteen water quality sampling stations were established on the main branch to determine the water quality of the streams and water impounded in the reservoir. The location, drainage area and summary of water quality test results for each of the sampling stations are:

Station 5933 was located at the north end of a drainage pipe under Legislative Route 42013. The drainage area of this station is about ten acres and includes approximately all of the five acre clay pit (Area 36). The drainage from this point is into the headwater of the East Branch Clarion River. Station 5933 was sampled 17 times between November 29, 1968 and October 23, 1969. The average daily acid discharge for the testing period was estimated to be less than one lb. per day. Following is the minimum and maximum values indicated by the water quality tests.

A shallow pond within a clay pit (Area 37) southeast of Station 5933 was sampled on February 26, 1969 and the water quality test results were: pH 4.

	<u>Minimum</u>	<u>Maximum</u>
pH	4.55	5.95
Total Acidity (mg/l)	0.0	15.0
Free Acidity (mg/l)	0.0	4.0
Alkalinity (mg/l)	0.0	12.5
Sulfate (mg/l)	35.0	76.
Total Iron (mg/l)	0.31	2.17
Flow (cfs)	0.00	0.09

70, sulfates 12 mg/ l, total iron 0.21 mg/ l and no free acidity. On the same day, a spring 800 feet west of Station 5933 was sampled with the following test results: pH 5.00, sulfates 11 mg/ l, total iron 0.29 mg/ l and no free acidity. The total acidity of both of these samples was 3.0 mg/ l.

Station 5954 was established about 1,200 feet upstream of the point that Martin Run enters East Branch Clarion River. The drainage area measured by this station is approximately 953 acres. This station was sampled 22 times between November 29, 1968 and October 23, 1969 and following are the indicated minimum and maximum test values.

	<u>Minimum</u>	<u>Maximum</u>
pH	4.55	5.75
Total Acidity (mg/l)	1.0	5.6
Free Acidity (mg/l)	0.0	0.5
Alkalinity (mg/l)	0.0	1.5
Sulfate (mg/l)	3.	15.
Total Iron (mg/l)	0.04	2.16
Flow (cfs)	0.09	5.13

This station is in the headwaters of the East Branch Clarion River and the water quality tests indicate the river is not being polluted to any extent by acid drainage from past mining operations in the vicinity of the village of Clermont. The drainage, from most of the mining operations, flows into Warner Brook and Red Mill Brook located in the Potato Creek watershed. Indications were that low pH's occurred at times of high flow and surface runoff causing flushing of organic acids from the drainage area.

Station 5955 was located at a point 200 feet upstream of where Twomile Run enters the East Branch Clarion River, measuring a drainage area of approximately 2, 758 acres. This station was sampled 19 times between November 29, 1968 and October 23, 1969. Eighteen of the tests indicated no free acidity with the only exception being that taken on April 3, 1969, a day of abnormally high stream flow. Test ranges were as follows:

Station 5956 was established 200 feet upstream of the point where Gum Boot Run enters the East Branch Clarion River. This station measures an area of approximately 3, 215 acres and was sampled 19 times between November 29, 1968 and October 23, 1969. The average daily acid load for the year 1969 was estimated to be 227 lbs. per day. Following are the minimum and maximum values of the water quality tests.

	<u>Minimum</u>	<u>Maximum</u>
pH	4.65	5.80
Total Acidity (mg/l)	2.0	5.0
Free Acidity (mg/l)	0.0	0.2
Alkalinity (mg/l)	0.0	1.5
Sulfate (mg/l)	4.	11.
Total Iron (mg/l)	0.07	1.32
Flow (cfs)	0.42	24.35

	<u>Minimum</u>	<u>Maximum</u>
pH	4.35	4.90
Total Acidity (mg/l)	3.0	10.0
Free Acidity (mg/l)	0.0	4.0
Alkalinity (mg/l)	0.0	0.0
Sulfate (mg/l)	9.	23.
Total Iron (mg/l)	0.07	0.91
Flow (cfs)	0.49	28.39

Station 5972 was located at a point 200 feet upstream of where Buck Run enters East Branch Clarion River and reflects a drainage area of approximately 4, 525 acres. This station was sampled five times between April 3, 1969 and June 11, 1969 and the average daily acid load during this period of sampling was estimated to be 612 lbs. per day. The following range in water quality was indicated:

Station 5957 was established just upstream of the point Smith Run enters East Branch Clarion River. This station which samples a drainage area of approximately 5, 688 acres was sampled six times between December 20, 1968 and June 11, 1969. The average daily acid load during

	<u>Minimum</u>	<u>Maximum</u>
pH	4.10	4.35
Total Acidity (mg/l)	7.5	9.0
Free Acidity (mg/l)	1.5	4.5

	<u>Minimum</u>	<u>Maximum</u>
pH	4.40	4.60
Total Acidity (mg/l)	5.0	8.0
Free Acidity (mg/l)	0.2	3.0
Alkalinity (mg/l)	0.0	0.0
Sulfate (mg/l)	11.	17.
Total Iron (mg/l)	0.10	0.22
Flow (cfs)	2.23	50.23

the  
period of  
sampling  
was 657  
lbs. per  
day. Water quality tests indicated the following minimum and maximum values.

Station 5958 was located just upstream of where Sugar Run enters East Branch Clarion River and samples a drainage area of about 7, 900 acres. This station was sampled six times between December 20, 1968 and June 11, 1969 with water quality tests indicating the following ranges.

	<u>Minimum</u>	<u>Maximum</u>
pH	4.50	4.85
Total Acidity (mg/l)	3.5	6.0
Free Acidity (mg/l)	0.0	1.0
Alkalinity (mg/l)	0.0	0.0
Sulfate (mg/l)	9.	15.
Total Iron (mg/l)	0.07	0.12
Flow (cfs)	2.48	55.82

	<u>Minimum</u>	<u>Maximum</u>
pH	4.65	5.20
Total Acidity (mg/l)	2.5	6.0
Free Acidity (mg/l)	0.0	1.0
Alkalinity (mg/l)	0.0	0.2
Sulfate (mg/l)	9.	13.
Total Iron (mg/l)	0.06	0.11
Flow (cfs)	2.67	60.16

	<u>Minimum</u>	<u>Maximum</u>
pH	4.75	6.00
Total Acidity (mg/l)	1.5	6.0
Free Acidity (mg/l)	0.0	0.0
Alkalinity (mg/l)	0.0	3.2
Sulfate (mg/l)	8.	18.
Total Iron (mg/l)	0.04	0.12
Flow (cfs)	2.08	110.25

The water quality of East Branch Clarion River indicated a marked improvement just above the reservoir. The average total acidity was 3, 1 mg/l and test results reflected no indication of free acidity which is made up of the strong mineral acids, such as sulfuric acid. The improved quality of the water was most noticeable in the summer months between June and September, at which time the pH ranged between 5. 80 and 6. 00. During this period the East Branch Clarion River, at the sampling point, was marginally alkaline.

Station 5974 sampled the reservoir slackwater. Samples were taken at this point five times between April 3, 1969 and June 11, 1969. Minimum and maximum values of the water quality tests were as follows:

Station 5960 was located near shore at a floating dock below the point Yonkers Run enters East Branch Reservoir. Water quality tests indicated the following minimum and maximum values on 13 samples taken between January 24, 1969 and October 23, 1969.

	<u>Minimum</u>	<u>Maximum</u>
pH	4.75	5.35
Total Acidity (mg/l)	2.0	4.5
Free Acidity (mg/l)	0.0	0.2
Alkalinity (mg/l)	0.0	0.5
Sulfate (mg/l)	6.	12.
Total Iron (mg/l)	0.03.	0.06

Station 5979 was located at the end of a floating dock about 250 feet from shore. Surface samples were collected six times between April 30,, 1969 and August 16, 1969.

Following are the test ranges.

	<u>Minimum</u>	<u>Maximum</u>
pH	4.90	5.70
Total Acidity (mg/l)	1.0	4.0
Free Acidity (mg/l)	0.0	0.0
Alkalinity (mg/l)	0.0	3.0
Sulfate (mg/l)	7.	23.
Total Iron (mg/l)	0.02	0.53

	<u>Minimum</u>	<u>Maximum</u>
pH	4.85	5.10
Total Acidity (mg/l)	2.0	3.5
Free Acidity (mg/l)	0.0	0.0
Alkalinity (mg/l)	0.0	0.0
Sulfate (mg/l)	13.0	20.
Total Iron (mg/l)	0.02	0.05

Station 5961 was located about 1,000 feet above the East Branch Dam embankment and at the west shore in the vicinity of a boat launch. Minimum and maximum test values of twelve surface samples collected between January 8, 1969 and October 24, 1969 were as follows:

	<u>Minimum</u>	<u>Maximum</u>
pH	4.75	5.25
Total Acidity(mg/l)	2.0	4.0
Free Acidity (mg/l)	0.0	0.5
Alkalinity (mg/l)	0.0	0.5
Sulfate (mg/l)	9.	22.
Total Iron (mg/l)	0.03	0.18

Station 5962 was located about 1,000 feet downstream of

the spillway and at this point the water sampled consisted mostly of that released from the reservoir. This station was sampled 21 times between January 8, 1969 and December 18, 1969. The water quality tests of the eight samples collected between January 8, 1969 and March 20, 1969 indicated a pH range from 4.30 to 4.50. However, eleven of the 13 samples collected between April 2, 1969 and December 18, 1969 indicated the pH was 4.70 or higher. Minimum and maximum test values of the 21 samples obtained were as follows:

	<u>Minimum</u>	<u>Maximum</u>
pH	4.30	6.70
Total Acidity (mg/l)	2.5	11.5
Free Acidity (mg/l)	0.0	2.5
Alkalinity (mg/l)	0.0	29.0
Sulfate (mg/l)	19.	47.
Total Iron (mg/l)	0.13	0.64
Flow (cfs)	0.	275.



At Station 5962, the acid load was estimated for the 15 water quality samples with a pH of 4.75 or less and the average acid load was 2,597 lbs. per day. The maximum acid discharge was 7,630 lbs. per day on May 15, 1969 when there was a large release (275 CIF) from the reservoir. Five of the water quality tests indicated the acid discharge was 3,300 lbs. per day or greater and for 12 of the test results, the acid discharge exceeded 1500 lbs. per day,

Station 5964 was established at a bridge crossing the East Branch Clarion River on the northern edge of Johnsonburg and about one-half mile downstream of the chemical dump. This station was sampled three times between March 7, 1969 and September 6, 1969 with test results indicating the following ranges.

	<u>Minimum</u>	<u>Maximum</u>
pH	5.05	5.40
Total Acidity (mg/l)	2.5	6.5
Free Acidity (mg/l)	0.0	0.0
Alkalinity (mg/l)	0.0	0.5
Sulfate (mg/l)	31.	49.
Total Iron (mg/l)	0.19	0.35

#### Water Quality Prior to Strip Mining

The results of water quality tests made by the Corps of Engineers on samples obtained at a sampling station on the East Branch Clarion River at Johnsonburg indicate that from 1934 to 1949 the average yearly pH was between 6.1 and 7.4. After strip mining operations began in the Swamp Creek-Johnson Run Area, the water quality deteriorated and the pH dropped to below 5.5.

The Corps of Engineers revealed that at the time they made their investigation for a dam site on the East Branch Clarion River, there were trout and other game fish in the river to its junction with the West Branch Clarion River at Johnsonburg.

### Headwaters of the Potato Creek Watershed

Four sources of acid mine drainage pollution (Areas 38, 39, 40 and 41) in the headwaters of the Potato Creek Watershed were briefly investigated. These sources are just the other side of the drainage divide however it was felt there was a possibility of acid seepage from these sources into the East Branch Clarion River. Water quality samples were not taken, but the areal extent of each source was mapped and information was obtained on the origin and history.

This investigation did not reveal any seepage into the East Branch Clarion River from the sources. These areas are shown on the maps included and are briefly discussed under "Sources of Pollution. "

## Sources of Pollution

### AREA 36 and 37

The only sources of acid mine drainage on the main branch of the East Branch Clarion River are two small clay pits in the headwaters. The clay pits have a total area of about 6.7 acres and are located off Legislative Route 42013 just west of the village of Clermont. Clarion fire clay was stripped at this location and the Clarion Coal which overlies the fire clay was very thin.

Recommended Abatement Measures - It is recommended that no abatement measures be taken. It is estimated that the combined average daily acid discharge from these sources is less than 2 lbs. per day.

## Sources of Pollution

### Headwaters of Potato Creek Watershed AREA 38

The Clarion fire clay was deep mined at this location and later the area was stripped. The clay was 4 to 19 feet thick and it was mined through a shaft by the Clermont Clay Products Company. The Clarion coal was observed to be thin and irregular; it ranged in thickness from less than an inch to about 2 feet. The clay pit is now being used for solid waste disposal. The area of the stripping is about 42 acres.

### AREAS 39 and 40

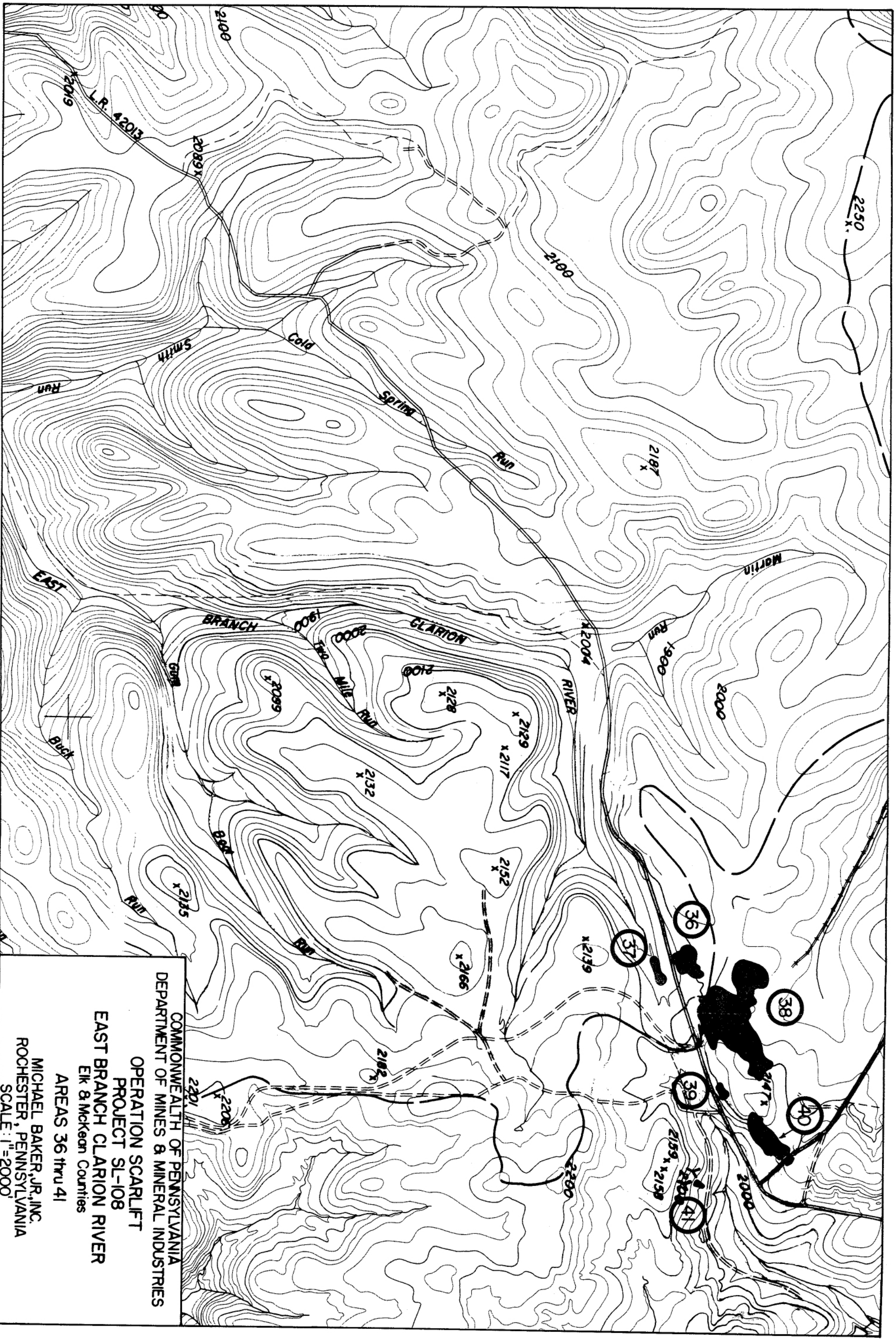
These areas were also stripped for the Clarion fire clay and coal, probably by the Clermont Clay Products Company.

### AREA 41

This is the location of the Clermont Mines of the old Buffalo Coal Company. According to Report R of the Second Geological Survey of Pennsylvania, 1880, they were "the largest and most profitable mines that have ever been worked in the County". The McKean and Buffalo Railroad Company constructed a railroad from Larabee, Pennsylvania to the village of Clermont to afford an outlet to the mines.

The Clarion coal was mined at this location and it had an average thickness of 3 feet, but ranged from 2'-4" to 3'-6". The coal was generally compact and brittle, and had a deep black luster, but there were numerous thin partings of pyrite. A general description of the stratigraphic sequence that was mined is as follows:

2' to 8'	Slate, blue and gray, hard 8" Coal
1" to 1-1/2 <sup>1</sup> .	Bone coal parting
2 <sup>1</sup> -3 <sup>11</sup>	Coal
2' to 3'	Fire Clay, white



COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF MINES & MINERAL INDUSTRIES  
OPERATION SCARLIFT  
PROJECT SL-108  
EAST BRANCH CLARTON RIVER  
Elk & Mckean Counties  
AREAS 36 thru 41  
MICHAEL BAKER, JR., INC.  
ROCHESTER, PENNSYLVANIA  
SCALE: 1"=2000'