SOUTHWEST TRIBUTARIES

SOUTHWEST TRIBUTARIES SUBWATERSHED

The Southwest Tributaries include all the drainage area which contributes flow to the main stream from the southwest at the mouth of the Upper Main Stream Subwatershed. This drainage area covers 3.15 square miles or 7.9 percent of the total watershed area.

A total of five water quality sampling stations were established in this subwatershed to monitor stream characteristics. Data from these stations indicated that during the project period, the area produced an average of 255 pounds per day acid and 151 pounds per day alkalinity. The total net discharge from this subwatershed was 104 pounds per day net acid. Basically, three feeder stream systems contribute flows to Big Scrubgrass from this subwatershed. Two of the tributaries were net alkaline streams, although exhibiting some measurable total acidity at times. The third tributary, monitored at Sampling Station No. 43 on Williams Run had a net acid discharge of 198 pounds per day average with an average pH of 5.7.

Flows recorded through Sampling Station No. 44 discharged an average net 71 pounds per day acid contributed by runoff from piled gob material of an abandoned deep mine. Downstream from Station No. 44, a smaller tributary enters the stream flowing from the southeast. Acid characteristics were also displayed in this stream as was recorded from Sampling Station No. 58. Average discharges of 50 pounds per day were recorded, resulting in a total of 121 pounds per day average

acid discharge at these two sampling stations. It is interesting to note the water quality data at Station No. 69, downstream from the confluence of the aforementioned stream. At this point net alkaline conditions were determined, indicating natural stream recovery. Dilution to the extent of alkaline runoff and spring flows probably accounted for a large portion of the stream's recovery.

Martin Run, through Station No. 42, flowed predominantly alkaline during low flow periods with an average net alkalinity of 8.8 ppm reaching a maximum of 110 ppm. Variable alkaline conditions were evident during high flows. Other seasonal variations in this subwatershed indicated Williams Run to flow in a variable condition during low flows and predominantly acid in high runoff periods. This is indicative of acid slugging, eliminating any possible dilution factors.

A detailed discussion of location, drainage areas and summary of water quality test results of the five sampling stations in this subwatershed follow. Figure 53 is a map of the sampling station locations in the subwatershed.

Station No. 42 was located on Martin Run at the east end of a culvert passing under L.R. 60003, 1.8 miles south of Pa. Route 8. There are 0.39 square miles of drainage area above this station and Mine Sites No. 32 and No. 36 contribute runoff flows to the stream. However, Martin Run at this point has been variable to net alkaline during low and high flow periods as well as throughout most of this study. Between March 3, 1971, and May 4, 1972, Station No. 42 was sampled 25 times and following are the indicated average, maximum and minimum test values.

	Average	Maximum	Minimum
Flow (gpm)	319.0	670.0	80.0
pH	6.3	7.2	4.8
Total Acidity (ppm)	6.2	20.0	0.0
Alkalinity (ppm)	15.0	110.0	0.0
Iron (ppm)	0.23	0.5	0.05
Sulfates (ppm)	28.0	58.0	16.0
Acid (ppd)	51.0	60.0	0.0
Alkalinity (ppd)	54.0	120.0	0.0
Iron (ppd)	1.0	2.6	0.1
Sulfates (ppd)	96.0	190.0	50.0

Station No. 43 was established on Williams Run at the east end of a concrete box culvert under L.R. 60003, 2.5 miles south of Pa. Route 8 and between the east and west bound lanes of Interstate Route 80. Station No. 43 has a drainage area of 1.0 square miles, and collects seepage flows from Mine Sites No. 36, No. 38 and No. 40. Williams Run at this point has been net acidic for most of this project but has flowed in a net alkaline condition a few times with the pH reaching 7.0. Between March 3, 1971, and May 4, 1972, this station was sampled 32 times. Listed below are the average, maximum and minimum water quality test data.

	Average	Maximum	Minimum
Flow (gpm)	765.0	3053.0	11.7
pH	5.7	7.0	3.6
Total Acidity (ppm)	26.0	40.0	0.0
Alkalinity (ppm)	4.0	30.0	0.0
Iron (ppm	0.24	0.7	0.05
Sulfates (ppm)	75.0	160.0	33.0
Acid (ppd)	217.0	1100.0	0.0
Alkalinity ppd)	19.0	260.0	0.0
Iron (ppd)	3.2	20.0	0.0
Sulfates (ppd)	828.0	4730.0	4.8

Station No. 44 had its location at the east end of two metal culverts under L.R. 60003, about 500' south of the intersection with Pa. Route 208 at Nectarine. This station has a drainage area measuring 0.51 square miles. Flows from Mine Site No. 41 and No. 55 contribute to the acid load off the stream along with seepage believed to originate from stripped over deep mine workings. Between March 3, 1971, and May 4, 1972, this station was sampled 29 times, the average, maximum and minimum values of which are listed below.

	Average	Maximum	Minimum
Flow (gpm)	196.0	530.0	15.0
pH	4.9	6.8	3.6
Total Acidity (ppm)	43.0	90.0	3.0
Alkalinity (ppm)	1.03	20.0	0.0
Iron (ppm)	0.53	0.9	0.2
Sulfates (ppm)	88.0	134.0	60.0
Acid (ppd)	72.0	190.0	1.8
Alkalinity (ppd)	1.0	26.0	0.0
Iron (ppd)	1.3	3.7	0.1
Sulfates (ppd)	207.0	750.0	12.0

Station No. 58 was set up at the north end of a metal culvert under Pa. Route 208, 0.3 miles east of the intersection with L.R.60003 at Nectarine. This station has a drainage area of 0.33 miles. Flows are contributed by Mine Sites No. 41, No. 42 and No. 43. During both high flows and low flows, water quality at this point was predominantly acid. Samples were collected 29 times between March 9, 1971, and May 4, 1972, revealing the following average, maximum and minimum water quality evaluations.

	Average	Maximum	Minimum
Flow (gpm)	123.0	280.0	10.0
pH	5.5	7.0	3.8
Total Acidity (ppm)	30.0	80.0	0.0
Alkalinity (ppm)	1.7	10.0	0.0
Iron (ppm)	0.2	0.4	0.05
Sulfates (ppm)	110.0	140.0	88.0
Acid (ppd)	50.0	150.0	6.0
Alkalinity (ppd)	2.4	25.0	0.0
Iron (ppd)	0.35	1.3	0.02
Sulfates (ppd)	159.0	420.0	16.0

Station No. 69 was established at the north end of a long concrete box culvert under Interstate Route 80 about 3.5 miles west of the intersection with Pa. Route 308 (Clintonville Interchange). Above this station there are 1.19 square miles of drainage area. Flows through this station are collected from Mine Sites No. 41, No. 42, No. 43, and No. 55. Prior to this point, the stream has been net acidic but dilution of the stream from uncontaminated runoff has increased the quality to a variable condition. This station was sampled 24 times between May 3, 1971, and June 23, 1972. Below are listed the average, maximum and minimum water quality characteristics.

	Average	Maximum	Minimum
Flow (gpm)	381.0	1000.0	18.0
pH	6.5	7.1	4.7
Total Acidity (ppm)	6.1	40.0	0.0
Alkalinity (ppm)	10.2	70.0	0.0
Iron (ppm)	0.07	0.6	0.05
Sulfates (ppm)	82.0	125.0	30.0
Acid (ppd)	17.0	60.0	0.0
Alkalinity (ppd)	78.0	760.0	0.0
Iron (ppd)	0.28	1.6	0.0
Sulfates (ppd)	437.0	1080.0	6.5

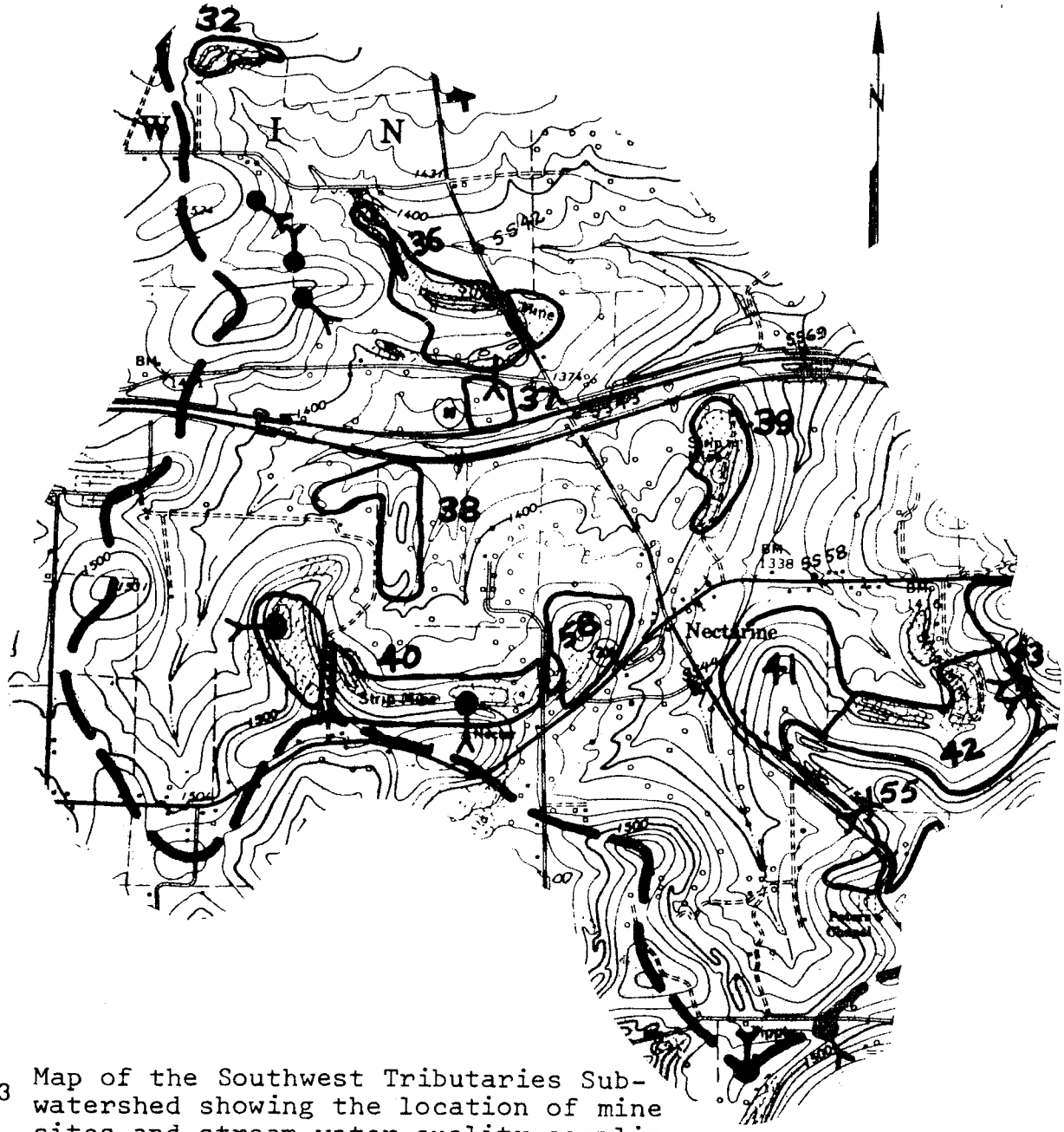


FIGURE 53 Map of the Southwest Tributaries Sub-watershed showing the location of mine sites and stream water quality sampling stations.

•SS 43 Water Quality Sampling Station Location

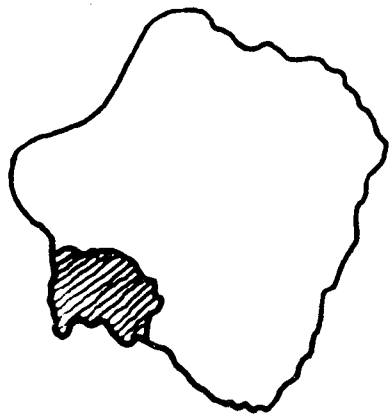
40 Location of a Strip Mine

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 Southwest Tributaries Subwatershed:

Nine strip mine sites are located in this subwatershed including three recently active mines. Parts of two other recent active mines drain through this area. These mines cover an area of approximately 300 acres or 15.3 percent of the drainage area. Some deep mining was done in this area in the past and evidence of several old deep mines were found, including one which was active as recently as 1965. Figure 53 is a map of this area showing the mine locations. Field investigations determined that only one of the deep mines was producing acid mine drainage. Gob material which is piled on the surface in one deep mine area is also an acid runoff source of stream pollution in the area.

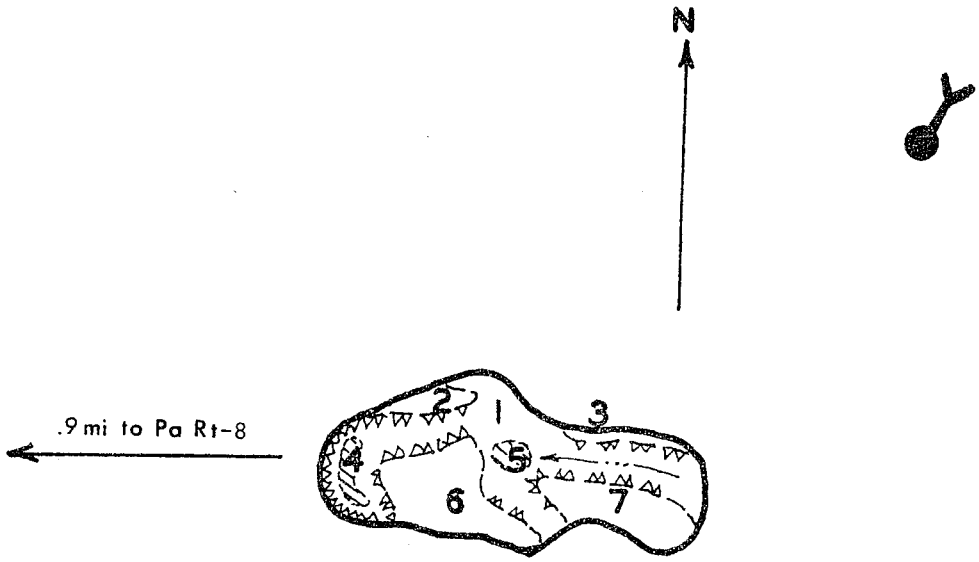
The recommendations for these areas should effect 98 percent of the sources and properly applied should be 75 percent effective. This should result in a 66 percent reduction in the overall pollution load from the area. This means that the average acid discharge from the area should be reduced by 316 pounds per day. Figure 30 is a key to the symbols used in the site maps.

SITE 32

Strip Mine Site No. 32 covers 4.7 acres on the extreme western edge of the watershed at the upper end of a small tributary to Scrubgrass Creek just north of Legislative Route L.R. 60072. The area has some trees about 20 years old and is very rough ungraded old spoil. Sampling Station No. 42 downstream from this site has an average pH of 6.3 with 8.8 parts per million net alkalinity. The spoil pH on the mine site is 4.0 and below and the water within the site has a pH below 4.0.

Since this site is small, it does not pose a pollution problem to the streams, and is located in a relatively remote area; no reclamation measures are recommended.

SITE 32



SITE 36

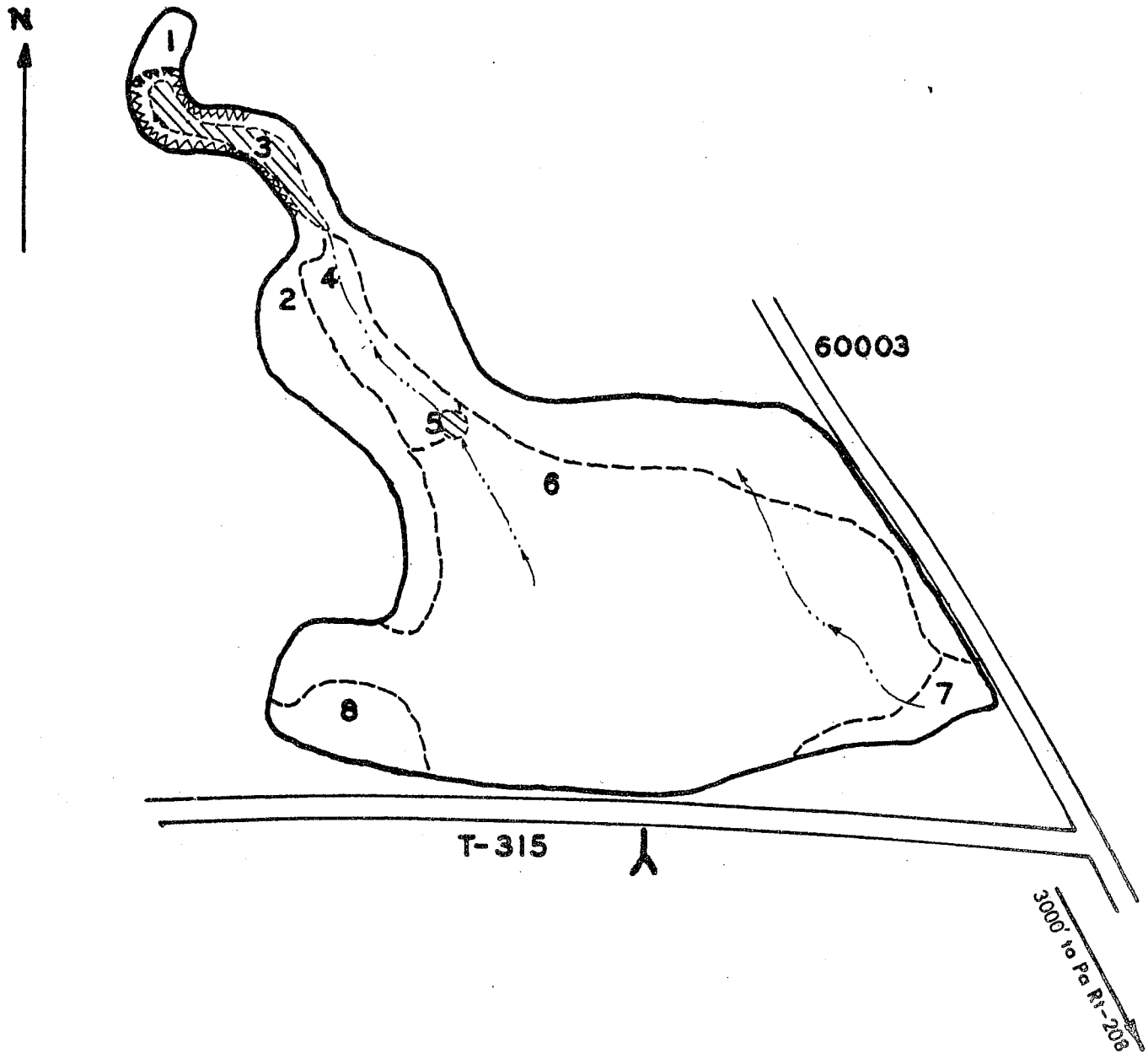
Strip Mine Site No. 36 covers 36.6 acres just north of Interstate 70, west of Legislative Route 60003 in the extreme southwestern edge of the watershed. The area has been partially regraded but revegetation has been only partially successful. There are trees on some of the area that are 8 to 10 years old and the area around the pool in the northern end has been partially landscaped to provide a recreation pond for a summer home. The water in this pool is very acid, having a pH about 3.5. The spoil pH on the area is about 4.6. Drainage from this area passes through Sampling Station No. 42 which has generally had good quality water. An old deep mine opening at the southern edge of this strip mine, just below Township Road T-315 is discharging a high amount of acid and should be sealed. Detailed drilling and pressure testing should be done to determine the extent of the workings and a hydraulic seal applied.

Areas #4 and #6 cover 22.9 acres and should be reseeded using revegetation Method No. 1.

Estimated Cost of Reclamation:

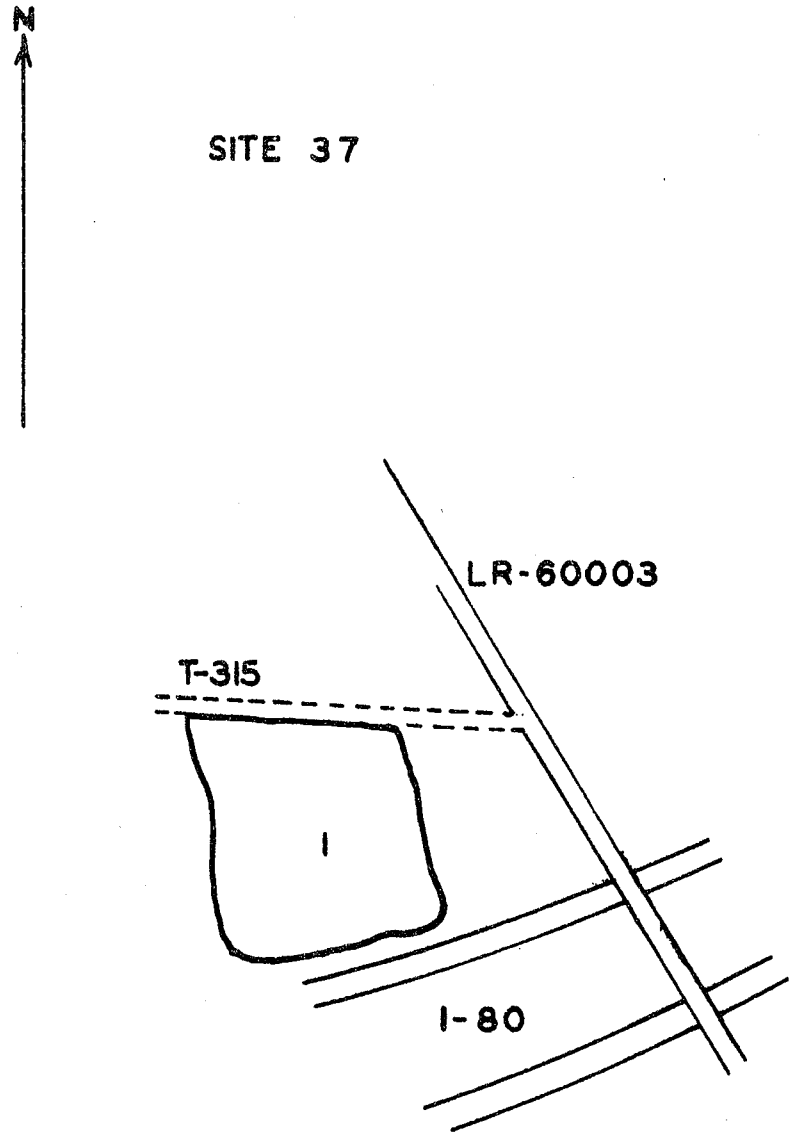
Areas #4 and #6	
22.9 acres of revegetation Method No. 1	$ 6,900
Sealing of one deep mine opening	20,000
TOTAL	$26,900

SITE 36



SITE 37

This strip mine covers 4.7 acres just north of Interstate 80 and has recently been regraded and seeded and needs no further revegetation to control acid drainage.


N
SITE 37
LR-60003
T-315
1
I-80

SITE 38

This strip mine covers 17 acres on the south side of Interstate 80 in the extreme southwest corner of the watershed. It has a spoil pH of 4.2 to 4.4 and is rough ungraded spoil partially covered with trees 10 to 20 years old. Seepage from this site drains through Sampling Station No. 43 which has had variable water quality, generally better during low flow periods but with an average net acidity of 22 parts per million.

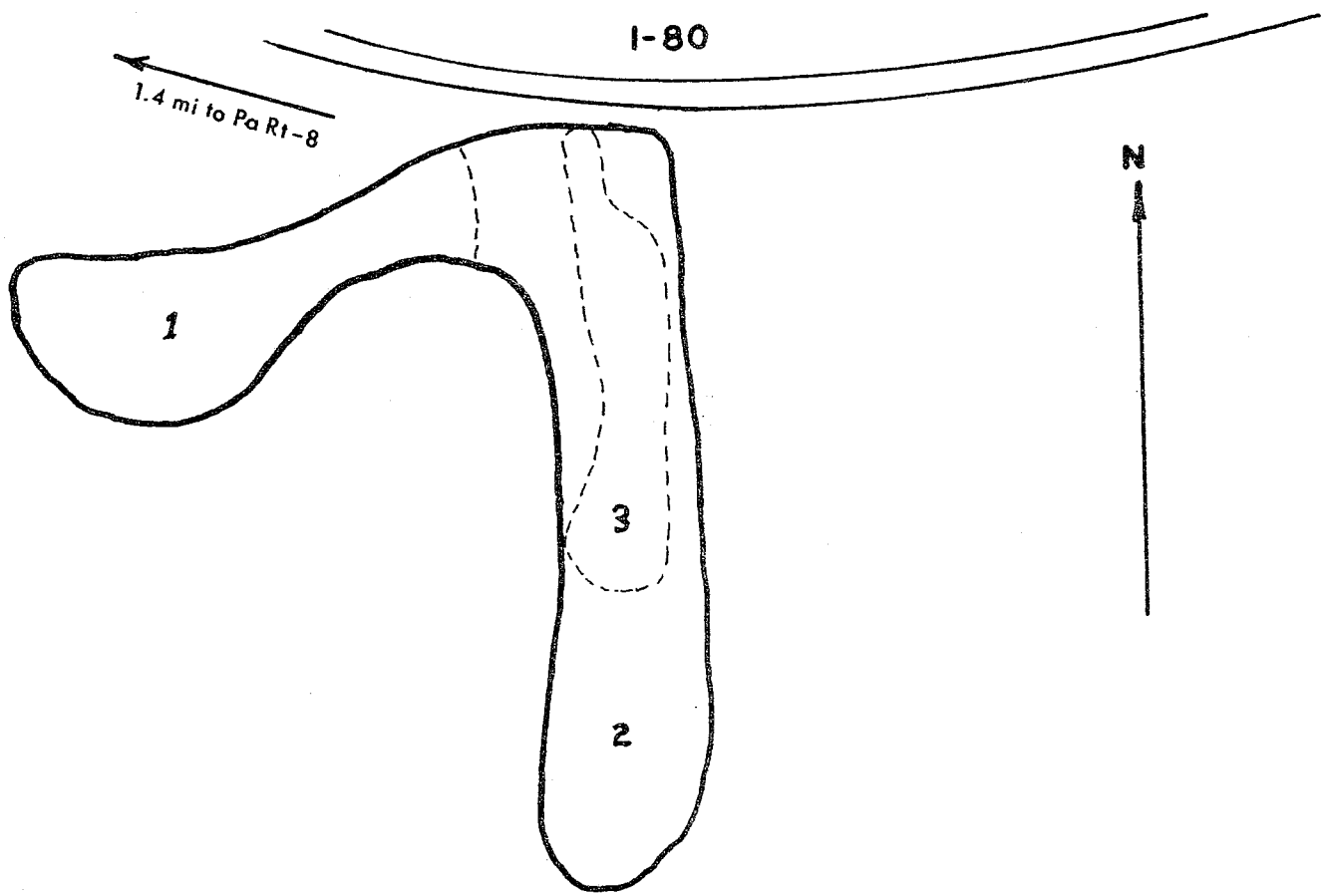
Area #1 covers 5.7 acres of extremely rough spoil material that is partially covered with grass and trees which have not developed adequately to control acid runoff from the area. Additional cover should be applied using revegetation Method No. 2.

Area #2 covers 8.3 acres and is adequately revegetated to control acid mine drainage.

Area #3 is 3.0 acres of rough spoil material which has not developed adequate cover to control acid formation and drainage. Selected grading followed by revegetation Method No. 1 should be applied to this area.

Estimated Cost of Reclamation:

Area #1	
5.7 acres of revegetation Method No. 1	$ 3,400
Area #3	
3.0 acres of selected regrading	1,800
3.0 acres of revegetation Method No. 1	900
TOTAL	$ 6,100

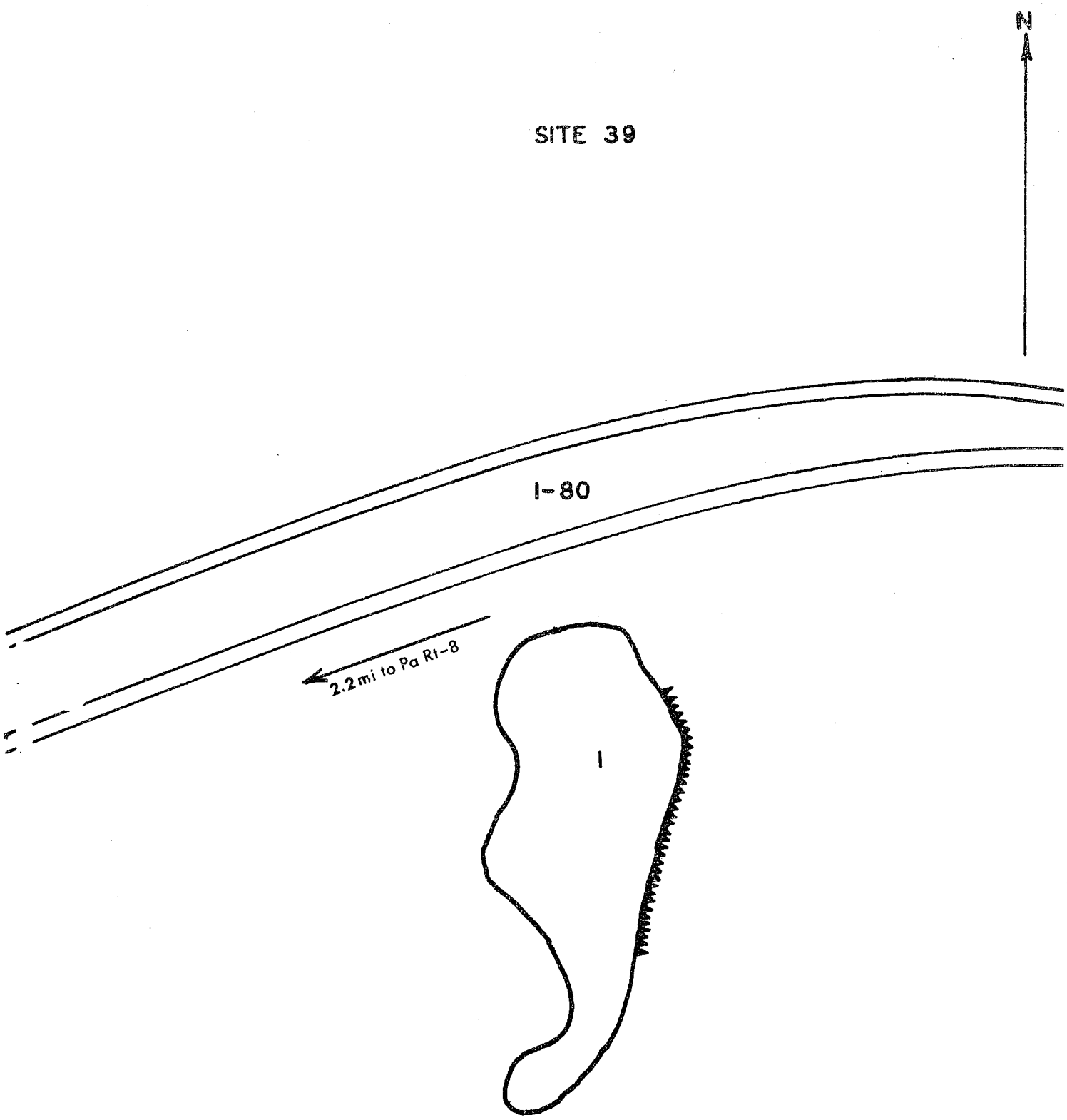


SITE 38

STIE 39

Strip Mine Site No. 39 covers 10.9 acres between Route 208 and Interstate 80 directly north of Nectarine. The site is rough and covered with Aspen and Cherry trees 12 to 14 years old. The spoil material has a pH of 4.2 to 4.6 with no ponded water. Runoff from this site passes through Sampling Station No. 69 which has generally good quality water. No additional reclamation is recommended.

SITE 39



SITE 40

Strip Mine Site No. 40 covers 20.9 acres on the north side of Route 208 west of Nectarine in the extreme southwest corner of the watershed. The extreme eastern end overlaps with strip mine site No. 58 which is a new active strip mine. An old deep mine opening was located on the western edge of this mine but no evidence of seepage was noticed. The spoil slopes on much of the strip mine are steep and some areas have trees 15 to 20 years old. The spoil pH is 4.8 to 5.2. Seepage from this site contributes to the flow in Sampling Station No. 43 which had variable to poor quality water.

Area #1 covers 5.0 acres which have adequate cover to prevent acid mine drainage.

Area #2 is 3.3 acres of bare level spoil which is a source of acid storm runoff and should be planted using revegetation Method No. 1.

Area #3 covers 0.5 acres and is an area where ponded water has accumulated in the final cut. Selected grading should be applied to partially backfill the area to provide adequate drainage so water will not accumulate. Revegetation Method No. 1 should follow.

Area #4 covers 4.0 acres and is adequately reclaimed to prevent acid mine drainage.

Areas #5 and #6 cover 3.9 acres including an acid pool and an area partially vegetated with trees. The area should be cleared and the slopes partially regraded back to the highwall using a terrace backfill to provide adequate drainage for accumulating water. Use revegetation Method No. 1.

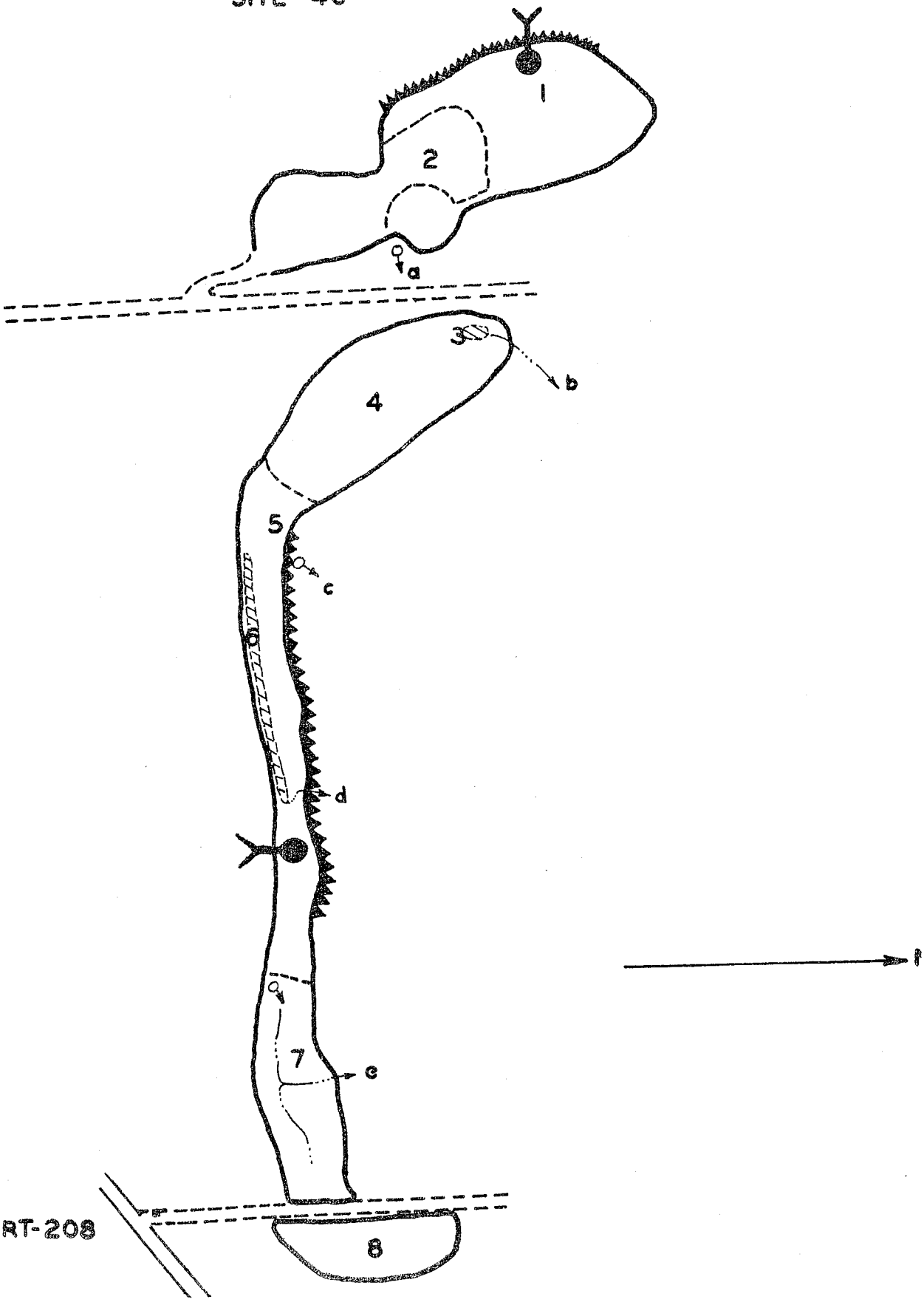
Area #7 covers 2.6 acres of rough spoil material. Selected grading to provide proper drainage and improve slope stability should be applied. Revegetation Method No. 1 should follow.

Area #8 covers 1.6 acres and had adequate cover to prevent acid mine drainage. No reclamation is recommended.

Estimated Cost of Reclamation:

Area #2	
3.3 acres of revegetation Method No. 1	$1,000
Area #3	
0.5 acres of selected grading	300
0.5 acres of revegetation Method No. 1	150
Areas #5 and #6	
3.0 acres of clearing	300
3.9 acres of terrace backfilling	3,900
3.9 acres of revegetation Method No. 1	1,200
Area #7	
2.6 acres of selected grading	1,600
2.6 acres of revegetation Method No. 1	800
TOTAL	$9,250

SITE 40



SITES 41, 42, 43 and 55

These mines are considered as a package because they occupy adjacent areas and all were affected by recent strip mining. These mines occupy the hilltops south of Route 208 and east of Nectarine. The boundaries of the old mining which were determined by the Soil Conservation Service investigation are virtually meaningless because of the recent mining.

SITE 41

This area lies just southeast of the intersection of Route 208 and L.R. 60003 at Nectarine. This area covers 40.8 acres under mine drainage Permit No. 3771BSM3 to Winger Coal Company issued May 4, 1971. The area includes 4.6 acres of previous strip mining. Tri-County Fuel Company had a previous mining permit on the area issued January 16, 1969, and some mining was done at that time also. Drainage from the area would flow through Sampling Stations No. 44 and No. 58, both of which have poor quality water. All of this area should now be the responsibility of the mining company and no reclamation measures are recommended under this project.

SITE 42

This area joins site 41 to the east. The area covers 46.2 acres under the same mine drainage permit covering Site No. 41. Old strip mine spoil occupies 18.1 acres, mostly within the boundaries of the present permit but extending slightly beyond to the north. The old spoil had an adequate tree cover to control acid drainage and reclamation of any old spoil not involved in the active permit area is probably

not justified. The remaining area is the responsibility of the active miner. No reclamation measures are recommended. Continued surveillance of Sampling Station No. 58 is recommended since acid conditions were found at this point as late as May, 1972.

SITE 43

This site lies adjacent to Site No. 42 to the east along Route 208. The area covers 65.3 acres under strip mine Permit No. 3771BSM1 to Winger Coal Company issued May 5, 1971. The area includes 20.8 acres of old strip mine spoil. This mine lies on the divide between the Southwest Tributaries Subwatershed and the South Branch Subwatershed. Drainage from the area would pass through Sampling Stations No. 58 and No. 70 as well as down an unnamed tributary to the South Branch which was not sampled. The area is the responsibility of the current miner and no reclamation is recommended.

SITE 55

This area covers 18.5 acres south of and adjacent to all three of Sites No. 41, No. 42 and No. 43. Most of this area is covered under mine drainage Permit No. 2568BSM 28 to Tri County Fuel Company issued January 16, 1969. 18.7 acres of old mine spoil lie just outside this permit area. An old deep mine opening lies on the west side of this area with the remains of the old tipple and coal spoil and gob spread out over the hillside. No drainage from the deep mine workings were found. However, runoff from the gob piles passes through Sampling Station No. 14 and this probably accounts for the poor quality of water in this stream. Since it is doubtful

that any new mining will be done in the area of the old deep mine, reclamation of this area may be warranted. Five reclamation areas are identified on the site map.

Area #1 covers 1.8 acres along L.R. 60003 and includes the remains of the old deep mine. The location of the actual opening has been mined over during previous strip mining operations and no seepage is apparent. The area is covered with old gob piles which are believed to be the source of the acid found in Sampling Station No. 44. Except for the gob material, the remainder of this area has grown up to trees and brush. This old gob material should be removed and buried and the area regraded and seeded using revegetation Method No. 1.

Area #2 covers 5.1 acres that have been partially regraded and have adequate cover. No reclamation is recommended.

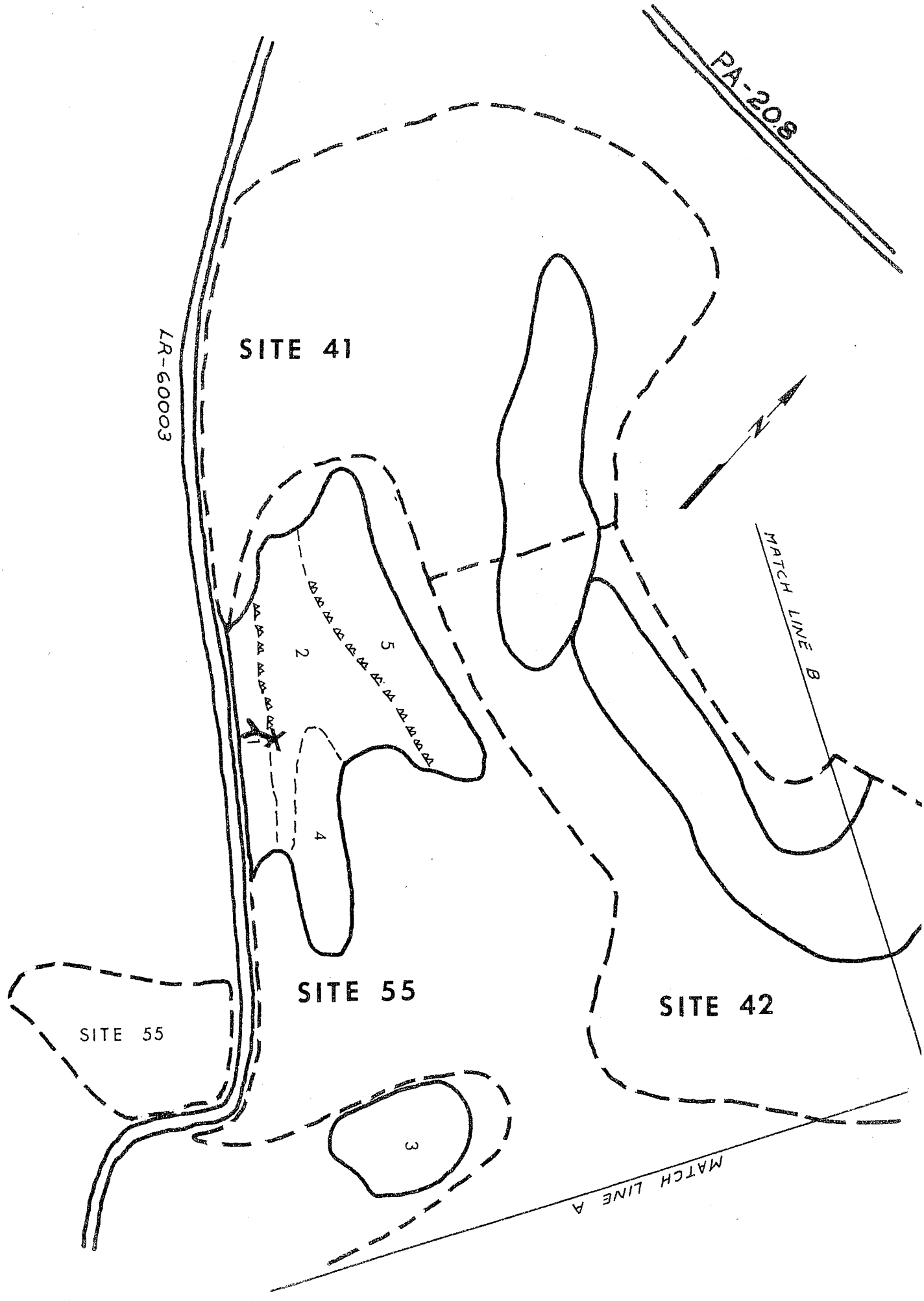
Area #3 is a separate area to the southeast. This is 4.4 acres of regraded mine spoil with little vegetation. The area is a source of acid storm runoff and should be planted using revegetation Method No. 1.

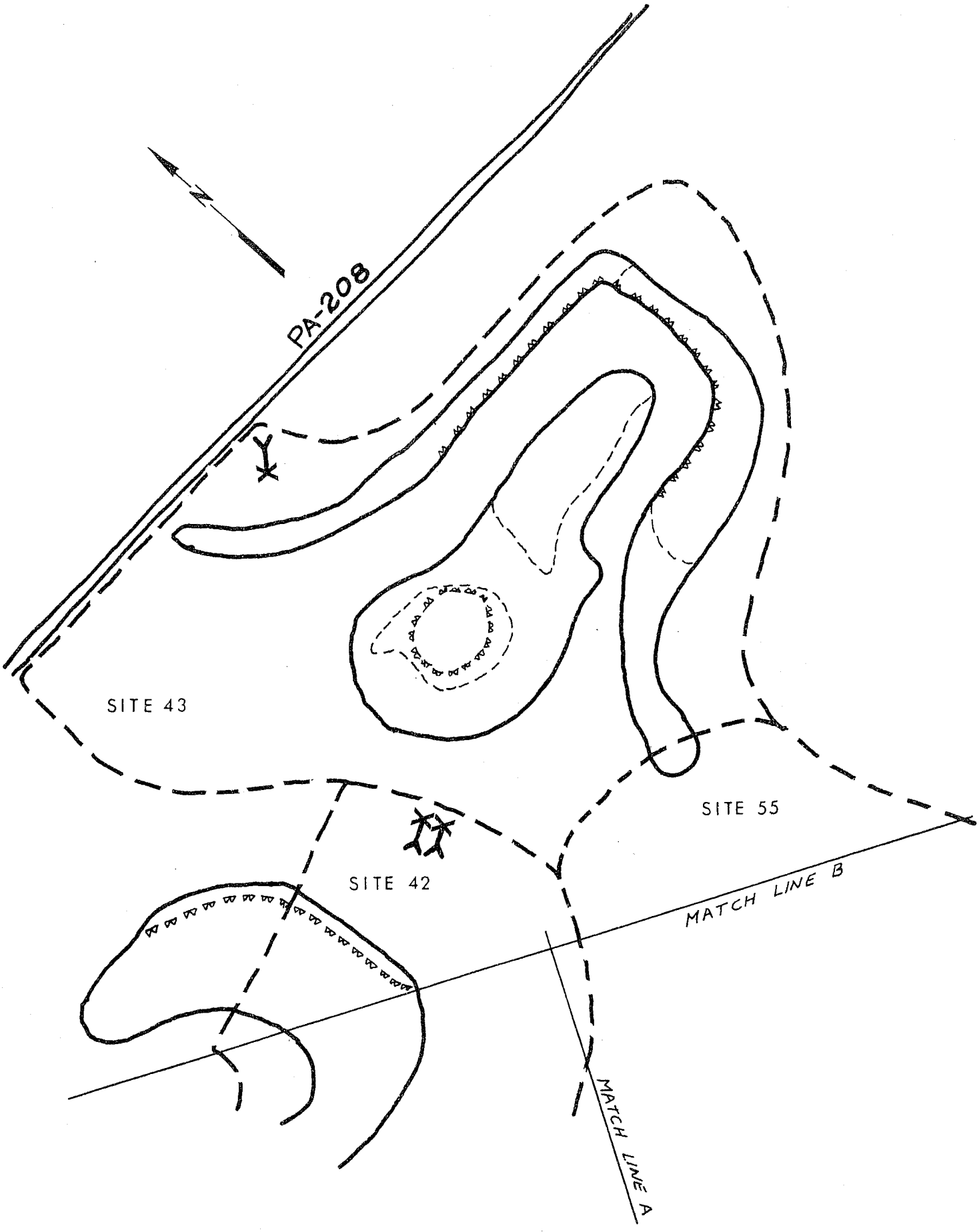
Area #4 is 2.4 acres above the old deep mine that is a source of acid storm runoff and has been regraded but has little vegetation. Use revegetation Method No. 1.

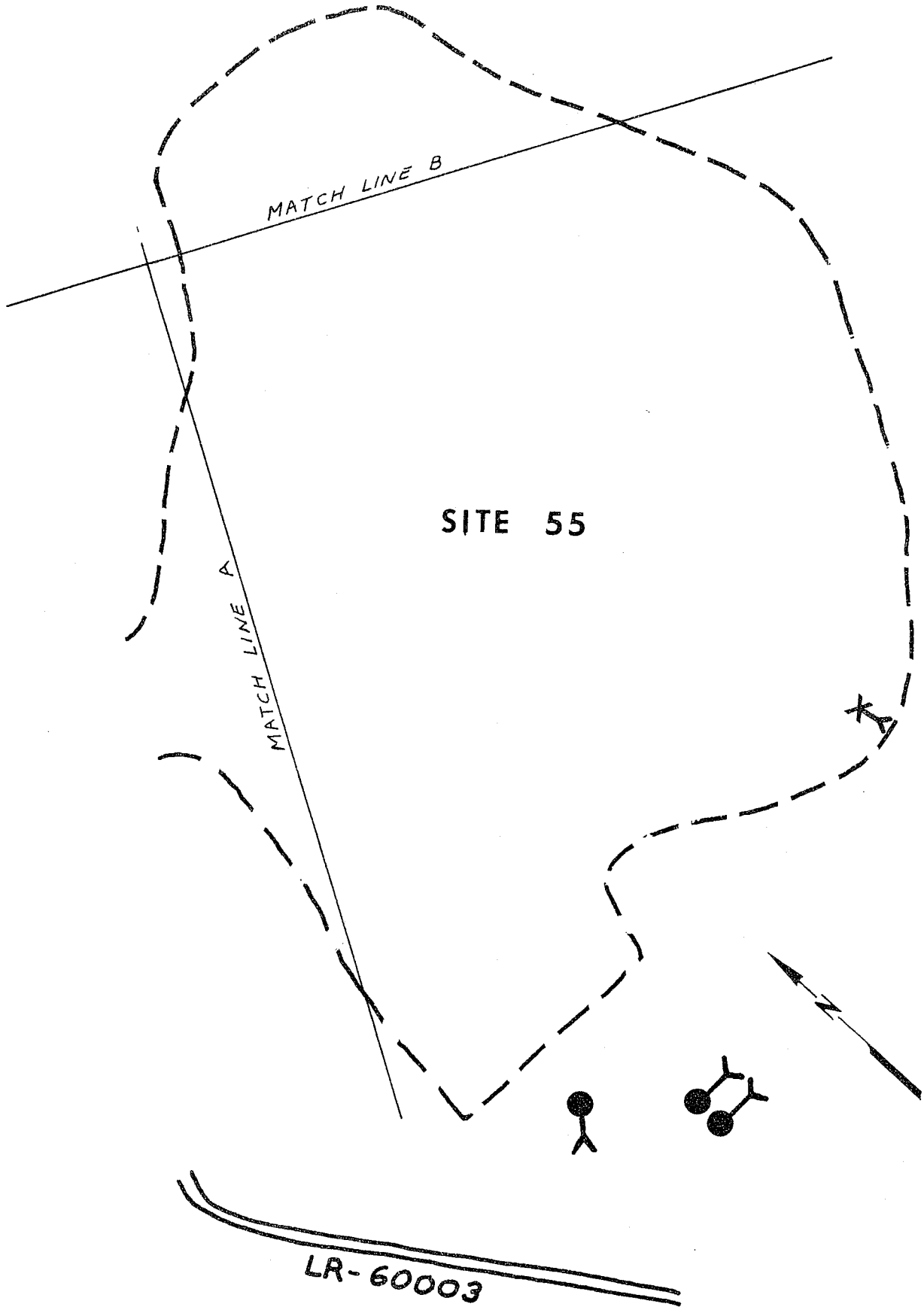
Area #5 is a partially regraded old strip mine area including a low highwall. The gob material from Area #1 should be buried below this old highwall and the surface regraded to provide adequate drainage and reseeded using revegetation Method No. 1 on 4.4 acres.

Estimated Cost of Reclamation:

Area #1	
Gob removal and burial	$ 4,000
1.8 acres of revegetation Method No. 1	600
Area #3	
4.4 acres of revegetation Method No. 1	1,300
Area #4	
2.4 acres of revegetation Method No. 1	700
Area #5	
Surface Sealing	1,000
4.4 acres of selected grading	2,000
4.4 acres of revegetation Method No. 1	1,300
TOTAL	$10,900


PA-208
LR-60003
SITE 41
N
MATCH LINE B
2
5
4
1
SITE 55
SITE 42
SITE 55
3
MATCH LINE A


N
PA-208
SITE 43
SITE 42
SITE 55
MATCH LINE B
MATCH LINE A


MATCH LINE B
SITE 55
MATCH LINE A
LR-60003

SITE 58

Site No. 58 covers approximately 25.7 acres on the east end of Mine Site No. 40 north of Route 208 at Nectarine. This is an active mine operated by Winger Coal Company under mine drainage Permit No. 3771BSM8 issued October 18, 1971, and reclamation of the area is the responsibility of the miner.

TABLE 14. SUMMARY OF ABATEMENT PLANS AND COSTS FOR THE SOUTHWEST TRIBUTARIES 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	
32																	*
36										20000	22.9	6900					$26,900
37																	*
38							3.0	1800			8.7	4300					$ 6,100
39																	*
40	3.0	300	3.9	3900			3.1	1900			10.3	3100					$ 9,200
41																	*
42																	*
43																	*
55																	*
																TOTAL	$42,200

*Where no costs are shown, no work has been recommended