TROUT RUN

TROUT RUN SUBWATERSHED

The Trout Run Subwatershed includes the Trout Run Watershed, the north branch of Brink Run above Sampling Station No. 66 and the drainage area on the north side of the main stream between these two streams. Located in the north-central part of the watershed, this subwatershed includes 2.85 square miles or 7.1 percent of the total watershed area.

The Trout Run Subwatershed is affected mainly by seepage from old strip mines which have adequate cover to prevent excessive soil erosion. Extensive field exploration failed to uncover any significant point sources of AMD in the watershed. Yet the acid pollution load on this stream is one of the highest in the entire Big Scrubgrass Creek Watershed. This data leads to the conclusion that a site which has a generally good tree cover but some exposed bare acid spoil material is still a potential source of stream pollution.

Reference was found in the mine drainage permit applications to deep mining around strip mine Site No. 20 in the watershed. Field exploration turned up only one small opening which was not discharging any significant amount even during prolonged wet weather. Therefore, this did not appear to be a significant source of AMD in the watershed.

A seepage point on strip mine Site No. 18 which flows into the Brink Run area appears from the surface to be an abandoned deep mine opening, although no supporting data was found for this theory. This seepage point does not affect Trout Run but was considered significant to the Brink Run area.

No additional deep mine openings were found during field exploration of the watershed.

Water quality samples collected during the 22 months between November, 1970, and August, 1972, indicated the pH at the mouth of Trout Run ranging between 3.4 and 6.8 (See Figure 36) averaging 4.8. For the duration of the project, Trout Run at the mouth had an average net acidity of 34.3 ppm (See Figure 37). Discharge rates averaged 568.0 gpm with a maximum of 17,950 gpm during the extremely wet period of late June, 1972, at which time a maximum of 4,300 pounds per day acid load was measured. Normal averages indicated 269.0 pounds per day acid discharge. The other tributary systems in this subwatershed produced an average of 115.0 pounds per day acid discharge, with a maximum of 270.0 pounds per day and an average of only 3 pounds per day alkalinity. The combined flow rates from these tributaries averaged 212 gallons per minute.

Hydrologic analysis of this subwatershed indicates that the average acid discharge could be much higher than the values cited here. The average annual runoff for USGS stream gages in the region ranges between 20 and 25 inches per as opposed to the measured 12.0 inches average annual runoff for this subwatershed. The low measured average runoff probably reflects the inability to catch high flows from storm hydrographs which would occur over very short time periods on this watershed and thus usually be missed by periodic sampling. These short-term flows probably contained a sig-

ACID MINE DRAINAGE PROJECT
BIG SCRUBGRASS CREEK WATERSHED

SAMPLING STATION NO. 30

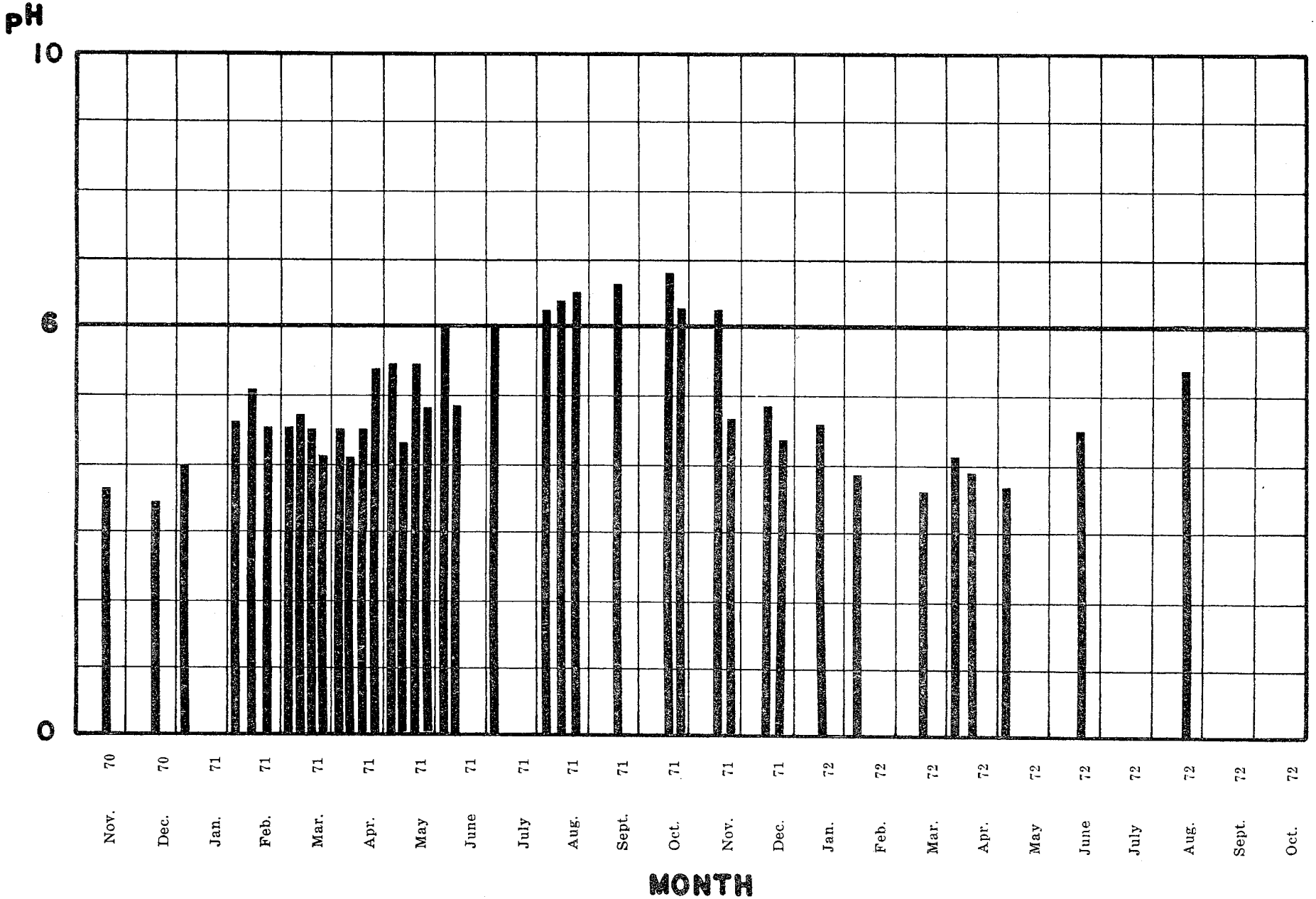


FIGURE 36

ACID MINE DRAINAGE PROJECT
BIG SCRUBGRASS CREEK WATERSHED

SAMPLING STATION NO. 30

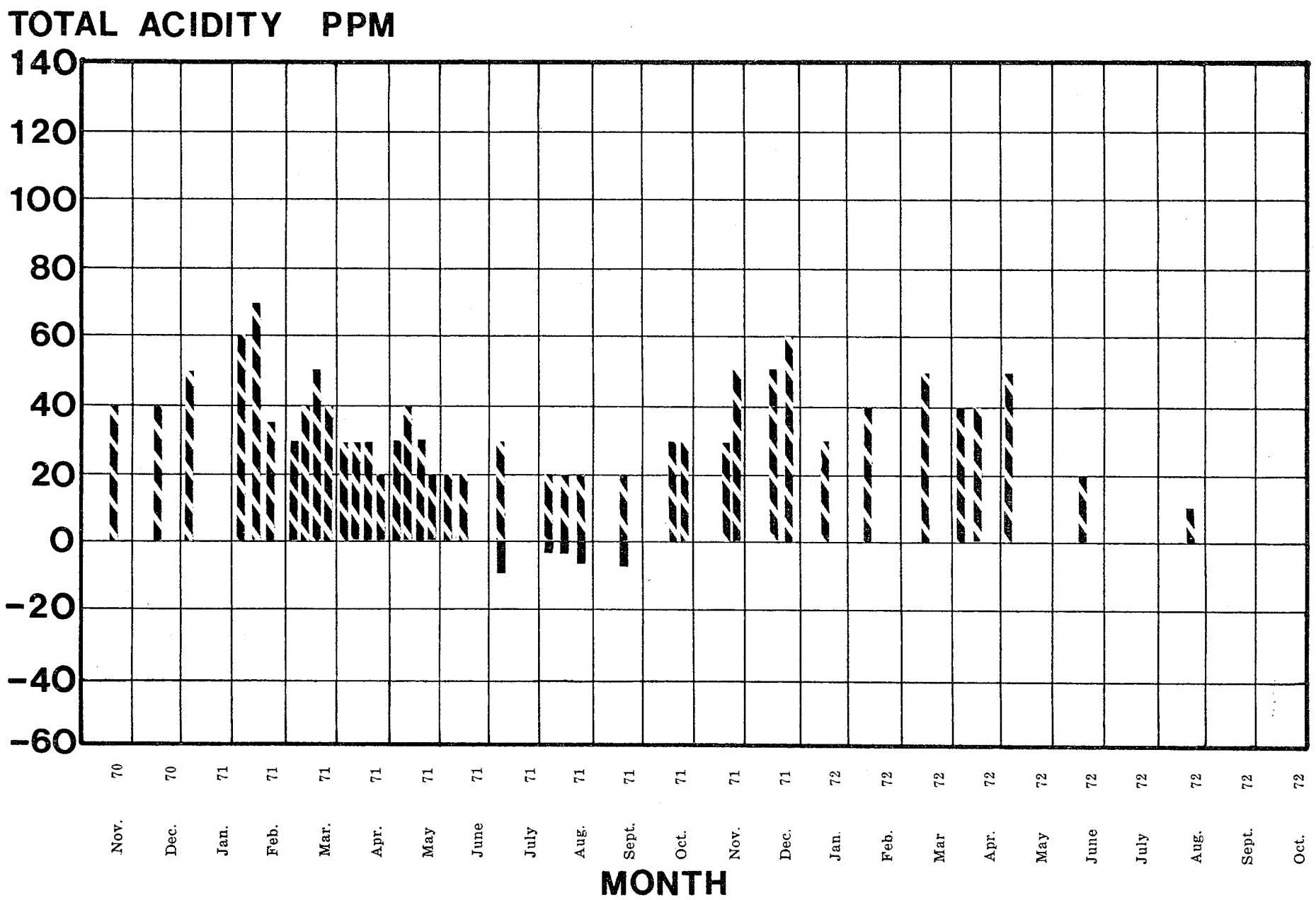


FIGURE 37

nificant part of the total runoff volume for the watershed. Assuming an average annual runoff of 20 inches from this watershed, an average of 1293 gallons per minute would be the resulting runoff rate. Considering even the lowest acid content measured of 20 ppm as the average for the year, an average acid discharge of 310 pounds per day would result. A program of continuous water quality analysis and flow measurements might verify this estimate.

A total of five water quality sampling stations were established in the Trout Run Subwatershed. Following is a discussion of the location, drainage area and summary of water quality tests. Location of sampling stations is shown in Figure 38.

Station No. 30 was established on Trout Run at the east and of a large stone arch culvert under L.R. 60011 about 50' from the confluence with Big Scrubgrass Creek. The Trout Run Watershed contains 1.36 square miles of drainage area collecting flows from Mine Sites No. 5, No. 6, No. 18, and No. 20. For the duration of the project period, Trout Run at the mouth was flowing predominantly acidic. On occasion, the pH did rise above 6.0 during lower flow periods. Between November 20, 1970, and August 22, 1972, this station was sampled 40 times resulting in the following average, maximum and minimum water quality values.

	Average	Maximum	Minimum
Flow (gpm)	568.0	17,950	101.0
pH	4.8	6.8	3.4
Total Acidity (ppm)	35.0	70.0	10.0
Alkalinity (ppm)	0.7	10.0	0.0
Iron (ppm)	0.29	1.15	0.05
Sulfates (ppm)	85.0	300.0	25.0
Acid (ppd)	269.0	4,300.0	24.0
Alkalinity (ppd)	2.3	37.0	0.0
Iron (ppd)	2.7	32.0	0.1
Sulfates (ppd)	538.0	6,030.0	69.0

Station No. 46 was located at the south end of a metal culvert under Township Road 349, about 0.3 miles east of Pa. Route 308 at Bullion. This tributary to Trout Run has a drainage area of 0.06 square miles at this sampling station. Flows from Mine Sites No. 5 and No. 6 are collected by this station accounting for the net acidic conditions. During the period between March 3, 1971, and May 4, 1972, Station No. 46 was sampled 26 times. Listed below are the average, maximum and minimum water quality values.

	Average	Maximum	Minimum
Flow (gpm)	27.0	90.0	2.0
pH	3.7	4.6	2.9
Total Acidity (ppm)	113.0	210.0	40.0
Alkalinity (ppm)	0.0	0.0	0.0
Iron (ppm)	0.73	1.40	0.3
Sulfates (ppm)	261.0	365.0	145.0
Acid (ppd)	31.0	160.0	3.1
Alkalinity (ppd)	0.0	0.0	0.0
Iron (ppd)	0.23	1.1	0.03
Sulfates (ppd)	91.0	340.0	5.8

Station No. 47 was established at the south end of a culvert under Township Road 349, about 0.40 miles east of the intersection with Pa. Route 308 at Bullion. This Trout Run tributary has a drainage area of 0.07 square miles at Station No. 47. Mine Sites No. 6, No. 7 and No. 8 contribute flows to this station. The stream at this point flowed in a net acidic condition during both high and low runoff periods. Between March 9, 1971, and May 4, 1972, this station was sampled 25 times. Following is a list of average, maximum and minimum water quality test data.

	Average	Maximum	Minimum
Flow (gpm)	35.0	91.0	6.0
pH	5.9	6.8	4.3
Total Acidity (ppm)	12.0	40.0	3.0
Alkalinity (ppm)	2.0	10.0	0.0
Iron (ppm)	0.25	0.6	0.05
Sulfates (ppm)	38.0	48.0	19.0
Acid (ppd)	4.6	7.3	0.2
Alkalinity ppd)	0.67	6.3	0.0
Iron (ppd)	0.14	0.7	0.01
Sulfates (ppd)	17.0	28.0	3.5

Station No. 65 was located in the headwater region of an unnamed tributary to Big Scrubgrass Creek about 2.2 miles due north of the intersection of Pa. Route 208 and Pa. Route 308 at Clintonville. The drainage area of this station measures 0.09 square miles and collects flows from Mine Site No. 19. Flows during the sampling period were net acidic. Between May 3, 1971, and May 4, 1972, 20 samples were collected from this station. Following are the average, maximum and minimum determinations indicated by the water quality tests.

	Average	Maximum	Minimum
Flow (gpm)	31.8	110.0	6.0
pH	5.6	6.6	4.1
Total Acidity (ppm)	15.0	30.0	10.0
Alkalinity (ppm)	4.6	20.0	0.0
Iron (ppm)	0.2	0.2	0.05
Sulfates (ppm)	24.6	52.0	3.0
Acid (ppd)	7.3	40.0	1.9
Alkalinity (ppd)	1.1	5.2	0.0
Iron (ppd)	0.06	0.5	0.0
Sulfates (ppd)	12.2	69.0	0.3

Station No. 66 was established at the mouth of East Branch Brink Run. The drainage area at this station measures 0.49 square miles and collects flows primarily from Mine Site No. 18 and also from Sites No. 19 and No. 29. East Branch Brink Run at this point carried predominantly acid flows each of the 23 times it was sampled between May 3, 1971, and May 4, 1972. Below are the average, maximum and minimum water quality test results.

	Average	Maximum	Minimum
Flow (gpm)	181.0	640.0	20.0
pH	4.3	6.3	3.3
Total Acidity (ppm)	61.0	110.0	20.0
Alkalinity (ppm)	0.0	0.0	0.0
Iron (ppm)	0.29	0.6	0.05
Sulfates (ppm)	98.0	140.0	52.0
Acid (ppd)	108.0	270.0	12.0
Alkalinity (ppd)	0.0	0.0	0.0
Iron (ppd)	0.8	4.6	0.05
Sulfates (ppd)	225.0	940.0	23.0

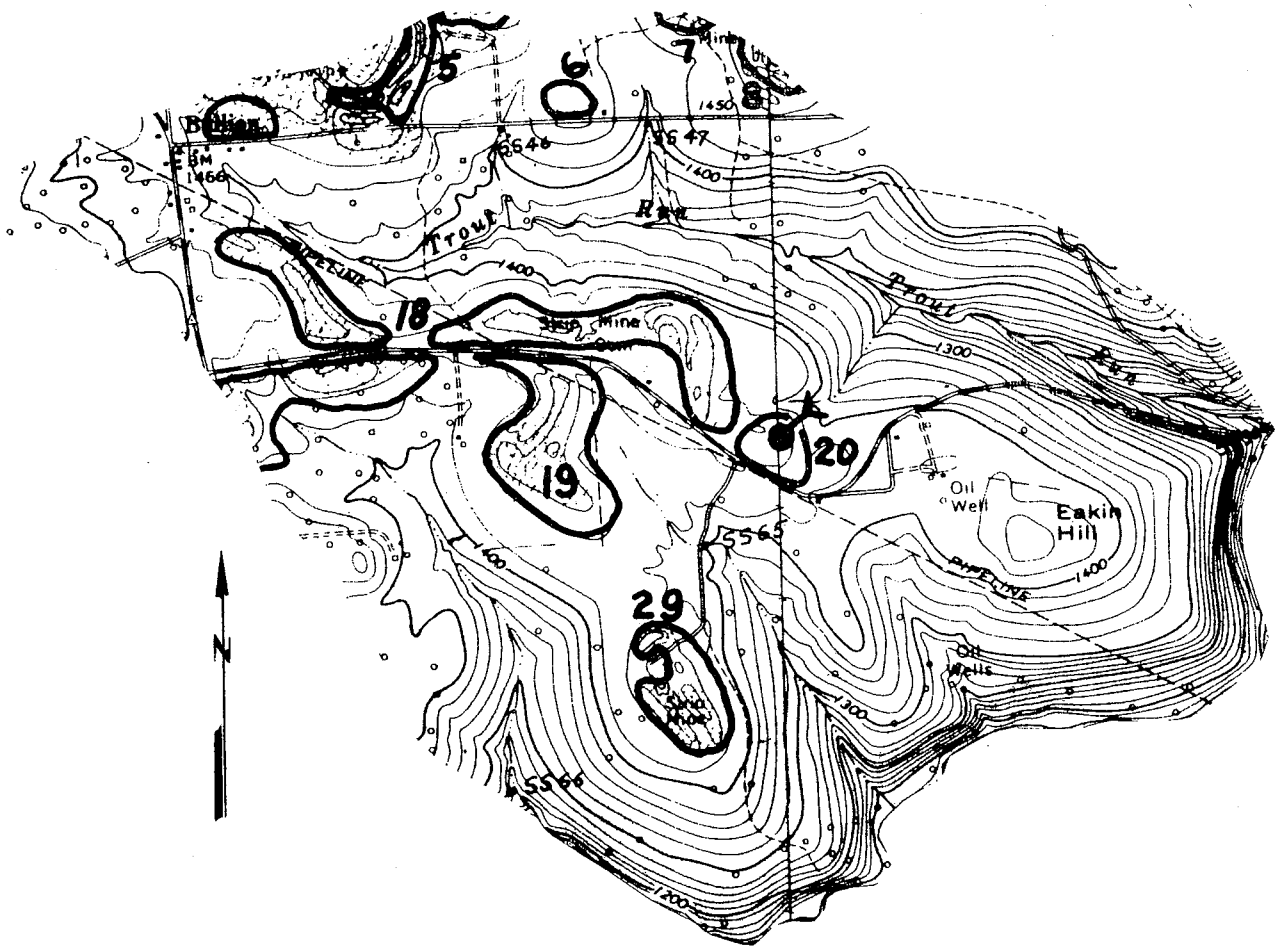


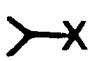
FIGURE 38 Map of the Trout Run Subwatershed showing the location of mine sites and stream water quality sampling stations.

•SS 46 Water Quality Sampling Station Location.

Location of a Strip Mine.

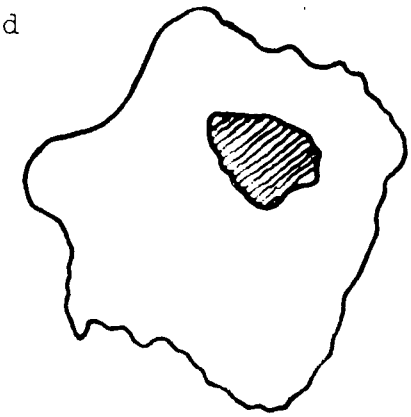
Deep Mine Opening - Acid Problem

Deep Mine Opening - No Acid Problem



Deep Mine Opening - Workings Stripped Out

Air Shaft



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Specific Reclamation Plans for the Trout Run Subwatershed:

Five strip mines lie wholly within this area and three more lie partially within the area. One old deep mine entry was found at the edge of one of the strip mines in the watershed. Figure 38 shows the watershed area with mine locations. Four of these mine sites, Sites No. 5, 6, 7 and 8, were included in the section on Bullion Run. These mines cover an area of approximately 112 acres or approximately 6.1 percent of this drainage area. Two of the seepage points within the area appear to have been old deep mine openings although the stripping activity probably completely disturbed any remaining underground workings on these sites.

Most of the mines in the area are old and were revegetated primarily with pine trees, birch, and aspen which are presently quite large and just beginning to produce adequate canopy and forest litter to control erosion. The acid pollution apparently comes from bare spots among the tree plantings, particularly in undrained depressions in the rough spoil areas where wet weather pools prevent the growth of adequate vegetation. Drainage of these wet weather pools and plantings on the bare areas along with some regrading should solve the pollution problem.

The recommendations for this subwatershed along with the recommendations for Mine Sites No. 5, 6, 7 and 8, in the Bullion Run section should effect 98 percent of the sources of pollution on the Trout Run subwatershed. These measures, properly applied, should be at least 75 percent successful,

causing an estimated 74 percent reduction in the pollution load on the streams. This means a reduction of approximately 346 pounds per day in the acid pollution load on the watershed.

Figure 30 is a key to the site map symbols.

SITE 18

This site includes abandoned strip mines and a possible deep mine opening. The site covers 62.7 acres divided into three separate sections on both sides of L.R. 60011 just east of the intersection with Route 308. The northern section drains into Trout Run and the southern section drains into Brink Run. This is the largest mined area in the Trout Run Subwatershed. Only one seepage point is found which can be called a point source of AMD and this contributes approximately 80 pounds of acid per day to Brink Run through Sampling Station No. 45. This seepage point, "a", has the surface appearance of an old deep mine entry, although this has not been verified by available records or long-term residents of the area.

The areas of this mine which contribute runoff water to Trout Run show no definite discharge points. However, all bare acid spoils are considered sources of acid in storm runoff and reclamation of these areas is thus highly recommended.

Area #1 covers 10 acres which need no further reclamation for acid control.

Areas #2 and #4 cover 3.5 acres which have some grass and trees which are not providing adequate cover, and the bare spoil is a source of acid pollution. These areas should be cleared of trees and regraded to fit the surrounding contours and provide adequate surface drainage. The disturbed areas should then be reseeded using revegetation Method No. 1.

Area #3 covers 5.8 acres of rough ungraded spoil which has some large trees but many bare spots, which are areas of acid formation. Additional cover is needed to reduce the acid formation. However, disturbing the area enough to allow planting of grasses and legumes would probably cause more short-term acid problems. Therefore, the recommendation is for these bare areas to be revegetated by planting trees using revegetation Method No. 6.

Areas #5 and #7 cover 10.0 acres which need no further work for acid control.

Area #6 covers 6.6 acres of fairly smooth spoil material which has poor vegetative cover. Additional soil cover should be provided to prevent acid formation by using revegetation Method No. 1.

Area #8 covers 2.3 acres of partially regraded spoil material which has very little vegetative cover. The outer edge of this area is steep and the center is an elongated bowl-like depression. At the southern edge a gully has formed to provide a surface outlet for runoff water from the depression. A two-foot thick seam of coal has been exposed near the top of this gully. Seepage "a" has some appearance of a deep mine entry. However, the stripping operation comes up to this point so that most of the deep mine workings would have been removed by the stripping operations. It is possible that some workings extended under the present road Route 308 and into the area on Mine Site #17 on the other side. However, some acid apparently originates from the untreated bare

spoil and the disturbed outcrop area. Normal hydraulic sealing of the entry and outcrop would result in the formation of a shallow pearched water table and probably a swamp in the depression. Since the outcrop is probably less than 100 feet wide back to the strip mined area and the overburden is less than 10 feet thick the most effective way to seal off this seep and eliminate the source would be to remove the remaining coal in the outcrop area back at least 50 feet. The quantity of coal involved would be approximately 900 cubic yards and, if found to be commercially valuable, could be sold to help offset reclamation costs. If not resalable, the coal should be buried under at least 5 feet of neutral soils. The area should then be regraded to fit the natural contours of the area but with slopes no greater than 20 percent. A system of diversions and waterways should be included in the regrading plan to limit all slope lengths to 100 feet or less to protect the slope from future erosion which would continue to expose the toxic materials. The entire area should then be replanted using revegetation Method No. 1.

Area #9 covers 6.2 acres which form an undrained depression of bare mine spoil. Infiltration on this area emerges as acid seepage over a wide area further down the valley slope. Selected grading should be done to provide adequate surface drainage and the area reseeded using revegetation Method No. 1.

Area #10 covers 2.9 acres of rough bare strip mine spoil that has a few scattered trees on it. The area is a source of acid in storm runoff but disturbing the existing vegetation is

considered undesirable. Therefore, hydroseeding over the existing vegetation using revegetation Method No. 2 is recommended.

Area #11 covers 18.3 acres of rough ungraded spoil material which has some tree cover but many bare areas, including some in undrained depressions. Selected grading is needed to provide drainage for all depressions. All disturbed areas should be reseeded using revegetation method No. 1 and about 1/3 of the remaining area should be planted to trees using revegetation Method No. 6.

Estimated Cost of Reclamation

Areas #2 and #4	
3.5 acres of clearing	$ 300
3.5 acres of contour backfill	3,500
3.5 acres of revegetation Method No. 1	1,000
Area #3	
2 acres of revegetation Method No. 6	300
Area #6	
6.6 acres of revegetation Method No. 1	2,000
Area #8	
Surface Sealing	2,000
2.3 acres of contour backfilling	3,200
2.3 acres of revegetation Method No. 1	700
Area #9	
4 acres of selected grading	4,000
4 acres of revegetation Method No. 2	1,200
Area #10	
2.9 acres of revegetation Method No. 2	1,800
Area #11	
1 acre of selected grading	1,000
6 acres of revegetation Method No. 6	1,800
TOTAL	$22,800

Figure 39. Seepage from area 8 on Mine Site No. 18 has created this acid bog along Route 308.

SITE 19

This strip mine covers 20.8 acres and drains into Brink Run through Sampling Station No. 66. The mine surface has been regraded but the vegetative cover is poor in some areas. These areas are sources of acid in storm runoff which contribute to the 108 pounds of acid per day flowing past Sampling Station No. 66.

Areas #1 and #3 are adequately vegetated for acid control.

Area #2 covers 10.9 acres and has already been partially regraded. Selected grading should be used to develop good drainage and an adequate water handling system and the area reseeded using revegetation Method No. 1

Estimated Cost of Reclamation

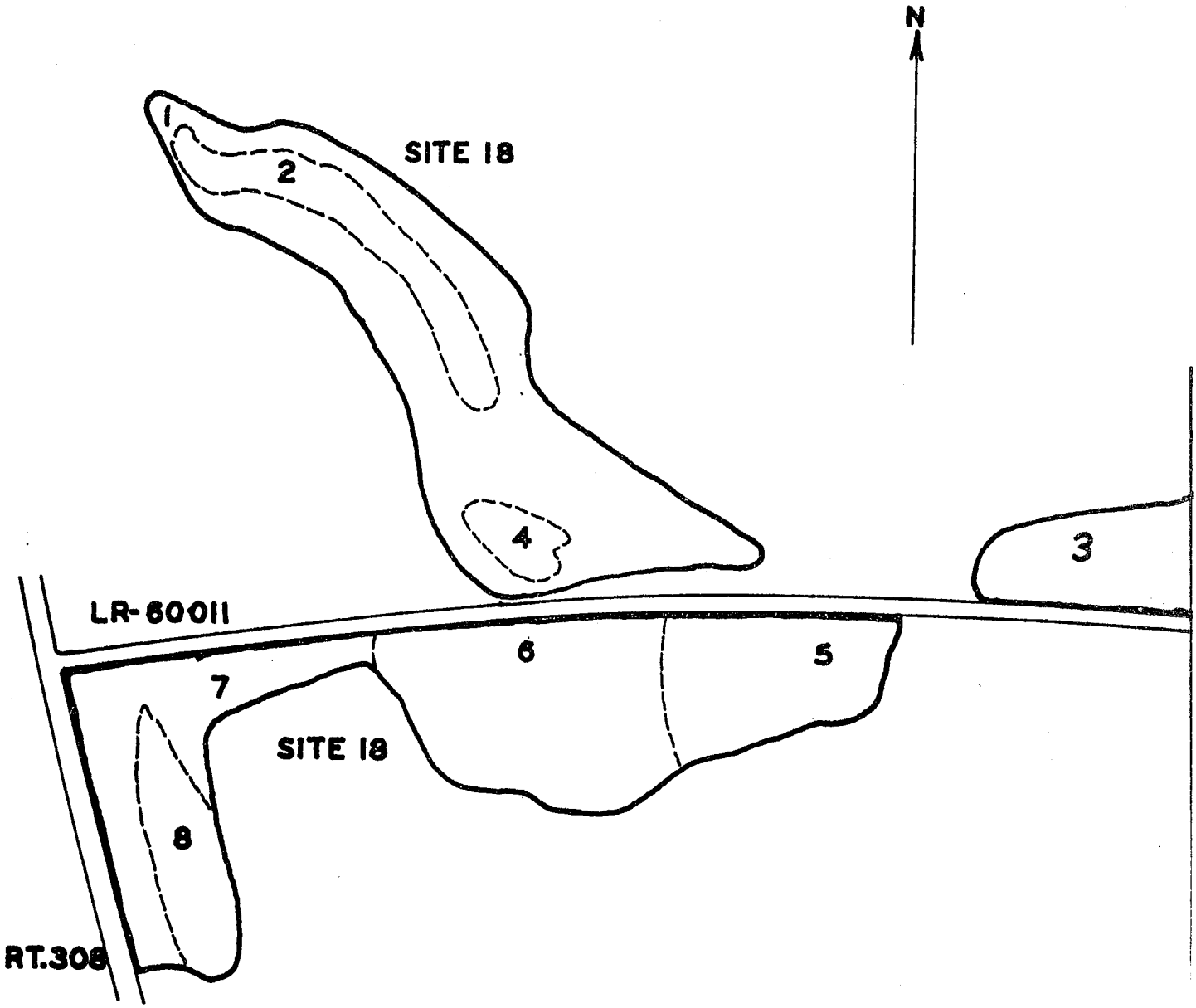
Area #2	
10.9 acres of selected grading	$6,500
10.9 acres of revegetation Method No. 1	3,300
TOTAL	$9,800

SITE 20

This strip mine covers 4.7 acres which drain into Trout Run. The spoil was regraded to a dish-shaped mound with steep outer slopes and a gentle depression in the center which tends to catch water. Except for the depression area, the site is covered with pine trees about 16 years old which have developed a nearly complete canopy. An apparent deep mine opening exists on the northeast edge of this strip mine. This mine has no discharge except during wet weather, and even then the flow was too small to measure. Since the apparent deep mine appears to have been small, the source of this acid water is probably the seepage from the depression. This depression should be drained and planted with a dense stand of trees which should eliminate most of the acid production on this area. Use revegetation Method No. 6 on one-half acre plus excavation of a short drainage ditch which should be seeded using revegetation Method No. 1.

Estimated Cost of Reclamation:

½ acre of revegetation Method No. 6	$100
½ acre of revegetation Method No. 1	100
½ acre of selected grading for drainage	300
TOTAL	$500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SITE 18
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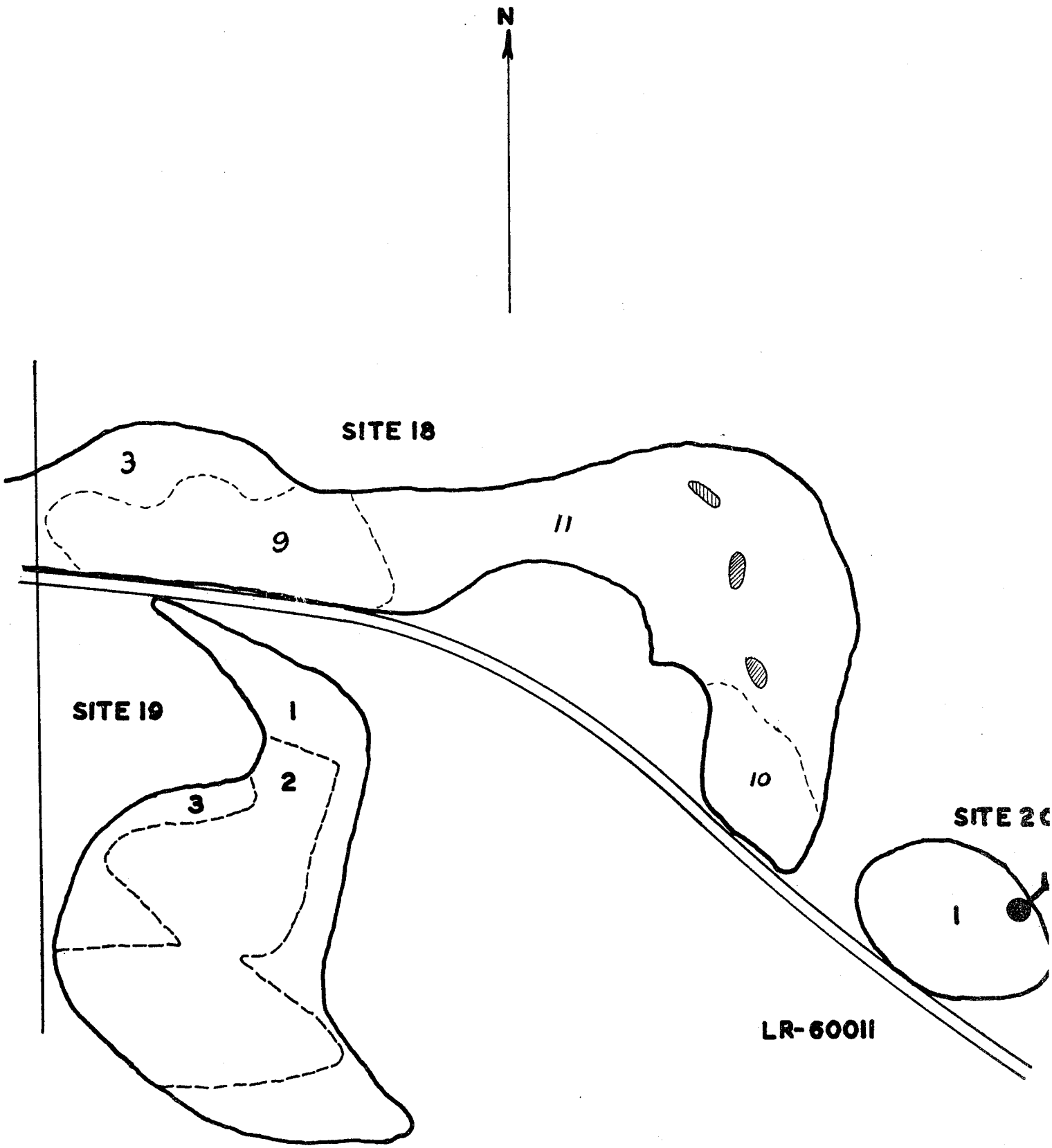
RT.308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SITE 18
3
9
11
10
SITE 19
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SITE 20
1
LR-60011

SITE 29

This site lies on the top of a ridge deep in the woods in the Brink Run drainage area. It covers a total of 12.1 acres. Trees 9 to 10 years old are growing on some areas of this mine with steep slopes and acid soil with a pH between 4.0 and 4.5. Much of the area has exposed acid spoil on the surface which is a source of acid runoff.

Area #1 covers 5.3 acres and is fairly level and can be planted using revegetation Method No. 1.

Area #2 covers 6.8 acres and is fairly rough with a rather thin cover of trees. This area should be seeded by hydro-seeder application of lime and grass seed among the existing tree cover. Use revegetation Method No. 2.

Estimated Cost of Reclamation:

Area #1	
5.3 acres of revegetation Method No. 1	$1,600
Area #2	
6.8 acres of revegetation Method No. 2	4,000
TOTAL	$5,600

SITE 29

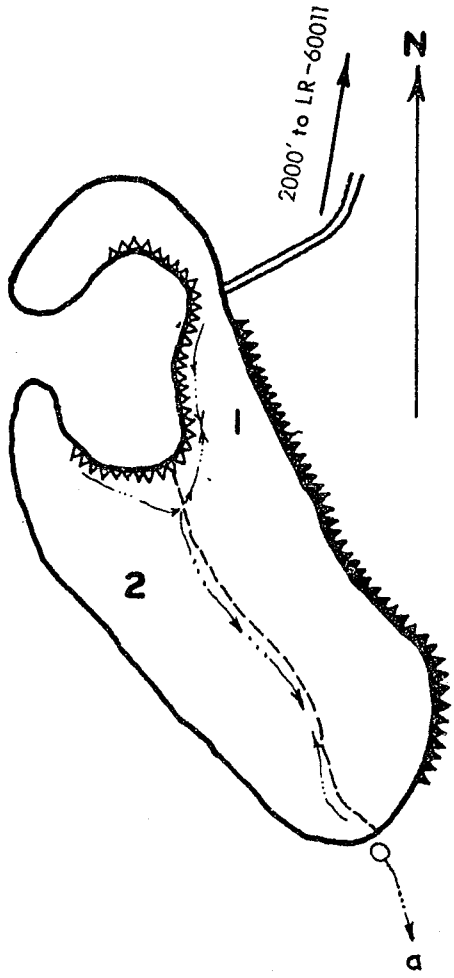

TABLE 11. SUMMARY OF ABATEMENT PLANS AND COSTS FOR THE TROUT RUN SUBWATERSHED

Mine Site No.	ABATEMENT METHOD																TOTAL COST
	CLEARING		TERRACE BACKFILL		CONTOUR BACKFILL		SELECTED GRADING		SURFACE SEALING	DEEP MINE SEALING	SOIL REVEGETATION		DIVERSION		LINED CHANNELS		
	Acres	Cost	Acres	Cost	Acres	Cost	Acres	Cost	Cost	Cost	Acres	Cost	Feet	Cost	Feet	Cost	
18	3.5	300			5.8	6700	5.0	5000	2000		27.3	8800					$22,800
19							10.9	6500			10.9	3300					$ 9,800
20							0.5	300			1.0	200					$ 500
29											12.1	5600					$ 5,600
																TOTAL	$38,700

Where no costs are shown no work has been recommended