

TWO MILE RUN SUB-.BASIN

INDEX

	<u>Page No.</u>
Discussion of Sub-Basin	A-175
Water Quality Sampling Stations	A-175
Coal Production from Instantur Mine	A-177
Sources of Pollution	
AREA 42	A-179

TWO MILE RUN SUB-BASIN

Discussion of Sub-Basin

Twomile Run has a drainage area of approximately 331 acres, The sources of pollution within this sub-basin are the abandoned Instantur Mines and associated mine waste materials, The acid discharges from these sources are responsible for approximately 2.3 percent of the total acid mine drainage pollution in the East Branch Clarion River Watershed,

Water Quality Sampling Stations

Four sampling stations were established in the Twomile Run sub-basin to determine the location of acid discharges and their effect on the water quality of the East Branch Clarion River.

The location, drainage area and summary of water quality test results for each of the sampling stations are:

Station 5934 was located about 300 feet upstream of the northern most heading of the Instantur Mines at a point where the drainage area is approximately 116 acres. On the basis of 11 samples obtained at this station between November 19, 1968 and November 18, 1969, it was estimated the average daily acid discharge at this point was less than 3 lbs. per day J. Minimum and maximum test values were as follows:

	<u>Minimum</u>	<u>Maximum</u>
pH	4.10	4.40
Total Acidity (mg/l)	6.0	12.0
Free Acidity (mg/l)	0.5	4.0
Alkalinity (mg/l)	0.0	0.0
Sulfate (mg/l)	6.	18.
Total Iron (mg/l)	0.00	0.05
Flow (cfs)	0.00	0.24

Station 5935 was established to measure the flow from the mine seal of the south heading on the east side of Twomile Run (Area 42C). This station was sampled 17 times between November 19, 1968 and December 17, 1969 with test results indicating the average daily acid discharge being 8 lbs. per day. The minimum and maximum values of water quality tests of these samples were as follows:

Station 5936 was located about 200 feet downstream of the southernmost mine

		<u>Minimum</u>	<u>Maximum</u>
heading at a point having a drainage area of approximat	pH	3.00	3.55
	Total Acidity (mg/l)	75.0	205.0
	Free Acidity (mg/l)	44.0	143.0
	Alkalinity (mg/l)	0.0	0.0
		<u>Minimum</u>	<u>Maximum</u>
	pH	3.40	4.25
	Total Acidity (mg/l)	10.0	28.0
	Free Acidity (mg/l)	1.7	20.0
	Alkalinity (mg/l)	0.0	0.0
	Sulfate (mg/l)	11.	36.
	Total Iron (mg/l)	0.05	3.85
	Flow (cfs)	0.01	0.60

ely 179 acres. The estimated average daily acid discharge at this point was approximately 10 lbs. per day as determined from 16 samples obtained at this station between November 19, 1968 and December 17, 1969. The range of test values was as follows:

Station 5937 was established near the mouth of Twomile Run at which point the drainage area is approximately 318 acres. This station was sampled 20 times between November 21, 1968 and October 23, 1969. The estimated average daily acid discharge at this point during the testing period was 130 lbs. per day. Minimum and maximum values of the water quality tests were as follows:

	<u>Minimum</u>	<u>Maximum</u>
pH	3.50	4.10
Total Acidity (mg/l)	19.0	49.0
Free Acidity (mg/l)	6.6	24.0
Alkalinity (mg/l)	0.0	0.0
Sulfate (mg/l)	40.	83.
Total Iron (mg/l)	0.08	0.84
Manganese (mg/l)	0.8	1.9
Flow (cfs)	0.06	3.37

Coal Production from Instantur Mines

The only records of coal production from the Instantur Mines are those found in bituminous mine inspector reports for the years 1890 to 1901. These records were obtained from the Pennsylvania Department of Mines and Mineral Industries and are as follows:

1890	11,483 Tons
1891	15,737
1892	21,058
1893	None
1894	19,844
1895	25,524
1896	34,263
1897	32,333
1898	27,352
1899	None
1900	None
1901	<u>11,229</u>
	198,823 tons

The Upper Mercer coal bed at the Instantur Mines averaged about 3 feet in thickness. An acre with a 3 foot coal bed would contain about 5,500 tons of coal and, if it is assumed about 60 percent of the coal was extracted, the recovery per acre would be 3,300 tons. The total production based on the mine inspector reports, would represent about 60 acres of workings, but this mine was opened around 1879 and it was being worked at the time the geologists from Second Pennsylvania Geological Survey were in the field studying the geology of Elk and McKean Counties (1876-1885). The mine was important enough for the old McKean and Buffalo Railroad Company to construct a spur line, in the early 1880's from the mine to their railroad siding at the village of Clermont.

Attempting to determine the area that has been mined at the Instantur Mines is complicated by the fact that no coal production was reported by the bituminous mine inspectors for the Gum Boot Mines. The Gum Boot Mines also were connected by a railroad spur line and they were being mined at about the same time by the same mining company, the Buffalo Coal Company.

The volume of material in the mine waste banks is no indication of the quantity of coal produced or the extent of underground mine workings. It was common mining practice in the late 19th and early 20th centuries to retain material extracted during the mining operation, other than coal, in the underground workings. This material was utilized as a packing for roof support in the mined out areas.

Sources of Pollution

AREA 42

The sources of acid mine drainage pollution in the Twomile Run sub-basin are 1) the abandoned railroad bed constructed in part by mine waste material, 2) the flow from Area 42C mine seal, and 3) the coal mine waste banks associated with the mining operations of the Instantur Mines. It is estimated the abandoned railroad bed contributes approximately 10 lbs. per day of the acid load and the mine seal about 8 lbs. per day. The balance of the estimated average daily acid discharge of 130 lbs. per day comes from the mine waste banks and possibly an insignificant amount from the mine workings which does not appear as seepage at the mine heading. The valley of Twomile Run contains a highly permeable deposit of fine to coarse sand. For this reason Station 5936, located below the mines, probably measured only a part of the acid discharge. The ground water flow in this area becomes stream flow further downstream and was sampled at Station 5937.

Of the four mine headings, only the Area 42C mine seal has a discharge. Since this discharge is a minor source of acid mine drainage pollution, it appears the sealing of these four headings has been effective in reducing acid discharges from the Instantur Mines.

The coal mine waste banks are approximately 70 years old and show evidence of having burned at one time. The total area covered by the mine waste banks are void of vegetation and represent approximately 1.7 acres. The mine waste banks are responsible for most of the pollution on Twomile Run inasmuch as there is no evidence of additional flow from the mine workings from seepage into Twomile Run further downstream. Laboratory experiments were performed on material from the mine waste banks at the Gum Boot Mines and it was determined the material had acid producing properties. A report on these experiments is included in Appendix C of this report. The material of the mine waste banks at the Instantur Mines is similar and in both areas the same coal bed was mined.

Recommended Abatement Methods - The average acid discharge from these sources is estimated, on the basis of water quality tests performed over a one year period, to be approximately 130 lbs. per day or approximately 2.3 percent of the total average daily acid load contributed by all pollution sources in the East Branch Clarion River Watershed.

It is questionable if it would be economically advantageous to abate the pollution from the mine waste banks due to the isolated area, the relatively low acid contribution and the fact that the quality of the East Branch Clarion River improve greatly by the time it reaches the East Branch Reservoir as is evidenced by test results taken from Station 5959.

If it is deemed desirable to reduce the acid discharges from this source, it is recommended the mine waste banks be covered with an average of 3 feet of soil, soil treated and planted. It is noted borrow material to cover these banks may have to be hauled from as far as five miles.

Reclamation Requirements

Earthwork

Cover mine waste banks with an average of 3 feet of soil.

Soil Treatment

Standard Ground Limestone (Total application of 5 tons per acre to contain a minimum of 240 lbs. magnesium per acre.

50-50-50 in lbs. of $N-P_2O_5-K_2O$ per acre

Planting

Creeping red fescue	60 lb.
Birdsfoot trefoil	20 lb.

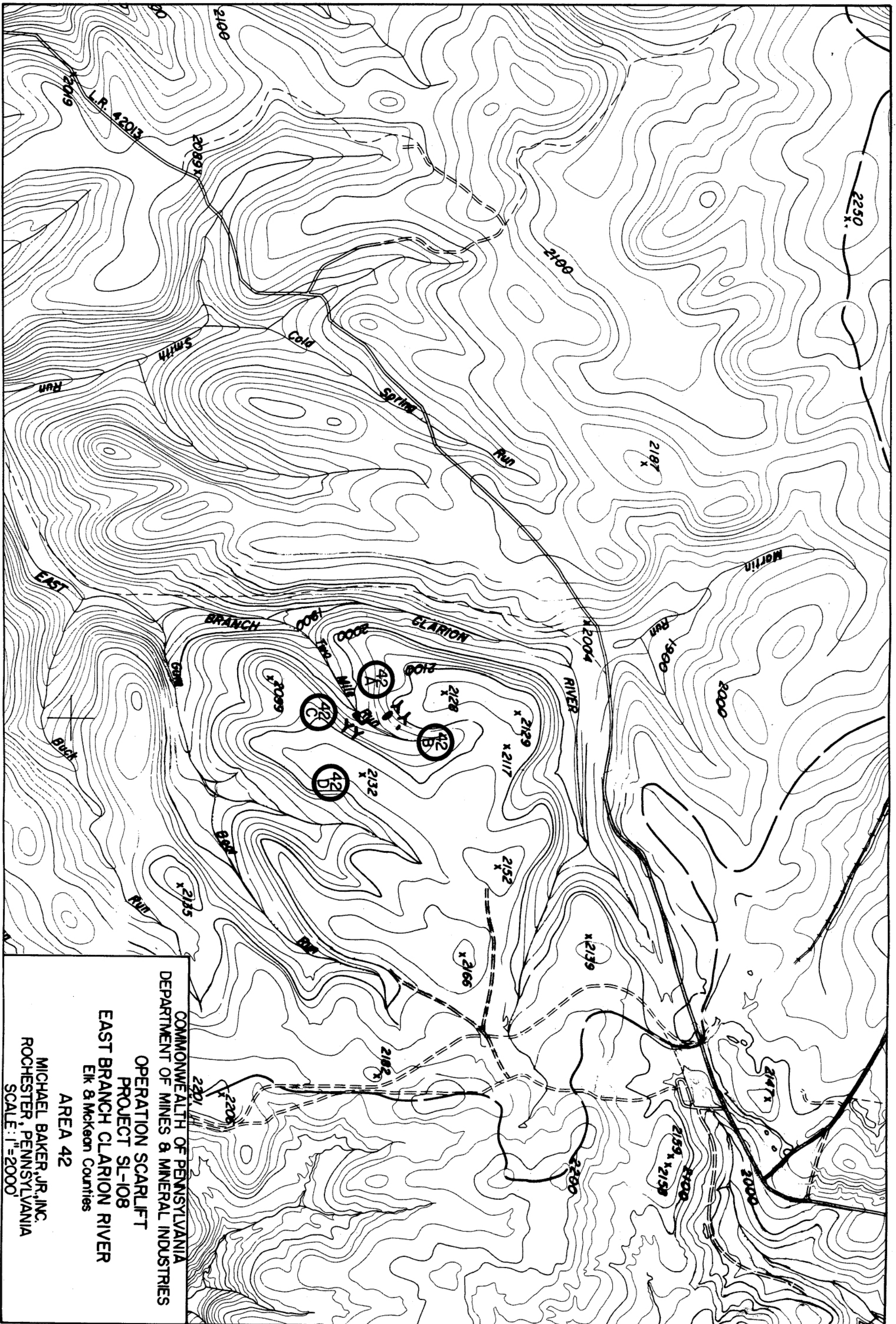
Planting Tree Seedlings (The following year)

Black locust	350
Autumn olive	1,800

An alternate to the above recommended reclamation requirements for the waste bank areas is to seal the mine waste banks by spraying with bituminous material to prevent water infiltration. Ground limestone should be spread on the area prior to application of the bituminous material. The effectiveness of this method of abating acid mine drainage pollution over a long period of time is questionable due to lack of such performance data.

Cost of Methods of Abatement

<u>Description</u>	<u>Estimated Percent Abatement</u>	<u>Estimated Cost</u>
<u>AREA 42</u>		
Cover mine waste banks with soil, soil treatment and planting	80%	\$56,000



COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF MINES & MINERAL INDUSTRIES
 OPERATION SCARLIFT
 PROJECT SL-108
 EAST BRANCH CLARION RIVER
 Elk & McKean Counties
 AREA 42
 MICHAEL BAKER, JR., INC.
 ROCHESTER, PENNSYLVANIA
 SCALE: 1"=2000'

