SMITH RUN SUB-BASIN

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SMITH RUN SUB-BASIN

Discussion of Sub-Basin'

Smith Run has a drainage area of about 2, 130 acres, The abandoned Anderson Mine is located in the headwaters area of the stream and is the only source of acid mine drainage pollution within the sub-basin. The water quality test results indicate the acid discharges from the Anderson Mine are insignificant and have little effect on the water quality of Smith Run,

Water Quality Sampling Stations

Six sampling stations were established in the Smith Run Subbasin to evaluate the effect acid discharges from the Anderson Mine have on the water quality of Smith Run and to determine if other sources of acid mine drainage exist within the sub-basin. The location, drainage area and summary of the water quality test results for each of the sampling stations are:

Station 5926 was located on the western tributary of Smith Run just upstream of the culvert under Legislative Route 42013 sampling a drainage area of approximately 356 acres. This station was sampled 22 times between November 20, 1968 and October 23, 1969. The water quality test results indicated the following minimum and maximum values.

Station 5927 was located in the headwaters of Smith Run and measures a drainage area of approximately 61. 5 acres. Station 5927 was sampled 21 times between November 29, 1968 and October 23,

	Minimum	Maximum
pH	4.30	5.35
Total Acidity (mg/1)	1.5	9.8
Free Acidity (mg/1)	0.0	1.4
Alkalinity (mg/1)	0.0	1.5
Sulfate (mg/1)	3.	13.
Total Iron (mg/1)	0.06	0.23
Flow (cfs)	0.07	3.77

69 and indicated the following minimum and maximum test values.

	Minimum	Maximum
pH	4.80	5.75
Total Acidity (mg/l)	0.5	4.0
Free Acidity (mg/l)	0.0	0.0
Alkalinity (mg/l)	0.0	1.5
Sulfate (mg/l)	3.	7.
Total Iron (mg/l)	0.01	0.07
Flow (cfs)	0.01	0.60

Station 5928 sampled the flow from Anderson Mine seal and the outlet was sampled 24 times between November 20, 1968 and October 23, 1969. The maximum acid discharge indicated was 101 lbs. per day on April 3, 1969 at a time an abnormally high flow was recorded from the mine seal outlet. Eleven of the water quality tests indicated the acid load was less than 10 lbs. per day and for all but two tests the acid load was less than 27 lbs. per day. Following are the minimum and maximum values indicated by the water quality tests.

Station 5929 was located on Smith Run about one half mile downstream of the Anderson Mine seal and upstream of the point Cold Spring Run

	Minimum	Maximum
pH	3.35	3.80
Total Acidity (mg/l)	20.0	55.0
Free Acidity (mg/l)	14.0	33.0
Aklalinity (mg/l)	0.0	0.0
Sulfate (mg/l)	31.	90.
Total Iron (mg/l)	0.13	1.32
Flow (cfs)	0.013	0.850

enters Smith Run. The drainage area at this point is about 393 acres. Station 5929 was sampled 22 times between November 20, 1968 and October 23, 1969 with water quality tests indicating the following minimum and maximum values.

	Minimum	Maximum
pH	4.10	4.85
Total Acidity (mg/l)	3.0	7.8
Free Acidity (mg/l)	0.0	2.0
Alkalinity (mg/l)	0.0	0.0
Sulfate (mg/l)	5.	21.
Total Iron (mg/l)	0.04	0.58
Flow (cfs)	0.07	3.82

Station 5930 was located at the mouth of Smith Run at a point where the drainage area is approximately 2, 127 acres. This station was sampled eight times between December 20, 1968 and July 23, 1969. Seven of the water quality tests indicated there was no free acidity and one test, taken April 3, 1969, indicated a free acidity of 0. 5 mg/ 1. This was the same date of the abnormally high flow recording from the Anderson Mine seal outlet. Minimum and maximum test results were as follows.

	Minimum	Maximum
pH	4.65	5.90
Total Acidity (mg/1)	2.0	4.5
Free Acidity (mg/1)	0.0	0.5
Alkalinity (mg/1)	0.0	2.0
Sulfate (mg/1)	4.	7.
Total Iron (mg/1	0.03	0.55
Flow (cfs)	0.53	16.90

Station 5931 was located at the mouth of Cold Spring Run, a tributary entering Smith Run from the east, and the drainage area at this point is approximately 405 acres. Station 5931 was sampled 22 times between November 20, 1968 and October 23, 1969. Nineteen of the water quality tests indicated there was no free acidity in the stream, while the other three tests indicated free acidities of only 0.2, 0. 2 and 0. 5 mg/1. Minimum and maximum test values were as follows:

	Minimum	Maximum
pH	4.70	5.35
Total Acidity (mg/1)	1.0	5.0
Free Acidity (mg/1)	0.0	0.5
Alkalinity (mg/1)	0.0	1.0
Sulfate (mg/1)	4.	12.
Total Iron (mg/1)	0.02	0.35
Flow (cfs)	0.07	4.22

Water Quality of Smith Run

Prior to this investigation, only a few water samples were collected in the Smith Run drainage area for water quality analyses. The following are the Pennsylvania Department of Health's water quality test results:

The Federal Water Quality Administration, Upper Ohio Basin Office,

1) Western Tributary of Smith Run at L. R. 42013 - Same Location as Station 5926

Date	pH	Total Acidity	Sulfates	Total Iron
7/28/53	4.8	6.0	10.	4.5

2) Headwaters of Smith Run - Same Location as Station 5927

Date	pH	Total Acidity	Sulfates	Total Iron
7/28/53	5.25	2.0	8.	7.8

3) Smith Run at L . R. 42013 - About 1,000 Feet Upstream of Station 5929

Date	pH	Total Acidity	Sulfates	Total Iron
7/28/53	4.35	6.0	20.	1.1

4) Smith Run near the Mouth - Same Location as Station 5930

Date	pH	Total Acidity	Sulfates	Total Iron
7/27/53	6.05	2.0	5.	0.0
8/30/60	5.98	0.0	8.	
12/14/66	5.0	4.0	9.	0.0

5) Anderson Mine Seal - Same Location as Station 5928

Date	pH	Total Acidity	Sulfates	Total Iron	Acid PPD
7/28/53	3.3	48.0	100	1.1	5.

Wheeling, West Virginia analyzed a sample collected from the Anderson Mine seal outlet on October 12, 1966 and the water quality test results were: pH 3. 3, total acidity 90. 0, sulfates 115. , total iron 1. 9, manganese 3. 0, and aluminum 8. 8 mg/ l. The acid discharge was 5 PPD.

The total acidity and relatively low pH of Smith Run appears to be due to organic acids. There is very little free acidity which is made up of the strong mineral acids such as sulfuric acid. The acidity and pH of Smith Run may be the result of the timbering operations that took place in the sub-basin for pulp wood for the papermill at Johnsonberg and for the hemlock bark used by the tannery at the former village' of Instanter which is now covered by the waters of East Branch Reservoir. Smith Run does contain some trout.

Source of Pollution

AREA 45

The Anderson Mine located on the upper reach of Smith Run is the only source of acid mine drainage pollution. This mine is undoubtedly the "Clay's Seven Foot Opening" referred to in reports of the Second Geological Survey of Pennsylvania (Report R, 1880 and Report RR, 1885). The mine was opened in the 1870's by a Captain Clay, a resident of the area, but it could have been operated by the Buffalo Coal Company as Report RR, p. 101, mentions that the elevation of the bottom coal seam was determined by a level line run to the opening by the Buffalo Coal Company. The coal bed is believed to be the Lower Mercer and at this location it consists of the following stratigraphic units:

---	Slate, Black (Roof)
0'-6-1/2	Coal
0[1]-1/2"	Slate
2'-6"	Coal
0[1]-2[11]	Slate
1'-0"	Coal
0'-9"	Fire Clay
1[1]-11[1,]	Coal
---	Fire Clay (Floor)
61-1111	Total

Coal Production - The extent of mining and the quantity of coal produced was not given in the reports of the Second Geological Survey of Pennsylvania. In the report "Bituminous Coal Fields" (Bull. M-6, Part II, 4th Pa. Geol. Surv. , 1926) the only mention of coal mining in Sergeant Township is a statement on p. 484 saying "openings are now abandoned. '

The Pennsylvania Department of Mines and Mineral industries file of mine inspector reports contains production figures for the Anderson Mine only for the years 1934 to 1937. The production of coal during these years was as follows:

1934	5,334 Tons	1935	3,600 Tons
1936	4,935 Tons	1937	3,805 Tons

The total production for this period amounted to 17, 674 tons, and it is possible that these years were the only ones in which the production was significant enough to be recorded. It would be impossible to determine the area that has been deep mined by using production figures and the volume of mine waste in the spoil banks because of the extremely variable character of the Mercer coal beds in Elk and McKean Counties. Also some of the production in the 1934-37 period may have come from stripping of approximately an acre along the crop line which theoretically could account for about 11, 000 tons based on a total thickness of six feet for the coal.

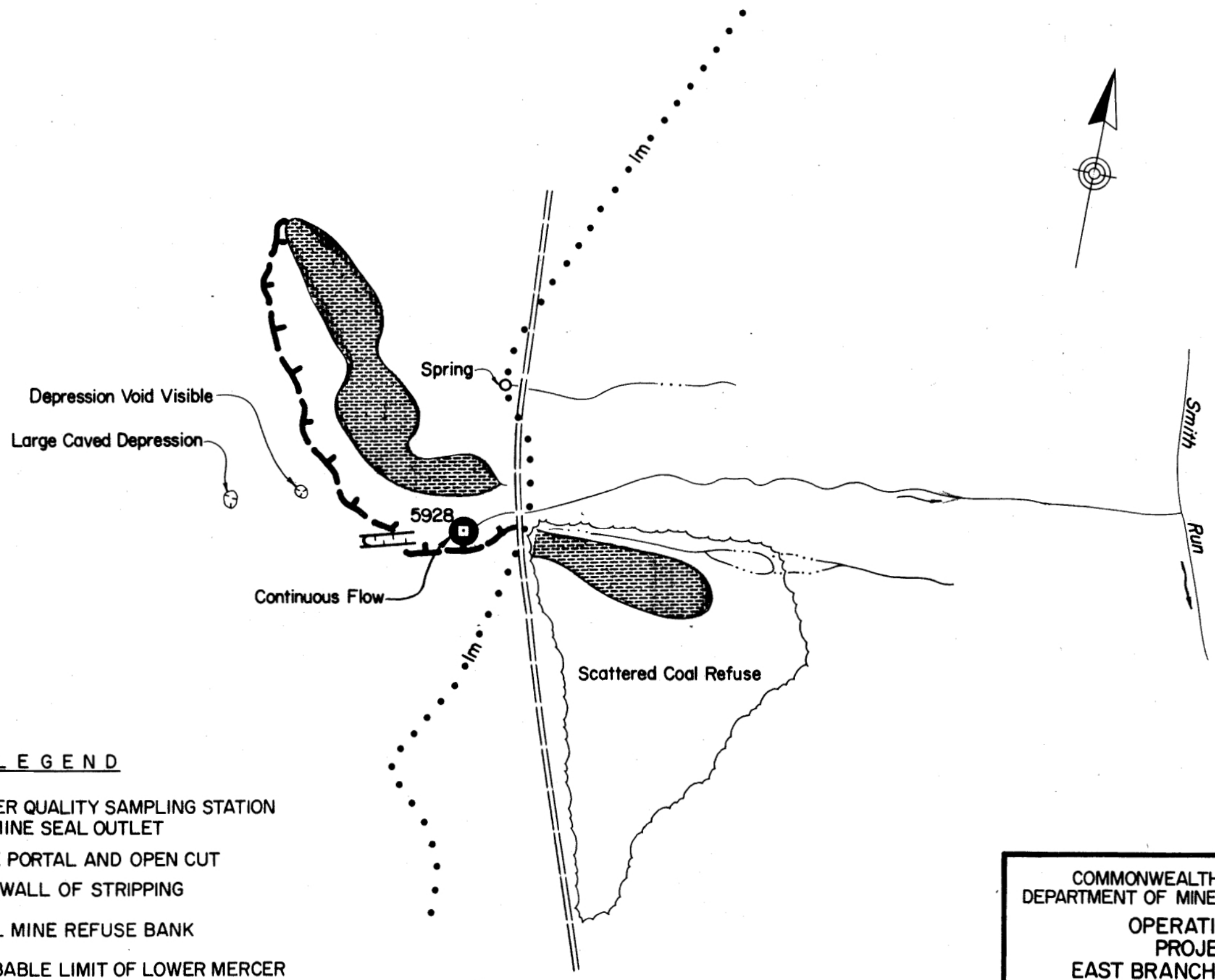
Recommended Abatement Measures - It is recommended that no abatement measures be taken to further reduce acid mine drainage pollution on Smith Run.

The water quality test data indicates that the acid discharges from the Anderson Mine are not significant and have very little effect on the water quality of Smith Run. The mine seal appears to be very effective in reducing the volume of acid discharge from the mine, if there was a significant acid discharge from the mine prior to sealing. Vegetation is growing on the spoil and mine waste banks and in places it is rather dense.

The average acid discharge from this source is estimated, on the basis of the water quality tests performed over a one year period, to be approximately 20 lbs. per day, or less than 0. 5 percent of the total average daily acid load contributed by the major sources into the East Branch Clarion River.

Figure 14 is a sketch map showing the Anderson Mine area.

FIG. 14



LEGEND

- 5928 — WATER QUALITY SAMPLING STATION AT MINE SEAL OUTLET
- MINE PORTAL AND OPEN CUT
- HIGHWALL OF STRIPPING
- COAL MINE REFUSE BANK
- lm — PROBABLE LIMIT OF LOWER MERCER COAL OUTCROP

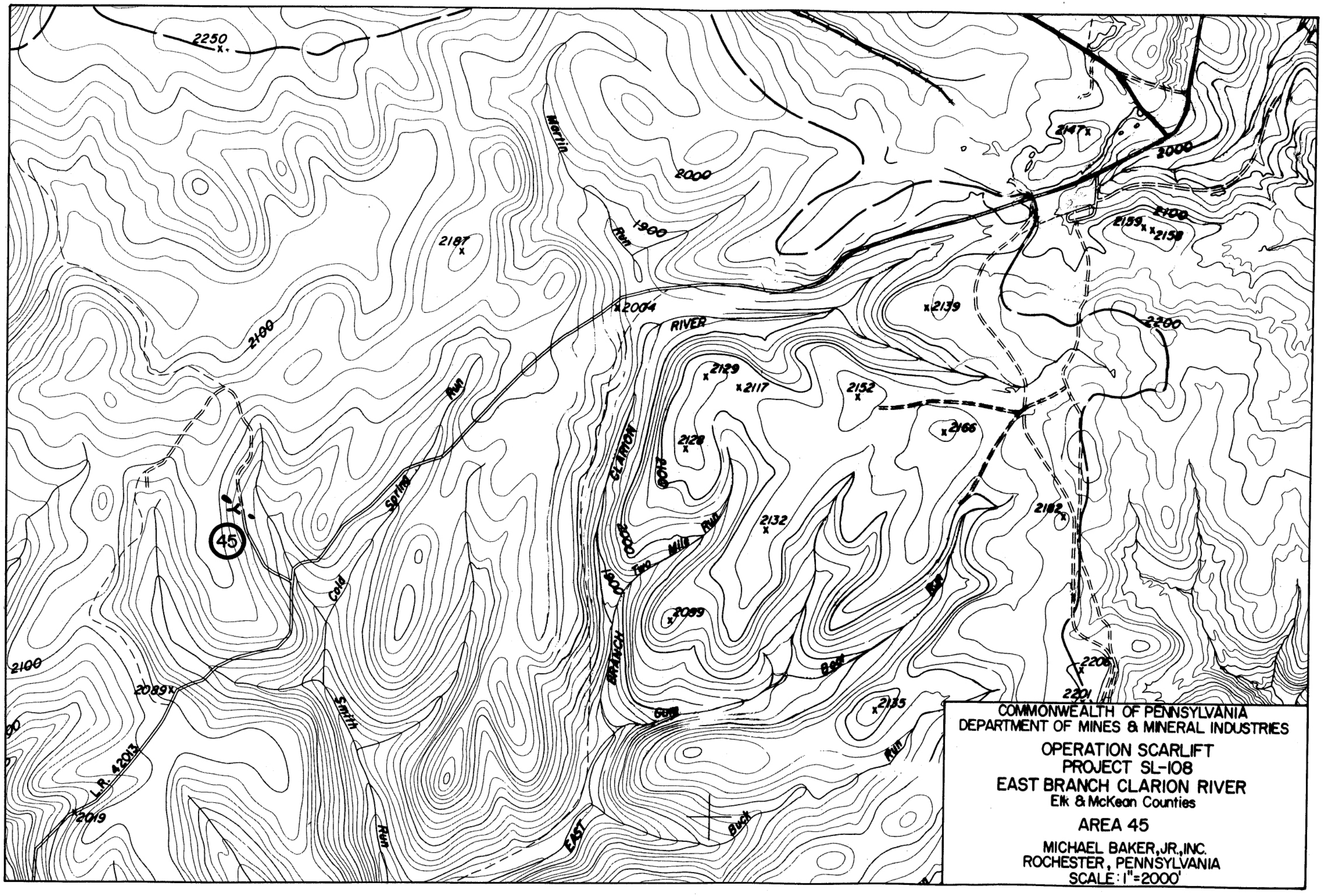
APPROX. SCALE : 1" = 100'

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF MINES & MINERAL INDUSTRIES

OPERATION SCARLIFT
PROJECT SL-108
EAST BRANCH CLARION RIVER
Elk & McKean Counties

SKETCH MAP OF ANDERSON MINE

MICHAEL BAKER, JR., INC.
ROCHESTER, PENNSYLVANIA



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AREA 45

MICHAEL BAKER, JR., INC.
ROCHESTER, PENNSYLVANIA
SCALE: 1"=2000'