



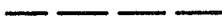







PROJECT AREAS
Reclamation Features

LEGEND

	Limit of Work
	Highwall
	Flume
	Diversion Ditch
	Drainage Channel
	Contour Backfill
	Terrace Backfill
	Minimal Regrading
	Deep Mine Seal
	Gas Well Seal

AREA I

This area, located along Whites Run, was strip mined for the two Clarion coal seams. This strip mine is essentially unreclaimed with the strip cut remaining along the base of the highwall. The highwall reaches a maximum height of about 50 feet. The Upper Clarion coal is about 2 feet thick and is outcropping approximately 35 feet up the highwall. The spoil pile supports a sparse growth of mature evergreens. This area was covered by a bituminous strip mine drainage permit no. 2769BSM10, Zacherl Coal Co.

Four acid discharges flow from this strip mine, three of which originate as surface water above the highwall.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg, Flow (g.p.m.)
103	78	1.2	63
104	74	.88	52
105	36	.46	29
106	12	.21	5
Total	200	2.8	

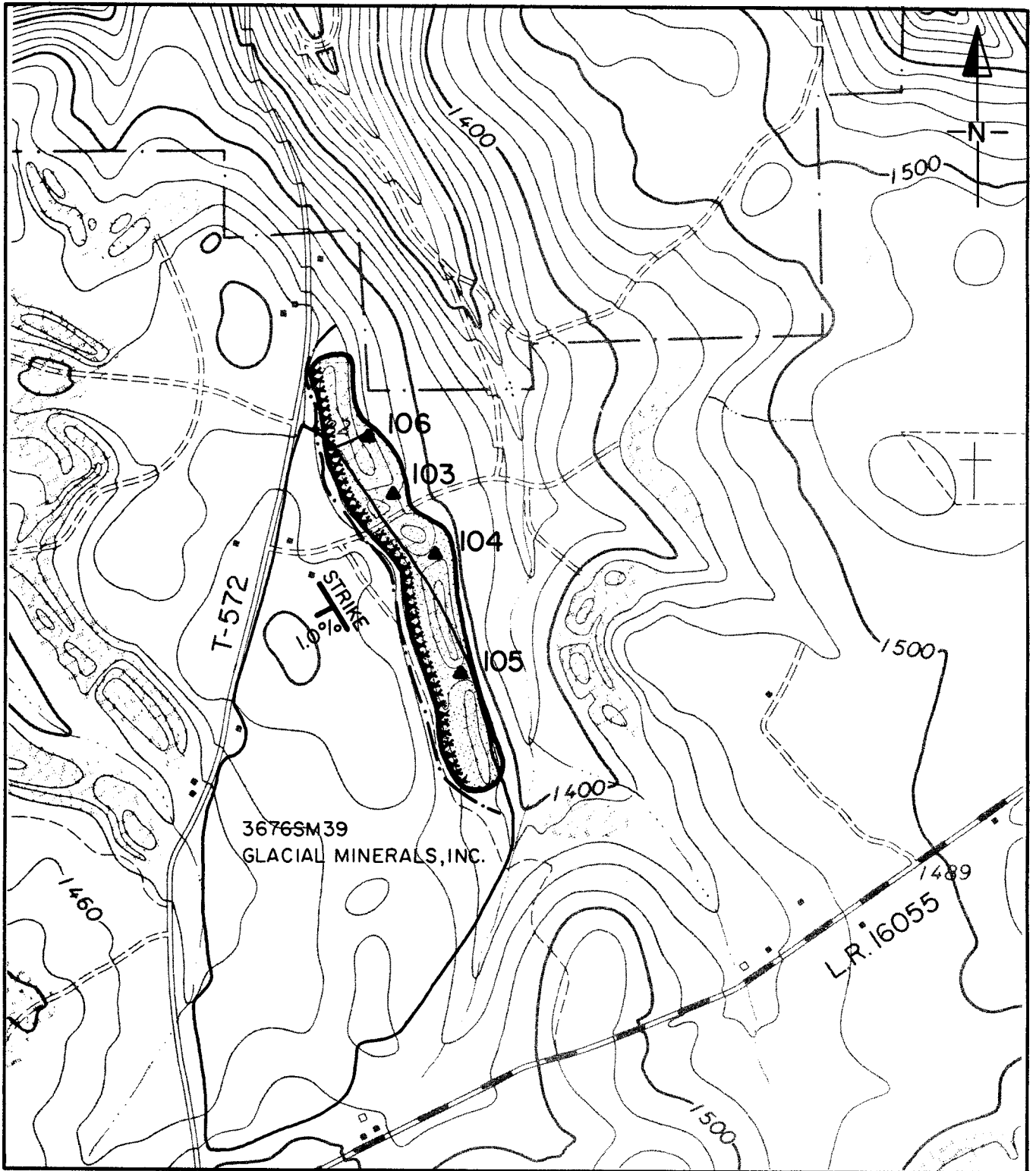
Proposed Reclamation Plan - Priority No. 2

This area should be terrace backfilled to above the exposed coal seam. A diversion ditch should be constructed to divert the surface flow away from the top of highwall. At the extreme northern end of the area the highwall is only about 15 to 20 feet high. This northern area should be restored to approximate original contour, eliminating the depression at the base of the highwall. The entire affected area should then be planted with appropriate grasses to prevent erosion.

Estimated Cost:

Terrace Backfill	23 Acres @\$2000/Acre=\$46,000
Approximate Original Contour	5 Acres @\$4000/Acre=\$20,000
Diversion Ditch	3900 Feet @\$3.00/Ft.=\$11,700
Revegetation	28 Acres @\$700/Acre=\$19,600
	Total Cost = \$97,300
Approximate Amount of Acid to be Abated	80%
Total Acid Abated	160 lbs/day
Cost of Abatement per lb. of acid per day	\$608

PROJECT AREA I



0' 500' 1000'
PROPOSED RECLAMATION PLAN

AREA I

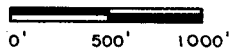
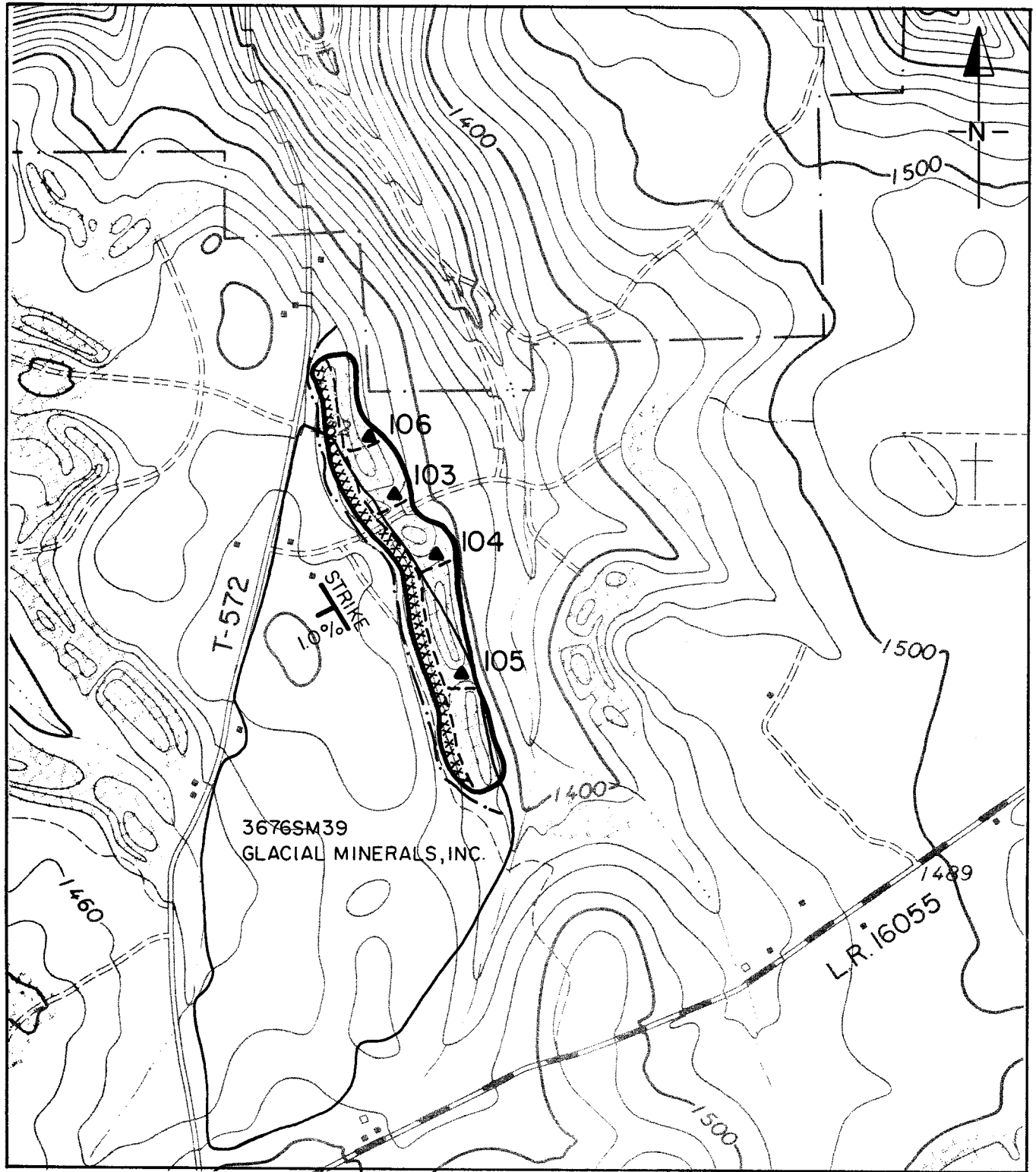
Alternate Reclamation Plan - Priority No. 11

Construct a diversion ditch along the top of highwall to convey surface runoff away from the strip mine. Drainage channels should be constructed along the base of the highwall to promote rapid runoff from the disturbed area. The entire disturbed area should be revegetated.

Estimated Cost:		
Diversion Ditch	3900 Feet @ \$3.00/Ft.	= \$ 11,700
Drainage Channels	4650 Feet @ \$30/Ft.	= \$139,500
Revegetation	28 Acres @ \$700/Acre	= \$19 600
	Total Cost	= \$170,800

Approximate Amount of Acid to be Abated	55%
Total Acid Abated	110 lbs/day
Cost of Abatement per lb. of acid per day	\$1,553

PROJECT AREA I



ALTERNATE RECLAMATION PLAN

AREA II

This small hillside strip mine has been left unreclaimed. The Lower Clarion coal was apparently stripped here. A series of impoundments have been left along the base of the highwall. A stream enters the northernmost impoundment and travels by subsurface flow through the other impoundments.

Mine drainage discharges by seepage through the spoil on the west end of the strip and overflows from the southern impoundment. The spoils along the southern end of the strip support mature tree growth.

Discharges	Avg. Acidity(lbs/day)	Total Fe(lbs/day)	Avg. Flow(g.p.m.)
107	2.2	.97	23
108	11	1.3	40
TOTAL	13	2.3	

Proposed Reclamation Plan - Priority No. 28

The stream which has a pH of 6.5 prior to entering the strip ponds should be relocated to follow an existing dry stream course adjacent to the strip mined area. The ponds along the highwall on the north should be treated, drained, and backfilled leaving a swale for drainage. The ponds to the south of the access road should be treated and drained by constructing a connecting channel with discharge into another existing dry stream course just south of the access road. The spoils to the south should be left undisturbed as they presently support a growth of large trees. All affected area should be planted with appropriate grasses.

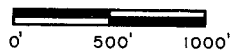
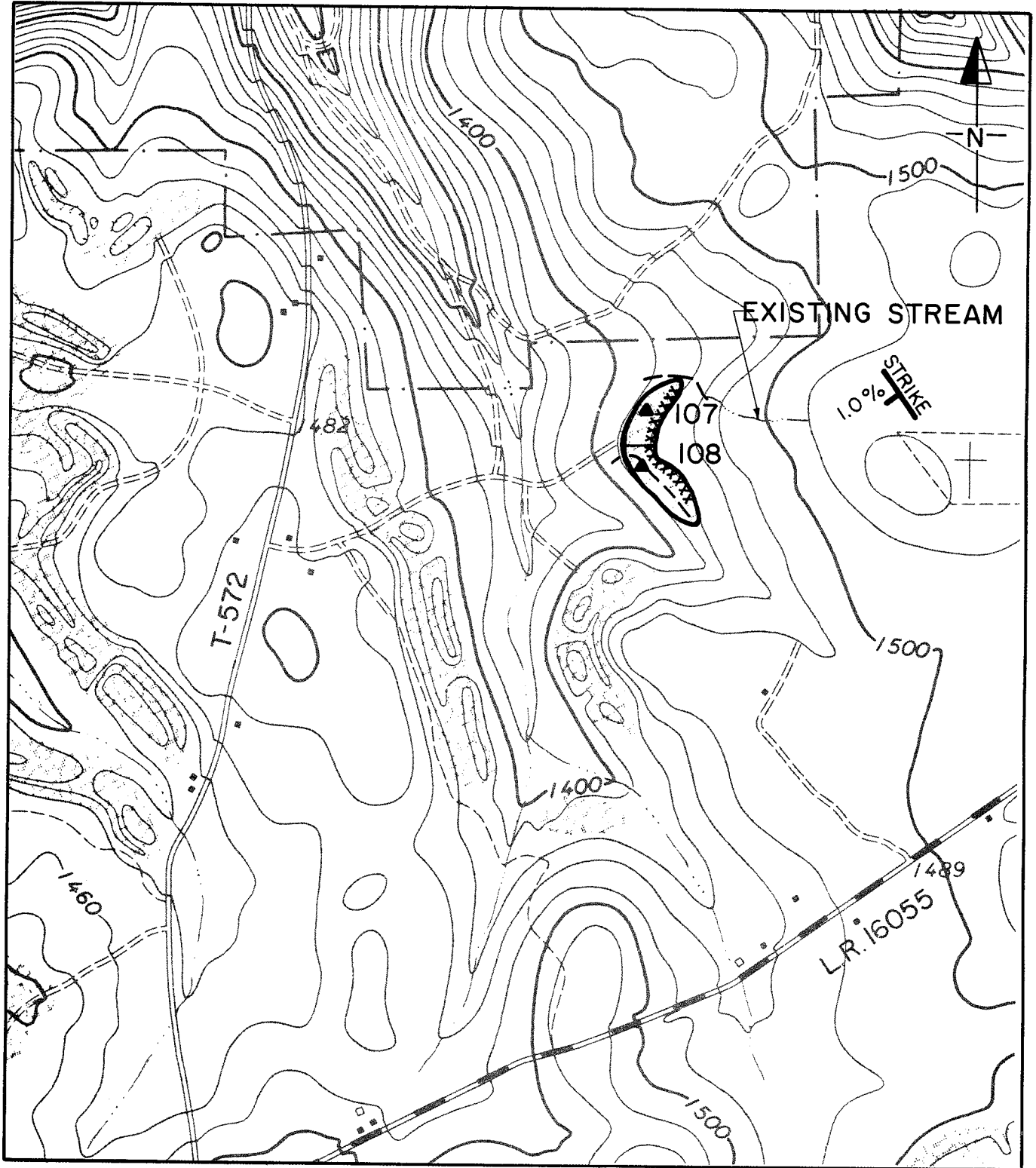
Estimated Cost:

Terrace Backfill	2 acres @ \$2000/acre = \$4,000
Drainage Channel	800 feet @ \$30/ft. = \$24,000
Stream Relocation	500 feet @ \$30/ft. = \$15,000
Revegetation	5 acres @ \$700/acre = \$3,500
TOTAL COST	\$46,500

Estimated Amount of Acid to be Abated	90%
Total Acid Abated	12 lbs/day
Cost of Abatement per lb. Of acid per day	\$3,875

Cost of Abatement per lb. of acid per day \$3,875

PROJECT AREA II



AREA III

This project area has been strip mined for the Clarion coal. There are two large gravity drains cut through the spoil. The area is essentially devoid of vegetation.

Acid mine drainage breaks out of the spoil in both gravity drains.

Discharges:	Avg. Acidity(lbs/day)	Total Fe(lbs/day)	Avg. Flow(gpm)
109	87	.77	19
110	168	1.1	46
TOTAL	255	1.9	

Proposed Reclamation Plan - Priority No. 1

Maximum reduction of the acid loads discharged-from this strip mine could be realized if the entire strip were terrace backfilled and revegetated. To compliment the backfilling, a surface water diversion ditch should be constructed along the top of highwall.

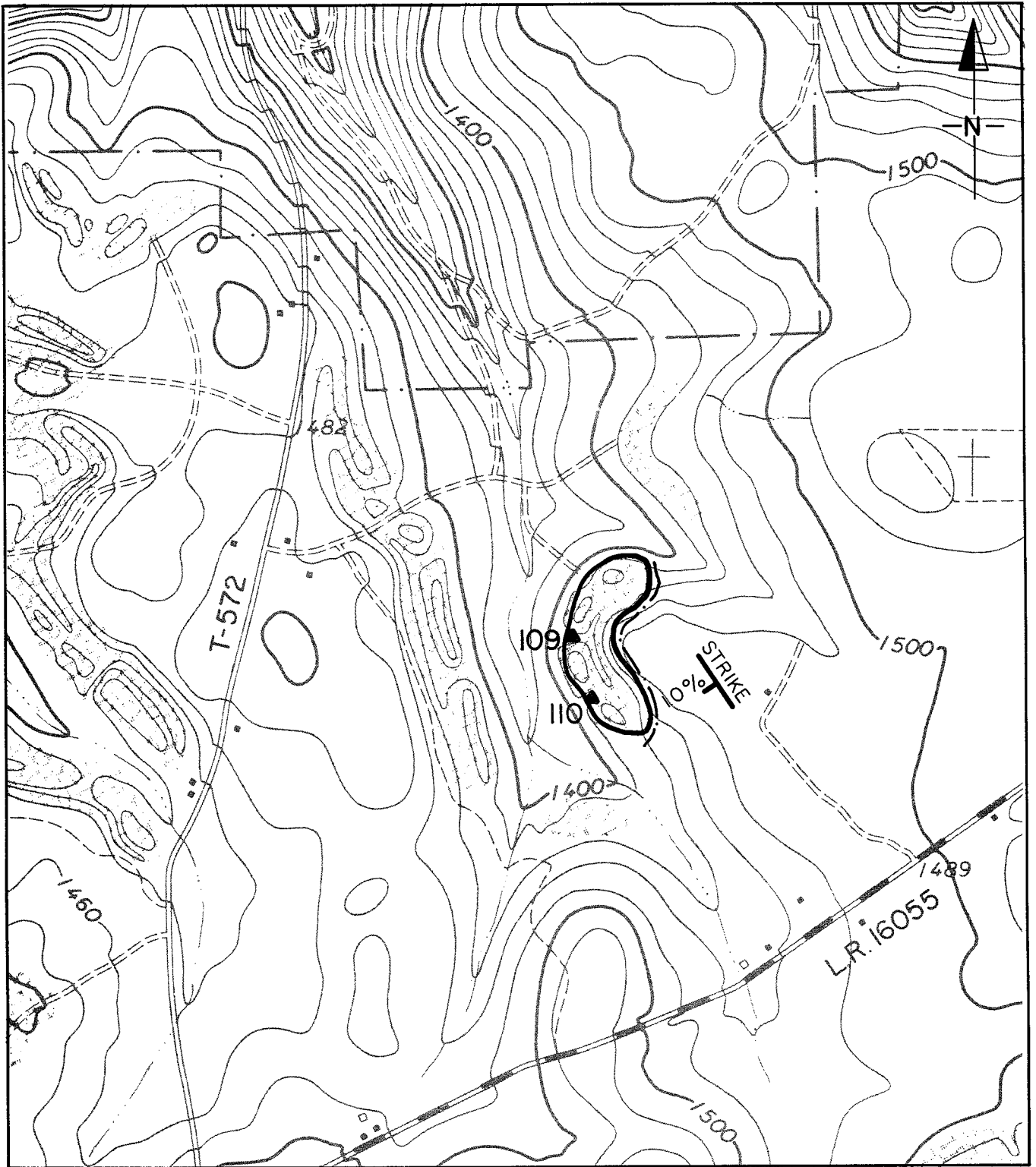
Estimated Cost:

Terrace Backfill	9 acres @ \$2000/acre	= \$18,000
Diversion Ditch	1200 feet @ \$3.00/ft.	= \$3,600
Revegetation	9 acres @ \$700/acre	= \$6,300
	TOTAL COST	= \$27,900
Approximate Amount of Acid to be Abated - 70%		
Total Acid Abated - 179 lbs/day		
Cost of Abatement per lb. Of acid per day - \$156		

Alternate Reclamation Plan - Priority No. 10

The area should undergo minimal regrading to eliminate any small surface depressions and to construct a drainage channel along the base of the highwall. This channel will drain through the existing gravity drains in the spoil and should be clay-lined through the spoil to prevent picking up acid from the pyritic material present in the spoil. This channelization should serve to

PROJECT AREA III



0' 500' 1000'

PROPOSED RECLAMATION PLAN

AREA III

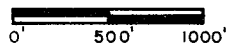
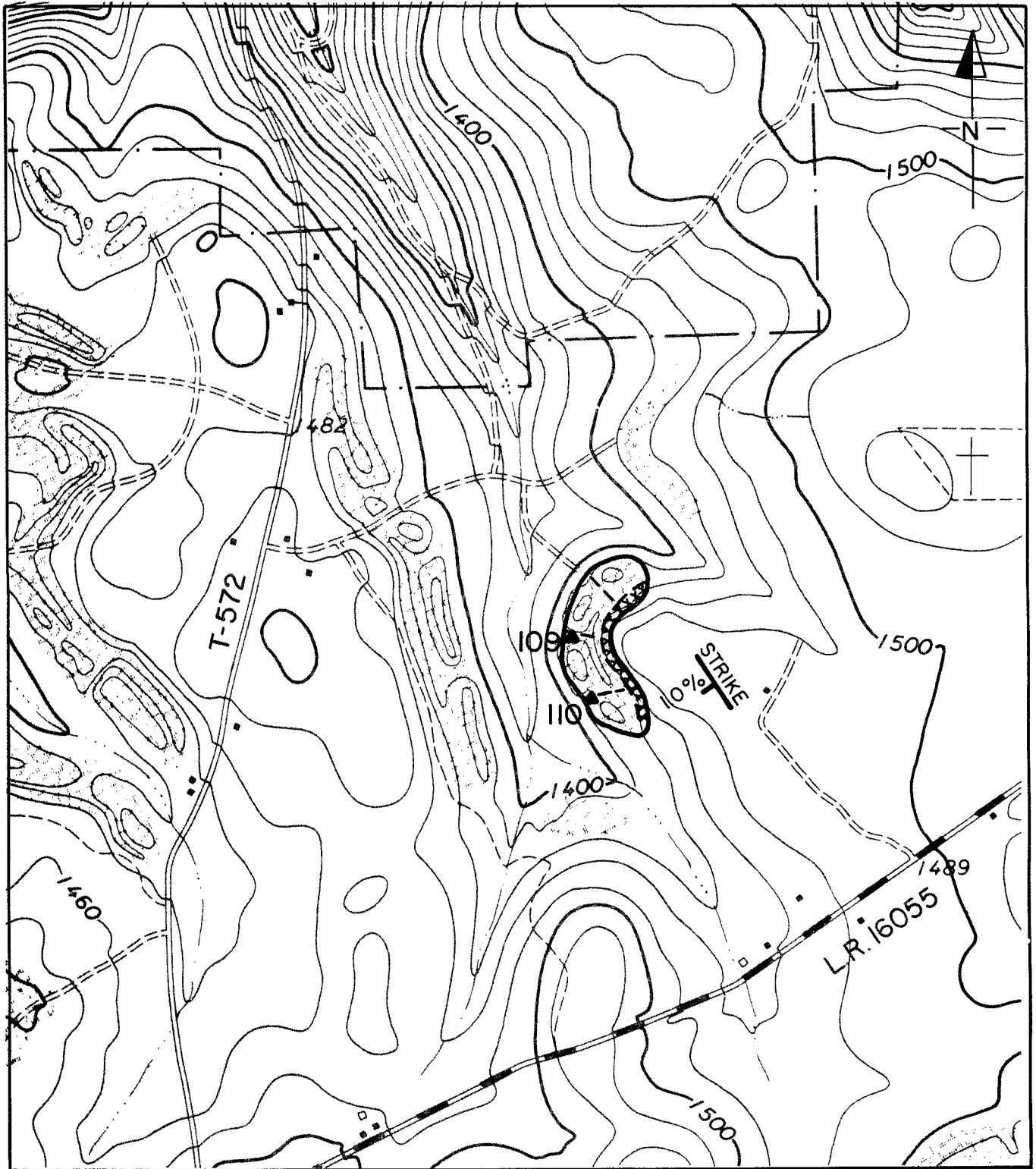
transport surface water from the strip mined area rapidly enough to reduce infiltration into the spoils. The entire affected area should be planted with grasses to absorb surface water and reduce erosion.

Estimated Cost:

Minimal Regrading	9 Acres @	\$500/Acre	= \$ 4,500
Drainage Channel	1800 Feet @	\$50/Ft.	= 90,000
Revegetation	9 Acres @	\$700/Acre	= 6,300
	Total Costs		= \$100,800

Approximate Amount of Acid to be Abated	60%
Total Acid Abated	153 lbs/day
Cost of Abatement per lb. of acid per day	\$659

PROJECT AREA III



ALTERNATE RECLAMATION PLAN

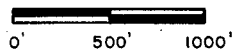
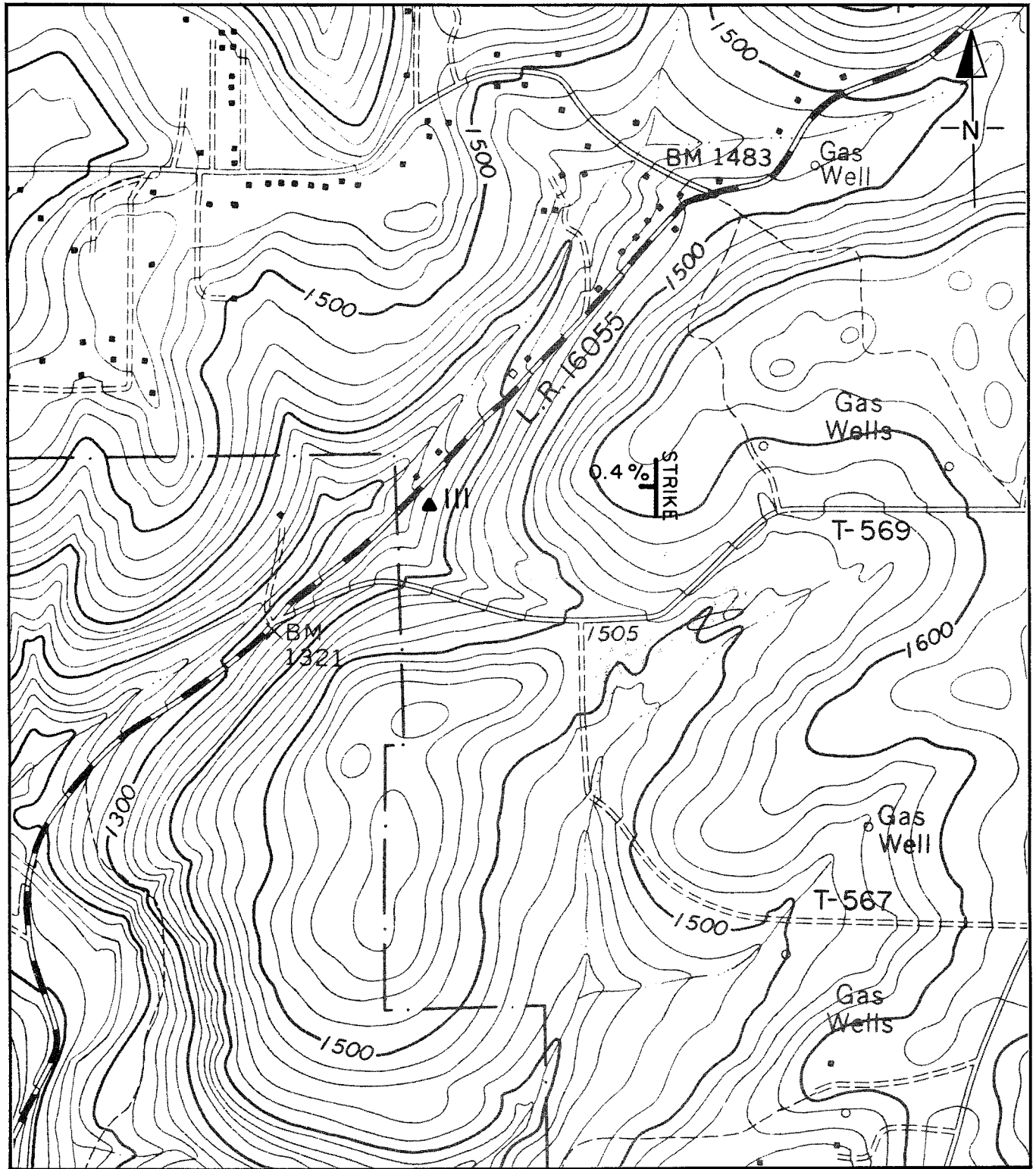
AREA IV

This is the site of an apparent abandoned gas well. The flow from this well is alkaline.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)
111	-18	3.4	50

Although the iron from this discharge is somewhat high, it is recommended that no reclamation be done. This source of alkaline water, although not in large quantity, will aid in the neutralization of the acid water of Stroup Run initially and eventually Mill Creek itself.

PROJECT AREA IV



AREA V

This project area has been strip mined for the Upper Clarion coal. The area has been planted with small evergreens. The small highwall has been backfilled. This area is covered by drainage permit 2767BSM8 issued to the H&G Coal and Clay Co.

Two small discharges seep from the reclaimed area. These sources of acid mine drainage exhibit very low flows and are frequently dry.

Discharge:	Avg. Acidity(lbs/day)	Total Fe(lbs/day)	Avg.Flow (gpm)
112	-.91	0	4
178	3.5	.66	9
TOTAL	2.6	.66	

Proposed Reclamation Plan - Priority No.1

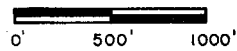
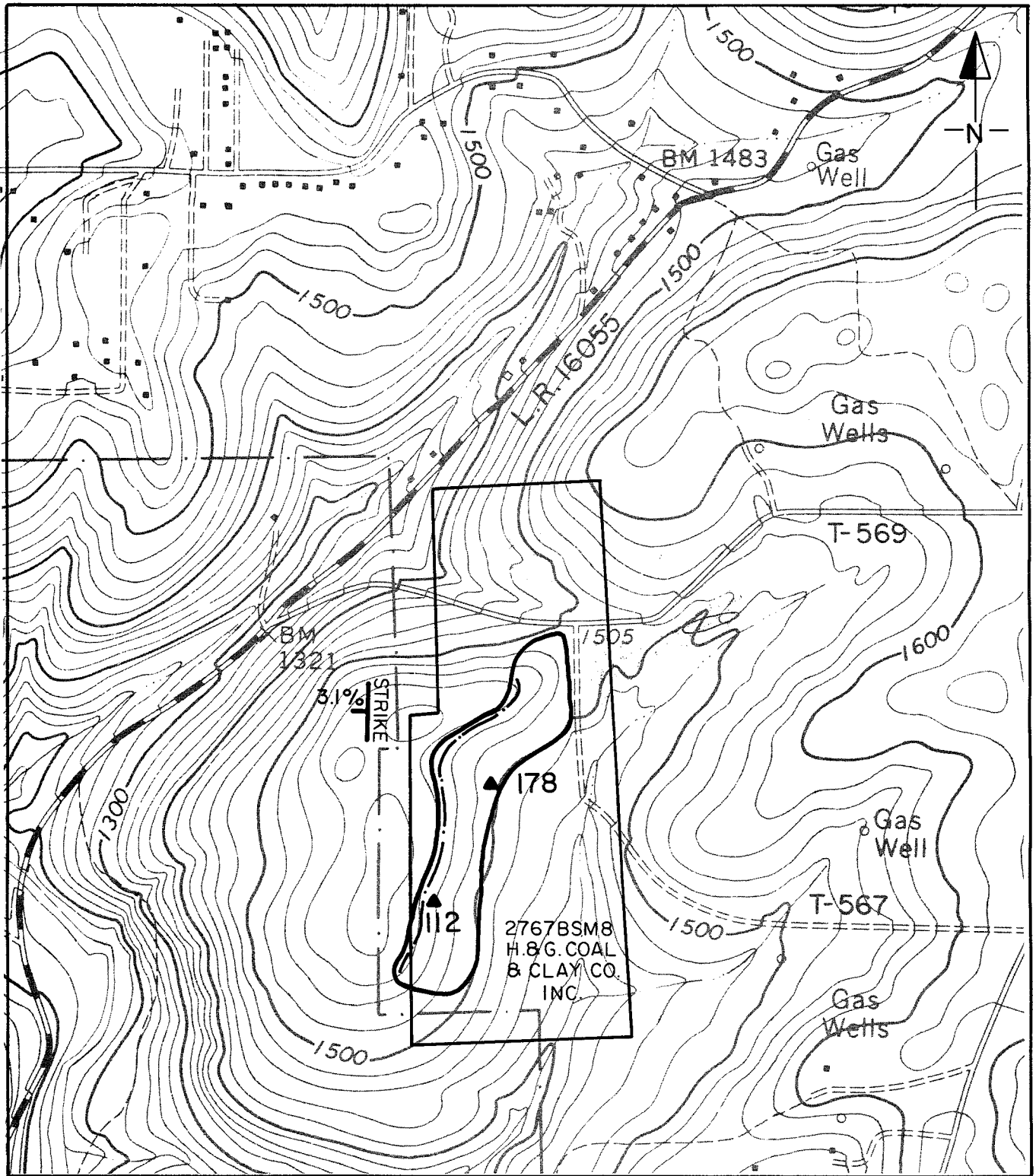
A diversion ditch should be constructed along the top of the highwall to divert upslope surface runoff away from the affected area. The entire disturbed area should be revegetated with grasses.

Estimated Cost:

Diversion Ditch	2800 Feet @ \$3.00/ft.	= \$8400
Revegetation	26 Acres @ \$700/acre	= \$18,200
TOTAL		= \$26,600

Approximate Amount of Acid to be Abated - 35%
 Total Acid Abated - 1 lb/day
 Cost of Abatement per lb of acid per day - \$26,60

PROJECT AREA V



AREA VI

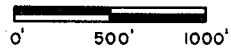
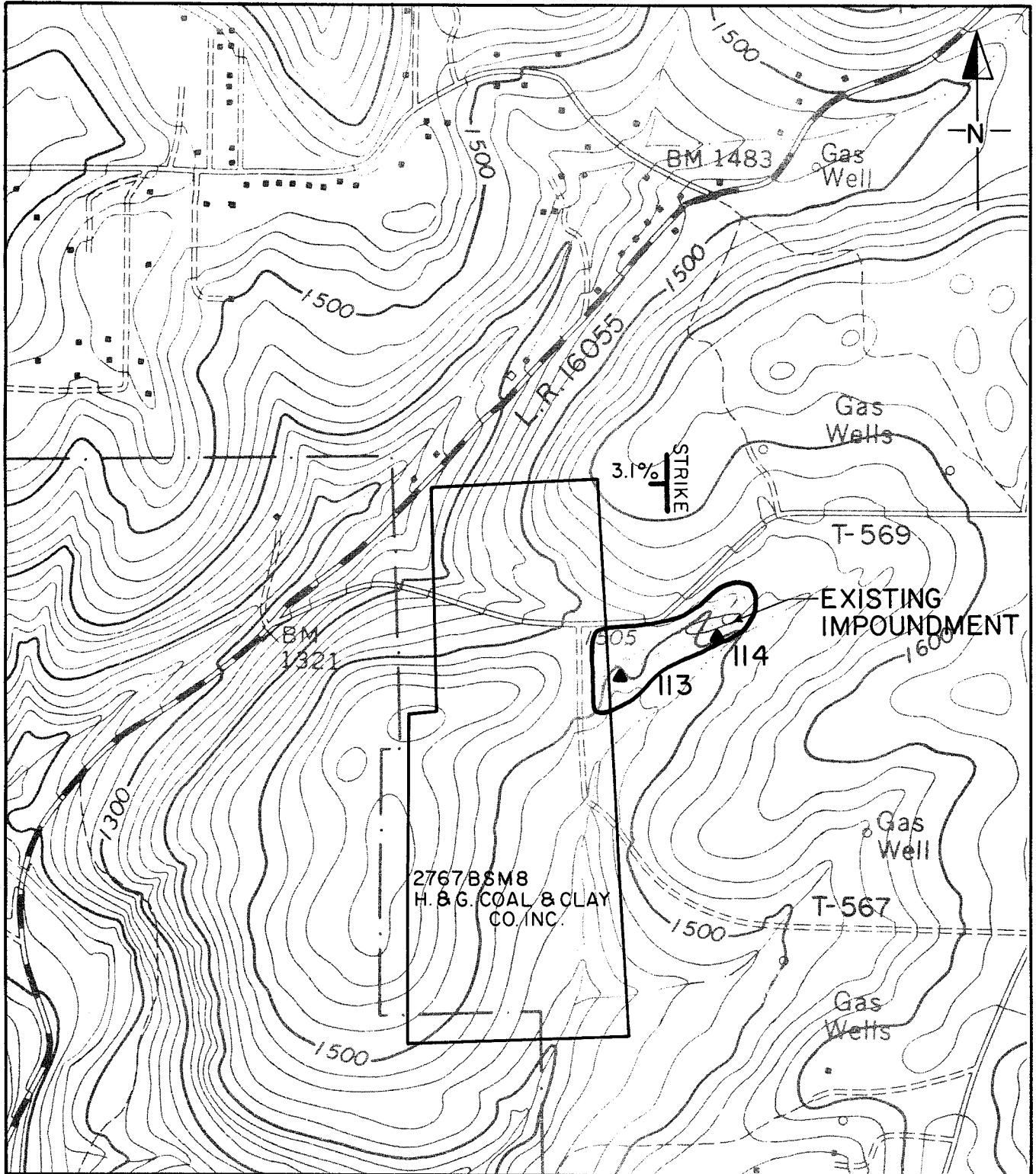
This area has undergone strip mining of the Upper Clarion coal which left an impoundment. There is very little spoil material remaining and the area, on the whole, has grown up with a variety of grasses, shrubs, and trees.

There is a small discharge breaking out in a cut along the western end of the area and during wet weather the impoundment also discharges. The flows from both sources has been very small and frequently altogether dry.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (gpm)
113	.68	.03	9
114	-7.4	.09	25
TOTAL	-6.7	.12	

This area is generally supporting vegetation and neither the quantity nor quality of the discharges present a problem. It is recommended, then, that this area be left as is, as abatement of such an area is without reason.

PROJECT AREA VI



AREA VII

This area is the site of a small strip mined There is a moderate growth of evergreens over portions of the area. The Lower Clarion coal was mined here.

Water breaks from the downslope end of the disturbed area.

Discharges:	Avg. Acidity(lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)
115	17	.49	9

Proposed Relcamation Plan - Priority No. 9

The stripped area should be backfilled to provide positive drainage.

The entire affected area should then be planted with appropriate grasses.

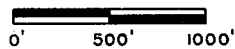
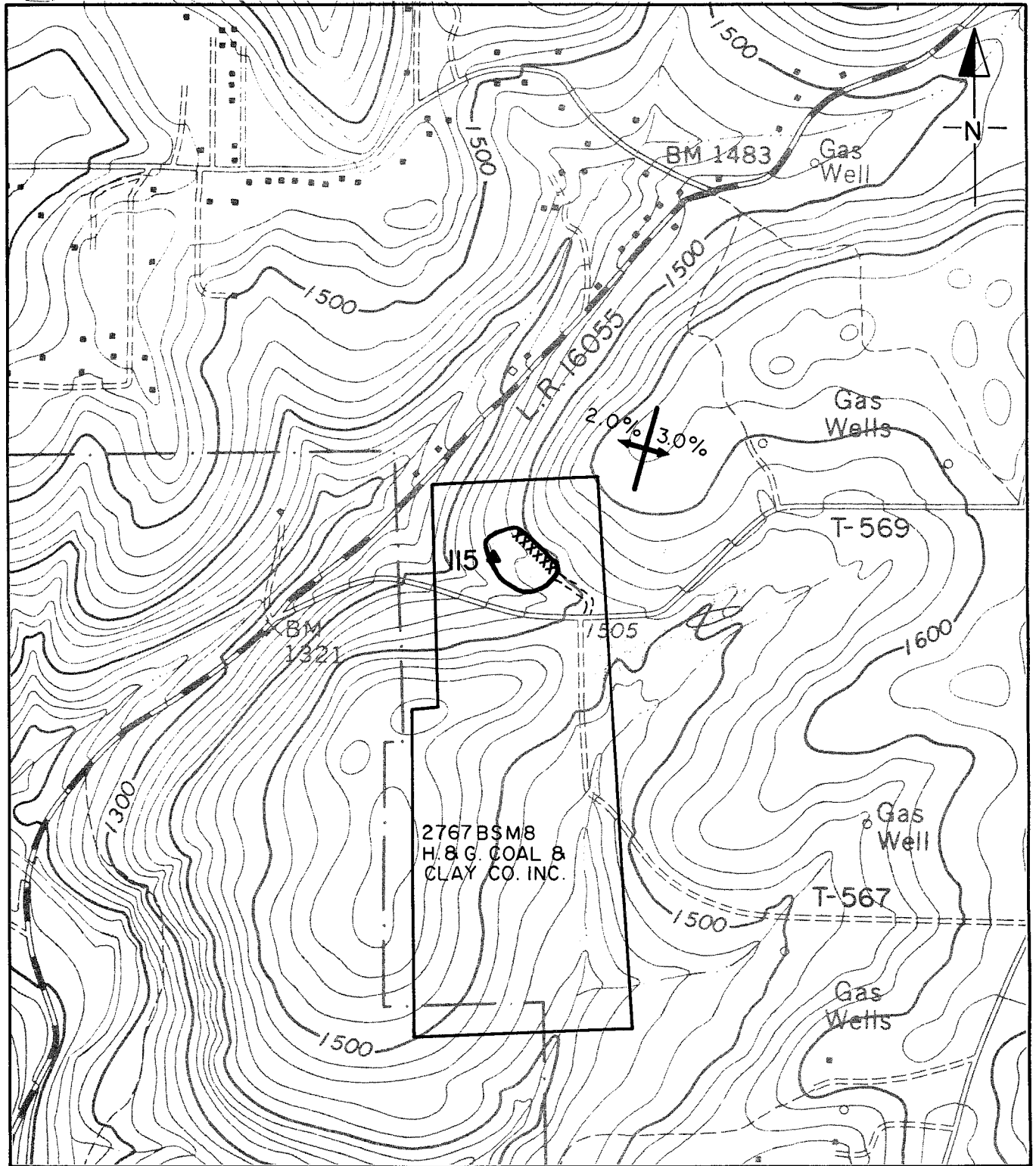
Estimated Cost:

Terrace Backfill	3 Acres @ \$2000/Acre	=	\$6,000
Revegetation	3 Acres @ \$700/Acre	=	2,100

Total Cost \$8,100

Approximate Amount of Acid to be Abated	70%
Total Acid Abated	12 lbs/day
Cost of Abatement per lb. of acid per day	\$675

PROJECT AREA VII



AREA VIII

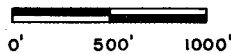
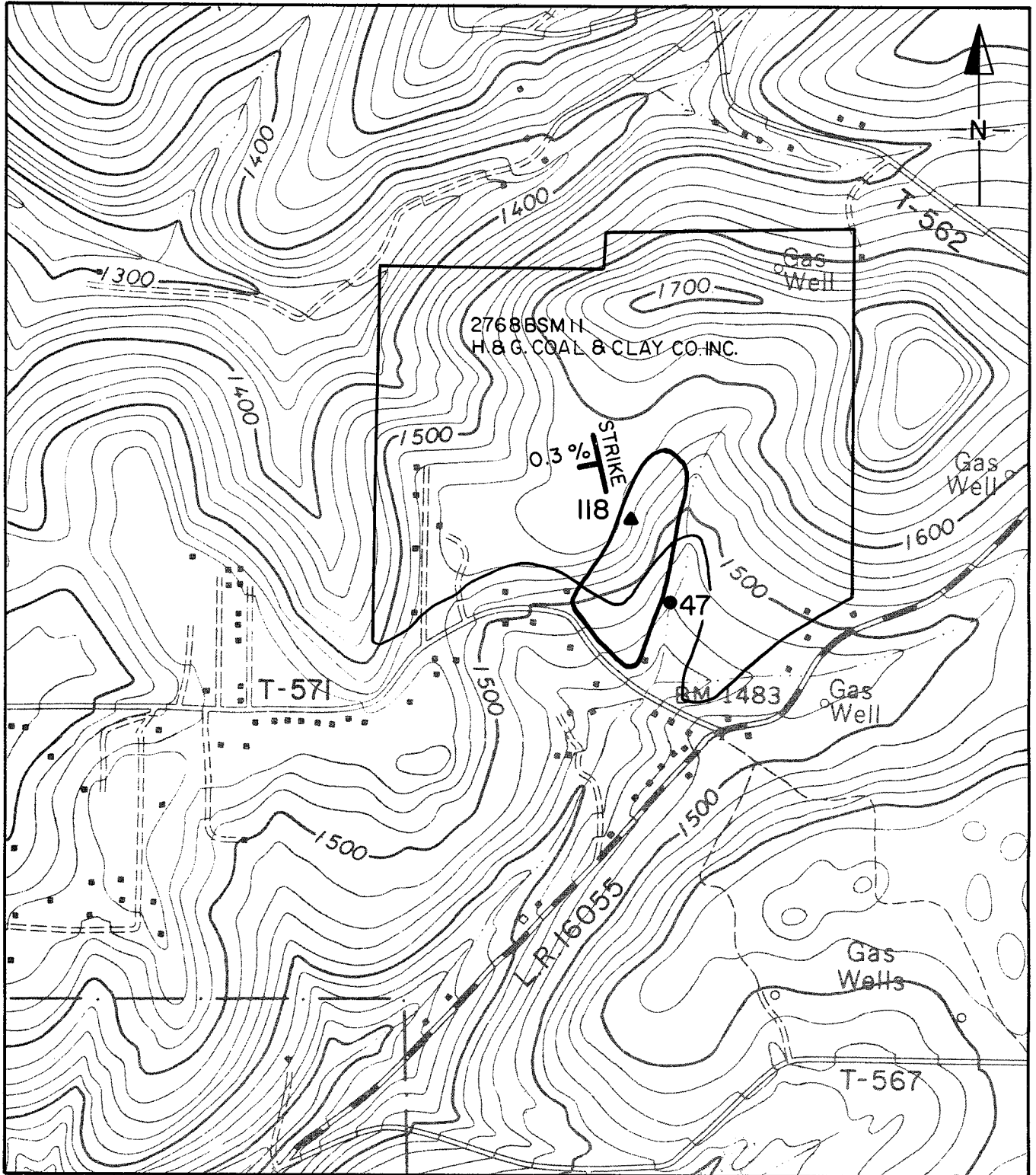
This area has been strip mined for the Brookville and Clarion coals. The area has been backfilled and planted although there are only a few small evergreens presently growing. The backfilled slopes, left exposed by a lack of vegetation, have been badly eroded. This area is covered by mine drainage permit 2768BSM11 issued to the H & G Coal and Clay Company.

There is a rather dissipated discharge of acid mine drainage breaking out from the upper slopes of the backfilled area. The discharge, although quite acidic, was too widespread to measure flow. At the conclusion of the third months' sampling, we began to monitor the quality of the receiving stream, an unnamed tributary to Stroup Run, to determine the impact from this strip area.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)
Receiving Stream 47	-27	1.9	235

It is recommended that this area is left as is due to the very small amount of acid mine drainage present and the continuing alkaline nature of the receiving stream.

PROJECT AREA VIII



AREA IX

This area has been strip-mined for the Lower Kittanning coal, being generally well backfilled. The area is predominately devoid of vegetation although there are a few areas covered by mature evergreens. There is no grass cover and consequently much of the area is badly eroded.

One discharge of acid mine drainage was located from this strip mined area. Drainage from a widespread area of seepage collects in a single channel at the southwest corner of the disturbed area.

Discharges: Avg. Acidity (lbs/day)			Total Fe
(lbs/day)	Avg. Flow (g.p.m.)		
119	41	3.6	11

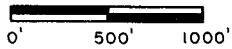
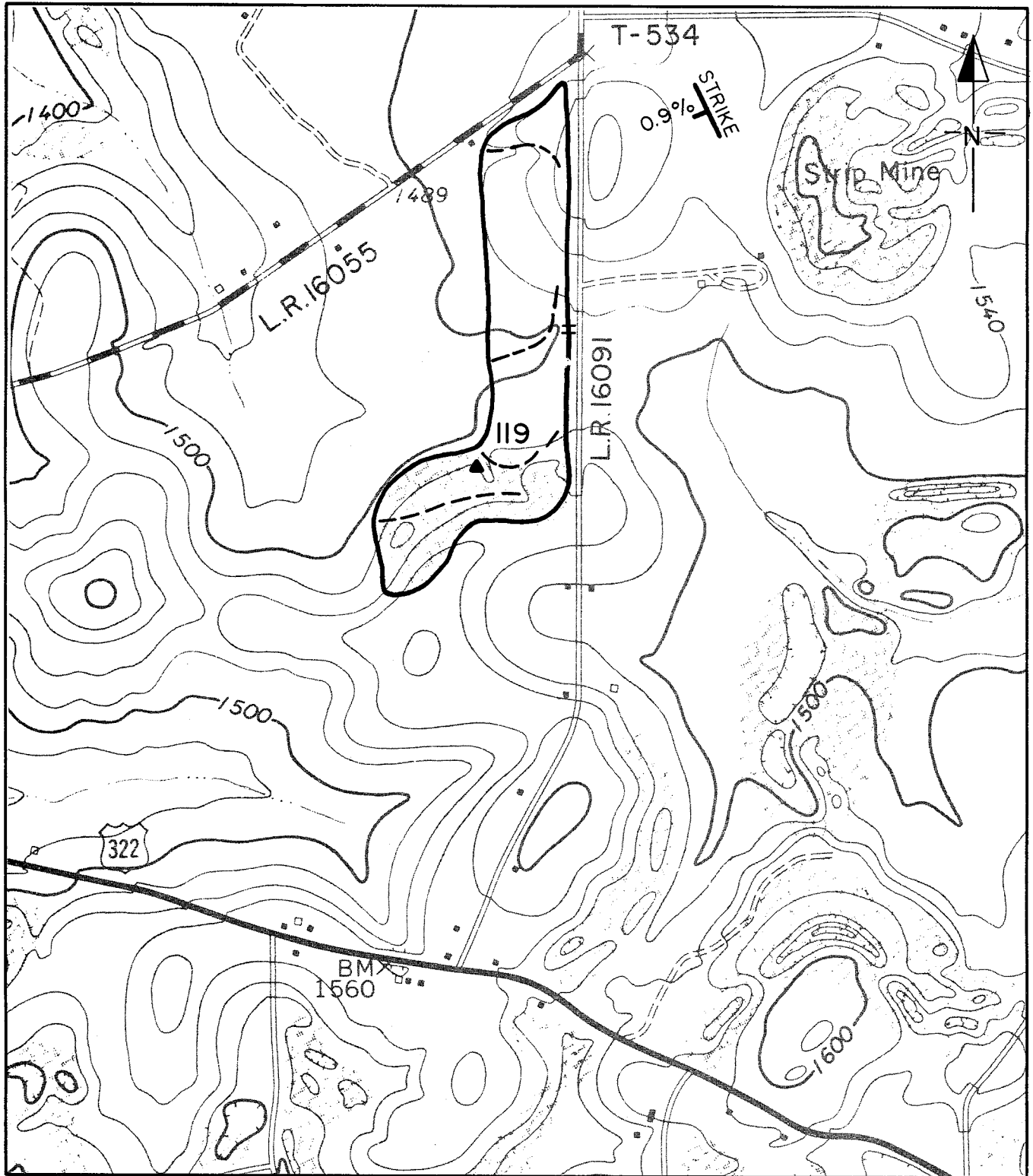
Proposed Reclamation Plan - Priority No. 30

A series of drainage channels should be constructed on the affected area to carry off surface runoff as quickly as possible, limiting infiltration into the spoils. The entire area should also be planted with appropriate grasses. Minimal regrading will be necessary to cover exposed carbonaceous material.

Estimated Cost:

Minimal Regrading	48 Acres @ \$500/Acre	= \$ 24,000
Drainage Channels	2300 Feet @ \$30/Ft.	69,000
Revegetation	48 Acres @ \$700/Acre	= 33,600
	Total Cost	\$126,600
Approximate Amount of Acid to be Abated		60%
Total Acid Abated		25 lbs/day
Cost of Abatement per lb. of acid per day		\$5,064

PROJECT AREA IX



AREA X

This is the location of a small strip mine in the Upper Clarion coal seam. There is only a small highwall present and much of the area is forested with mature trees. An area of carbonaceous shale which covers approximately 1% acres on the northern edge of the larger strip area probably contributes much of the acid from this area. The project area is covered by drainage permits 3675SM17 issued to the Mauersberg Coal Co., and 3676SM21 issued to the W. P. Stahlman Coal Company.

A small discharge of acid water breaks out in the roadside ditch adjacent to the black shale area. A second discharge is largely attributable to runoff from the northern smaller strip area.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)
120	2.6	.04	1
121	6.9	.17	3
Total	9.5	.21	

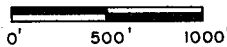
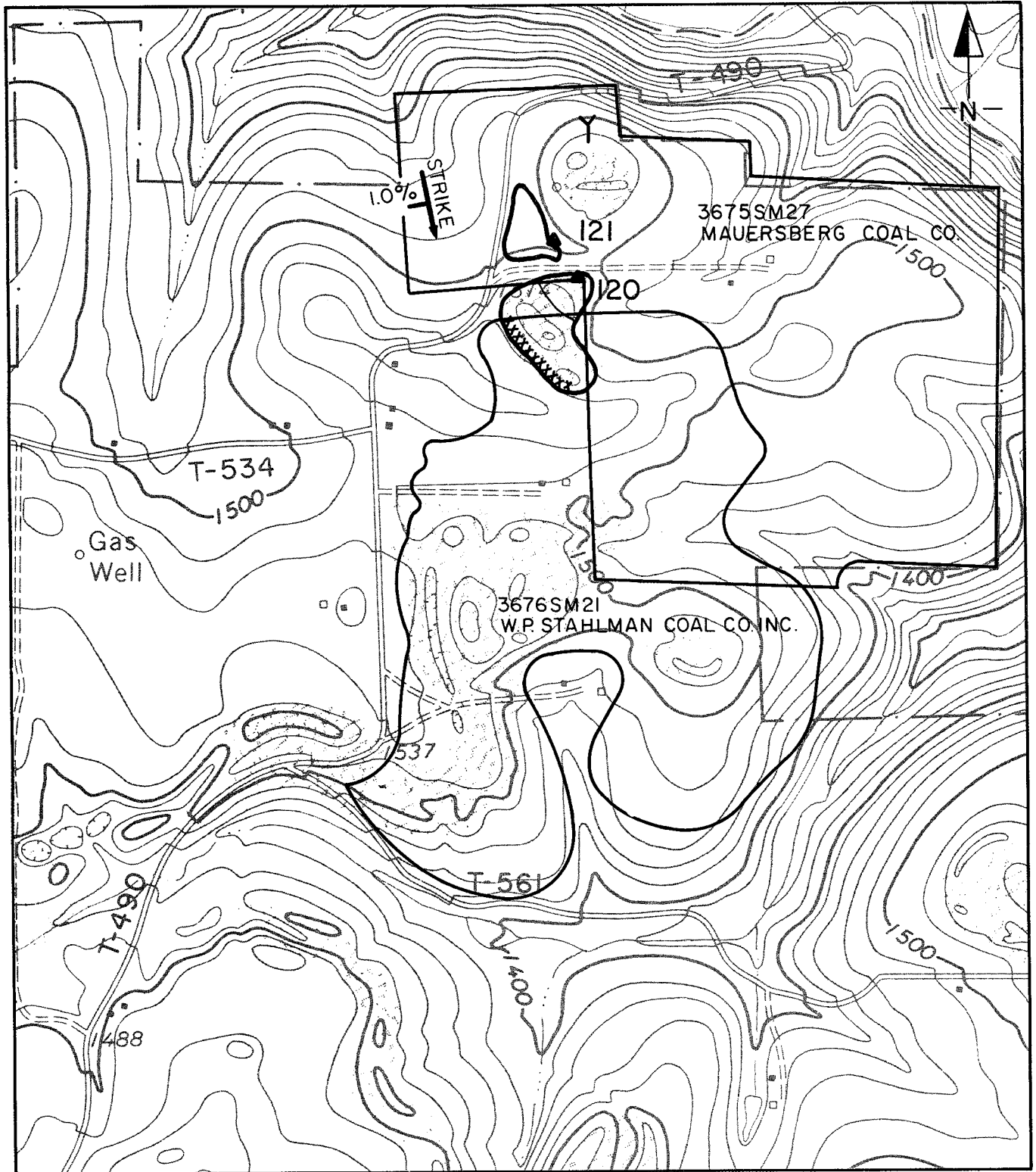
Proposed Reclamation Plan - Priority No. 24

To abate the acid mine drainage at this location the area of black shale should have minimal regrading to remove the carbonaceous material and expose better quality material. The entire revegetated strip area should then be planted with grasses to reduce erosion and infiltration.

Estimated Cost:

Minimal Regrading	3 Acres @ \$500/Acre	=	\$1,500
Revegetation	15 Acres @ \$700/Acre	=	10 500
Total Cost		=	\$12,000
Approximate Amount of Acid to be Abated			40%
Total Acid Abated			4 lbs/day

PROJECT AREA X



PROPOSED RECLAMATION PLAN

AREA X

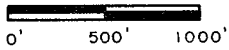
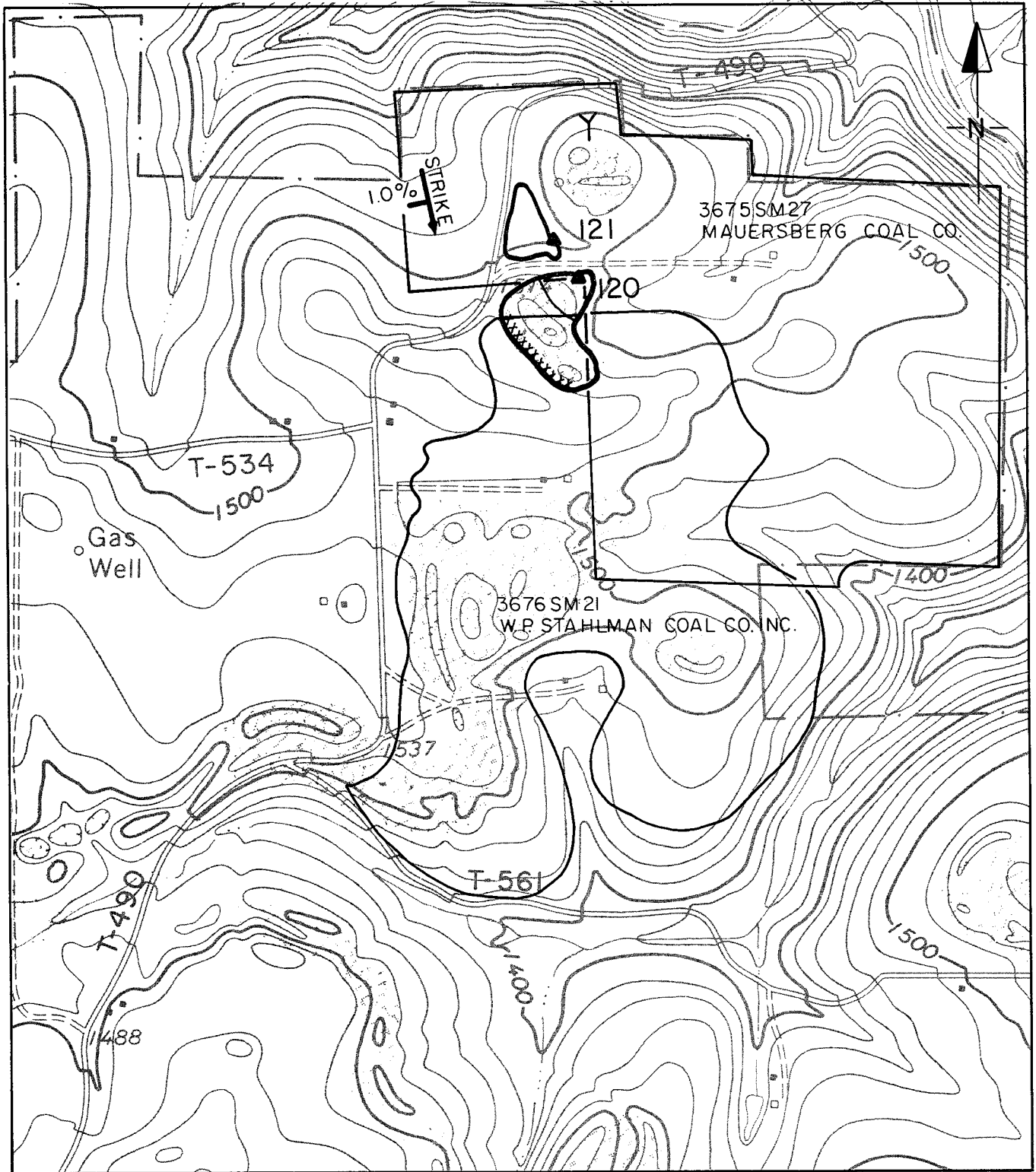
Alternate Reclamation Plan - Priority No. 25

To achieve greater abatement of acid from this location the southern strip mine should be terrace backfilled to eliminate the highwall. This should be done in addition to the work previously proposed.

Estimated Cost:

Minimal Regrading	3 Acres @	\$500/Acre	\$ 1,500
Revegetation	15 Acres @	\$700/Acre	10,500
Terrace Backfill	6 Acres @	\$2000/Acre	12,000
	Total Cost		= \$24,000
Approximate Amount of Acid to be Abated			70%
Total Acid Abated			7 lbs/day
cost of Abatement per lb. of acid per day			\$3,429

PROJECT AREA X



ALTERNATE RECLAMATION PLAN

AREA XI

This strip mined area is nearly devoid of vegetation. The Upper Clarion coal was probably stripped here. Much of the area has carbonaceous shale exposed on the surface which is unsuitable for supporting vegetation. A number of tiny evergreens were planted over a portion of this area by a local Boy Scout troop. The mining operation apparently stripped out a spring at this location.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)
	122	106	11
			34

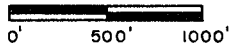
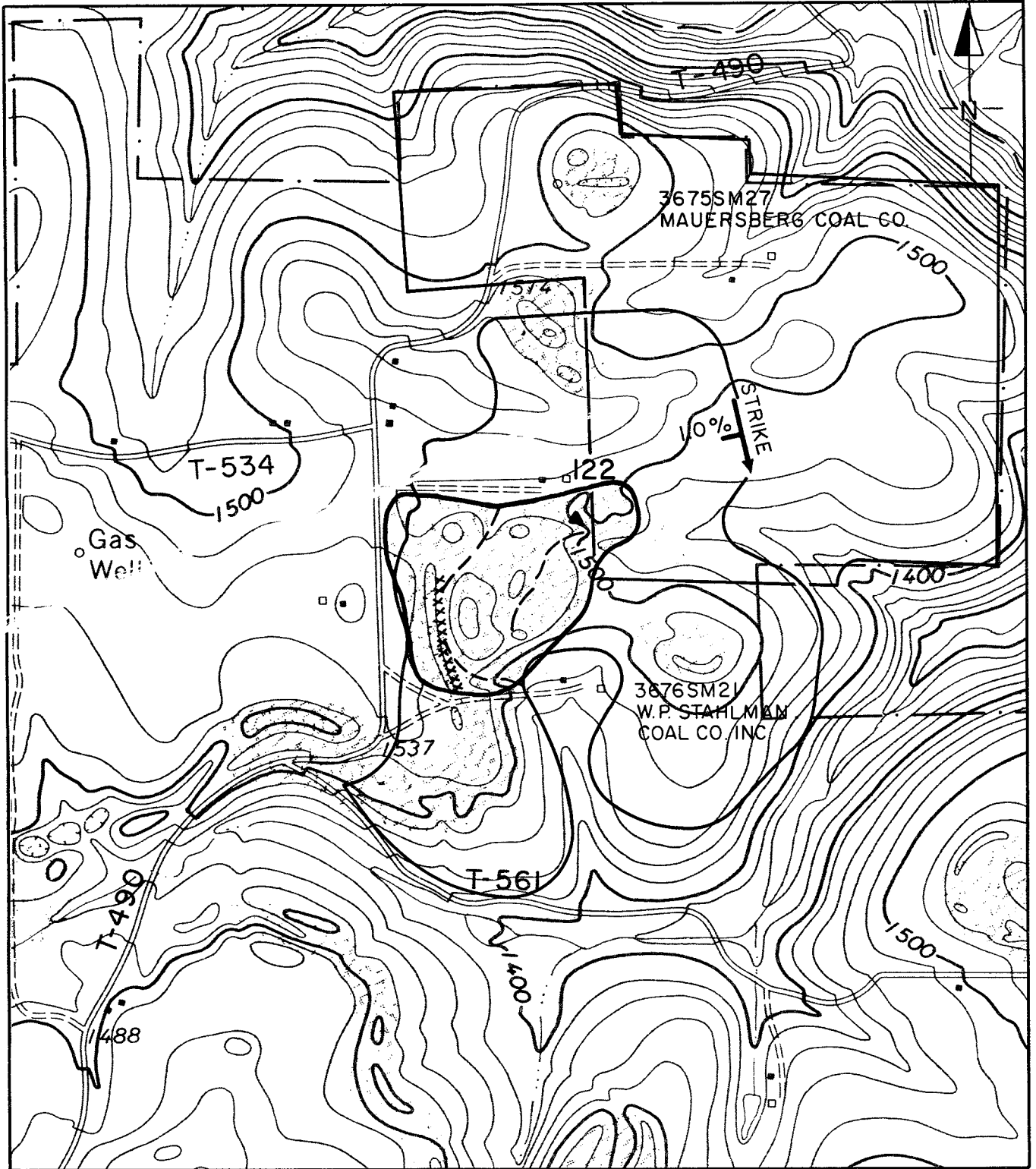
Proposed Reclamation Plan - Priority No. 20

Channelization to carry runoff from the strip mined area as quickly as possible, complimented by revegetation with appropriate acid-tolerant grasses, should serve to abate a portion of the acid produced by this area; particularly during periods of precipitation and runoff.

Estimated Cost:

Drainage Channels	2700 Feet @ \$30/Ft.	=\$ 81,000
Revegetation	41 Acres @ \$700/Acre	= 28,700
	Total Cost	= \$109,700
Approximate Amount of Acid to be Abated		50%
Total Acid Abated		53 lbs/day
Cost of Abatement per lb. of acid per day		\$2,070

PROJECT AREA XI



AREA XII

This area was strip mined for the Upper Clarion coal. The affected area is barren, supporting no vegetation except isolated clusters of trees. A highwall approximately 25 feet high remains along the western portion of the strip mine. Most of the project area is covered by drainage permit 3676SM21 issued to the W. P. Stahlman Coal Company.

Two small discharges of acid mine drainage flow from this strip mine along the western periphery. Both of these flows have been intermittent.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)
123	23	.14	6
124	5.3	.07	1
Total	28	.21	

Proposed Reclamation Plan - Priority No.21

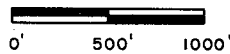
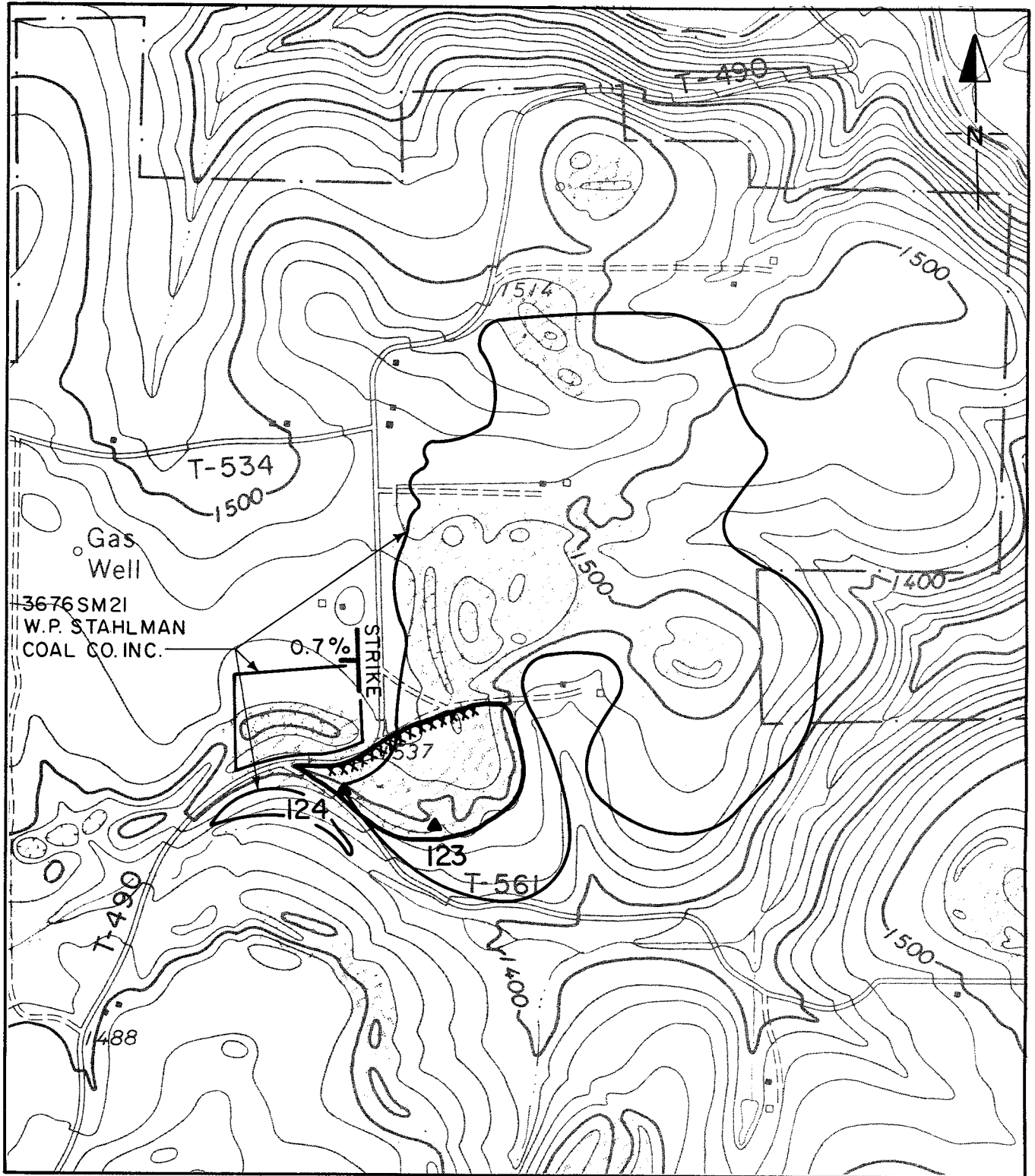
There is no obvious solution for the abatement of acid mine drainage from this area. The quantity of discharge **is** very small although the quality poor. The nature of the spoil material is such that it probably would not support the growth of grasses without bringing in suitable top material. Some abatement of acid mine drainage could be achieved by minimal regrading to eliminate depressions and provide better top material. The entire area should then be revegetated.

Estimated Cost:	Minimal Regrading 22 Acres @ \$500/Acre	=	\$11,000
	Revegetation 22 Acres @ \$700/Acre	=	15,400

Total Cost = \$26,400

Approximate Amount of Acid to be Abated	40%
Total Acid Abated	11 lbs/day
Cost of Abatement per lb. of acid per day	\$2,400

PROJECT AREA XII



AREA XIII

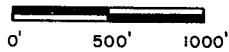
This area was strip mined for the Upper Clarion coal. The acid mine drainage at this location is primarily surface runoff from a relatively unvegetated strip mined area. The area is covered by drainage permit 3676SM21 issued to W. P. Stahlman Coal Company.

During periods of precipitation acidic runoff from this area flows into an adjacent roadside drainage ditch and then directly into Jones Run less than 100 feet away.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)	
	125	17	.40	8

This area typifies a common source of wet weather acid production throughout the watershed. Due to the irregular nature of the discharge and the generally small acid load, it would be economically infeasible to attempt to abate the acid from this type source. This area could be incorporated into a reclamation plan for Area XV.

PROJECT AREA XIII



AREA XIV

This area has been strip mined for the Clarion coals. The southwestern tributary of Jones Run has been completely removed by strip mining. Tributary 12E originates at several springs located at a farm about 2800 feet northwest of its confluence with tributary 12F. The pH at the springs is about 5.0. Tributary 12F forms in a swampy area adjacent to the western stripped area. The swampy area apparently receives most of its water in the form of surface runoff from the strip mined area and possibly groundwater feed in part recharged through the strip mine spoil material. Approximately 100 acres of strip mined area drains to the tributaries at their confluence.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)
126 Stream	Too Dissipated to Measure		
Station 12E Stream	516	96	258
Station 12F Total	229 745	4.2 100	280

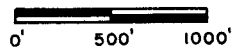
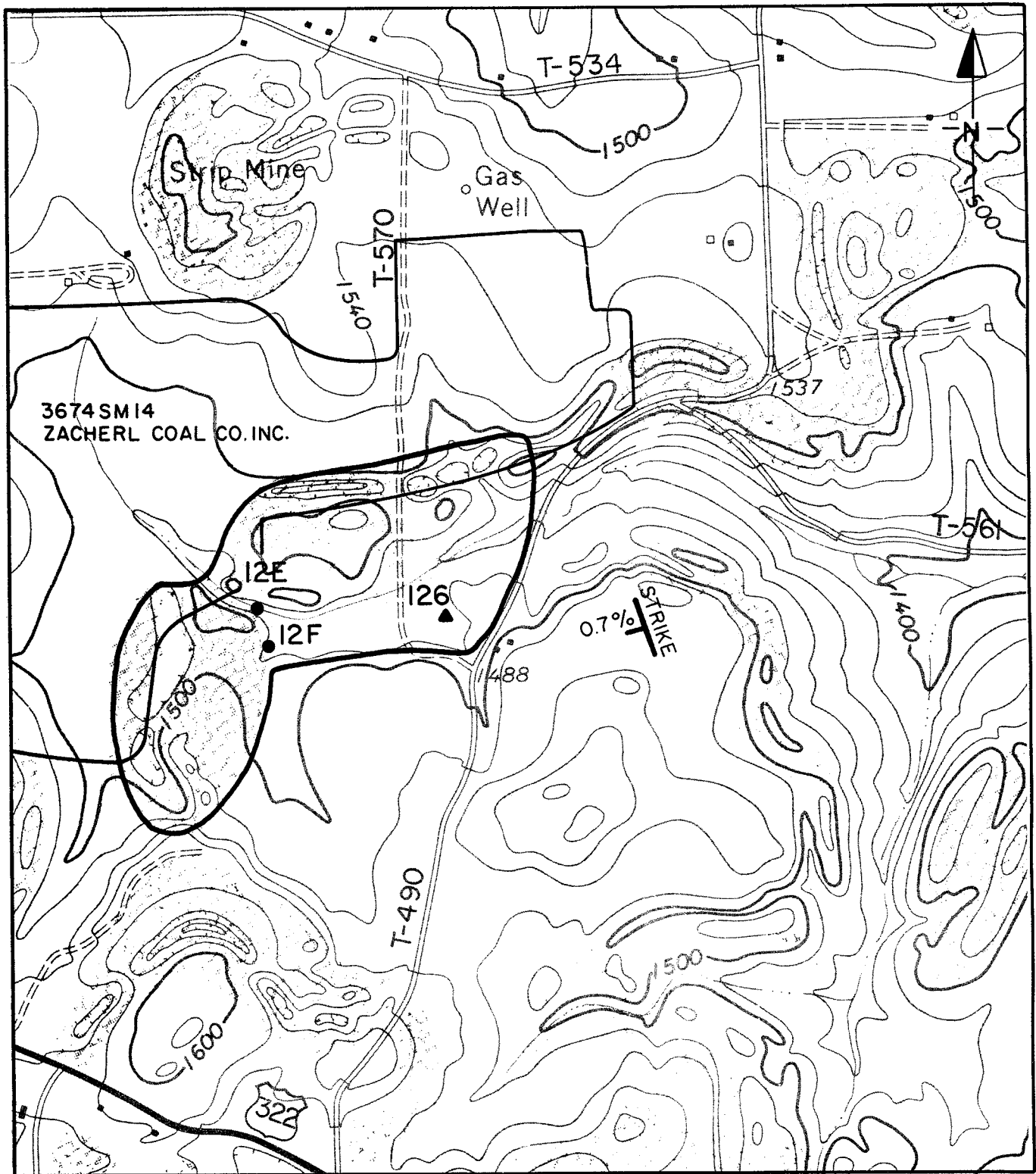
Although no distinct discharge points were located along the tributaries they are obviously picking up acid as they flow through the spoils of the old strippings. The acid could best be abated by constructing a clay lined channel along the present course of the main stream (12E) to carry the water and prohibit contact with pyritic material present in the spoil material. The adjacent affected area should be revegetated with acidtolerant grasses. The western strip mined area should be regraded to eliminate depressions and provide positive drainage.

Reclamation of this area will not be possible at this time as much of the area is presently under permit to Zacherl Coal Company of Lucinda, Pennsylvania. Zacherl Coal Company is active at this strip and intends to extend its operation west from the confluence of 12E and 12F. Zacherl also plans to amend the permit to include the area to the east of the present workings. The mine drainage permit for this location is 3674SM14. As Zacherl Coal Company has portions of the previously strip mined area under

AREA XIV

permit any reclamation plans for this area will have to be delayed until such time as the present operator is finished at this location. Efforts should be made to coordinate the reclamation plans of the present operator with those of the Department.

PROJECT AREA XIV



AREA XV

This area has been strip mined for the Clarion coals. An unnamed tributary to Jones Run flows through the stripped area, traveling along the base of the highwall for a distance of about 900 feet before flowing out of the stripped area through a gravity drain in the spoil.

Discharge #127 is the result of surface water collecting in a depression on the fringe of the affected area. Discharge #128 flows from the adjacent hilltop strip mine and enters the unnamed tributary where it begins to flow through the affected area, Discharges #129 and #131 break out at an old drainage cut through the spoil.

Discharges:	Avg. Acidity(lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)
127	8.8	.06	12
128	9.3	.01	8
129	218	10	70
131	Too Dissipated to Measure		
	Total	236+	10+
Stream			
Station 30	91	.41	32
Stream			
Station 32	937	23	279

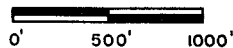
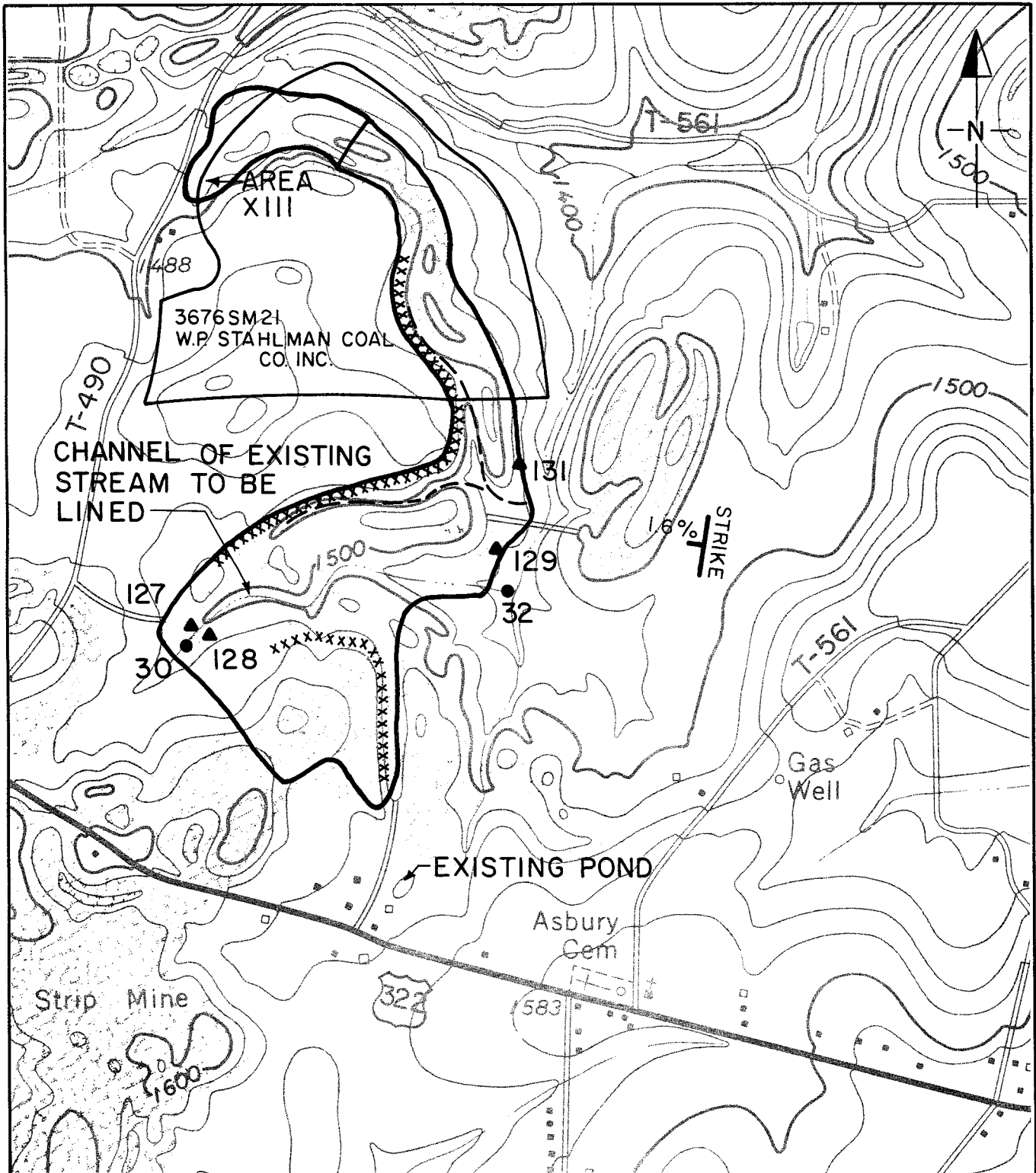
Proposed Reclamation Plan - Priority No. 16

The reclamation plan for this area could be expanded to contain Area XIII. This additional area should have minimal regrading to cover carbonaceous shale and expose better quality top material and then be revegetated.

Additional Estimated Cost

Minimal Regrading	10 Acres @ \$500/Acre	= \$ 5,000
Revegetation	10 Acres @ \$700/Acre	= 7,000
	Total Additional Cost	= \$12,000
Approximate Additional Amount of Acid to be Abated		60%
Total Additional Acid Abated		10 lbs/day
Grand Total Acid Abated		141 lbs/day
Total Combined Reclamation Cost		\$247,300
Combined Cost of Abatement per lb. of acid per day		\$1,754

PROJECT AREA XV



PROPOSED RECLAMATION PLAN

AREA XV

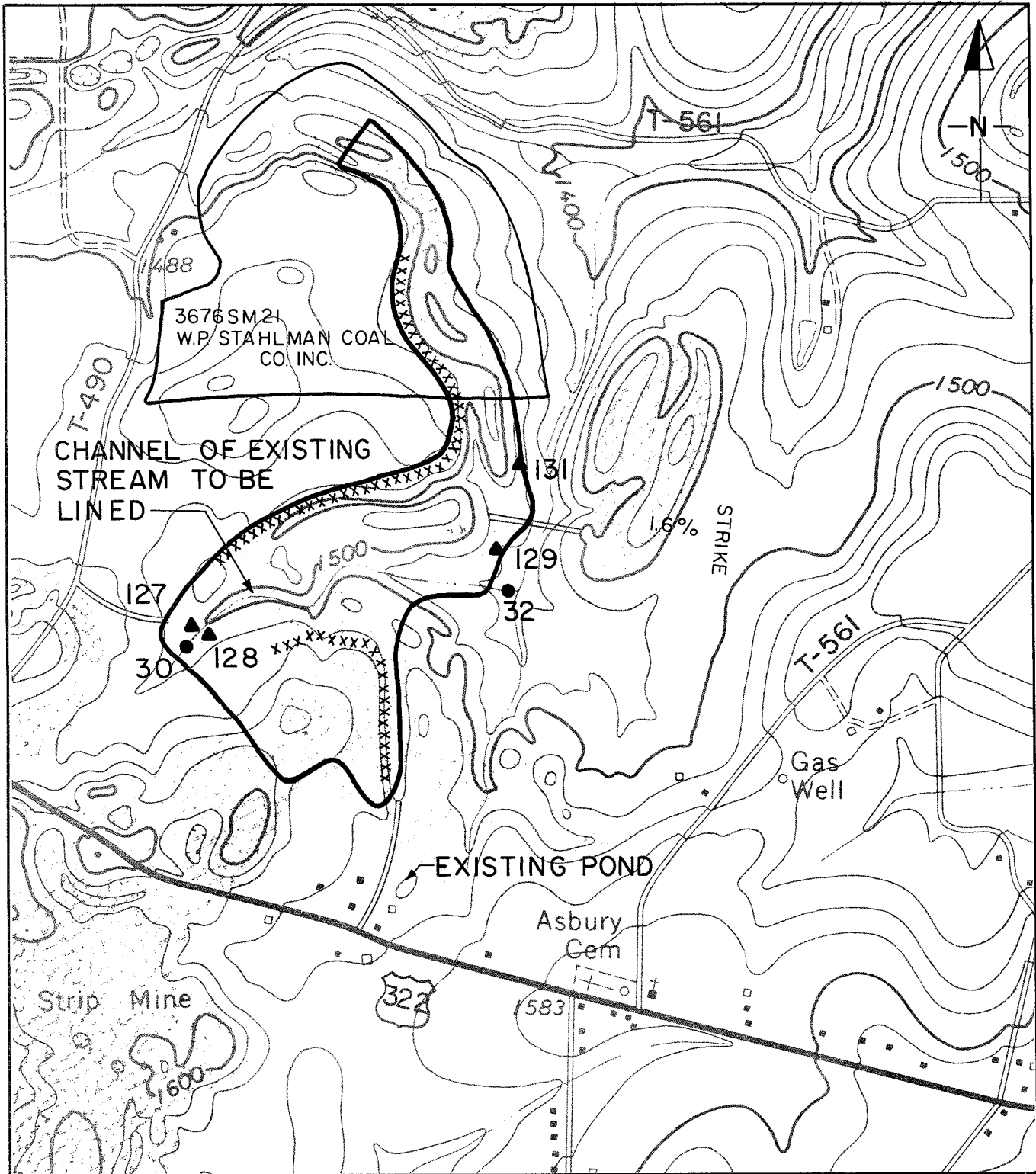
Alternate Reclamation Plan - Priority No, 17

To best abate the acid mine drainage from this area the channel of the unnamed tributary of Jones Run. should be clay lined to prohibit contact with acidic materials. Drainage channels should be constructed as needed throughout the eastern . .portion-of the strip mine to promote rapid-runoff of surface water and discourage infiltration.: The entire affected area should be revegetated with appropriate grasses to serve-as a deterrent_ to erosion and to--utilize-the natural processes of interception, evaporation, and transpiration to utilize precipitation, thus limiting both infiltration and runoff.

Estimated Cost:

Drainage Channels	3200 Feet @ \$30/Ft.	= \$ 96,000
Line Stream Channel	2800 Feet @ \$25/Ft.	= 70,000
Revegetation	99 Acres @ \$700/Acre	= 69,300
	Total Cost	= \$235,300
Approximate Amount of Acid to be Abated		60%
Total Acid. Abated		131 lbs/day
Cost of Abatement per lb. of acid per day		\$1,796

PROJECT AREA XV



ALTERNATE RECLAMATION PLAN

AREA XVI

This area has been strip mined for the Lower Clarion coal and has been reclaimed to the extent that no highwalls exist and the majority of the area is covered with mature evergreens.

There is a single discharge from this strip mine flowing from the outer toe of spoil at the southwest corner of the area.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)
130-	147	1077	19

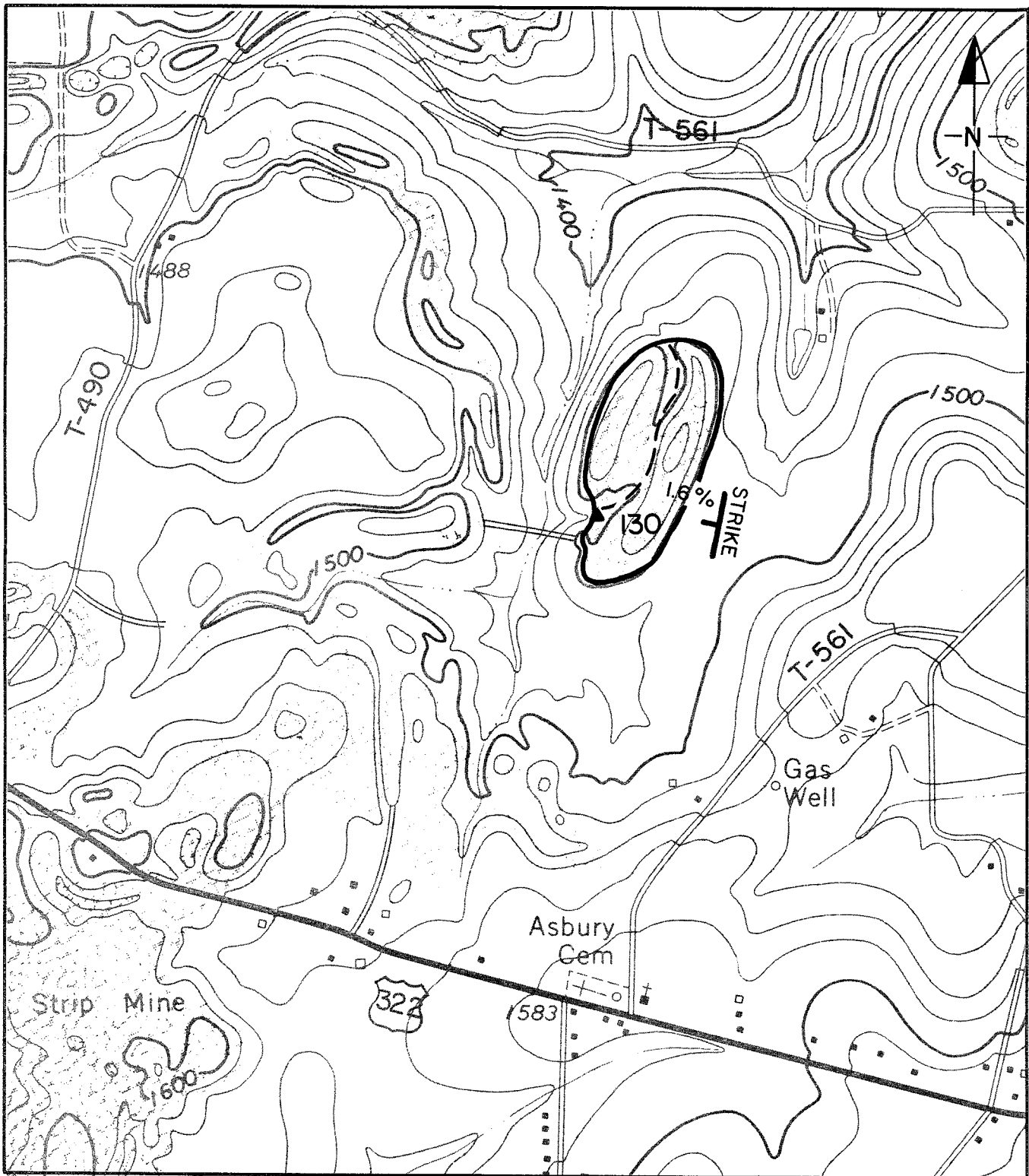
Proposed Reclamation Plan - Priority No. 15

Despite the high acid load from this source there appears to be no feasible method of abatement. Limited abatement could be achieved through the utilization of drainage channels to promote rapid runoff and-discourage infiltration of surface water into the spoils. The success of such a program would-be largely contingent on the establishment of a good vegetative cover as the spoil material appears very porous.

Estimated Cost:

Drainage Channels	1900 Feet @ \$30/Ft.	= \$57,000
Revegetation	27 Acres @ \$700/Acre	= 18,900
	Total Cost	\$75,900
Approximate Amount of Acid to be Abated		40%
Total Acid Abated		59 lbs/day

PROJECT AREA XVI



AREA XVII

This area has been extensively strip mined for the Lower Clarion coal. The affected area is essentially unreclaimed and relatively devoid of vegetation.

Several springlike discharges occur along the northeastern periphery of the area. These flows collect as two major flows.

Discharges: Avg. Acidity (lbs/day) Total Fe (lbs/day) Avg, Flow (g.p.m.)			
132	457	5.8	139
133	254	5.0	48
	Total 711	11	

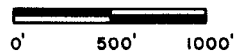
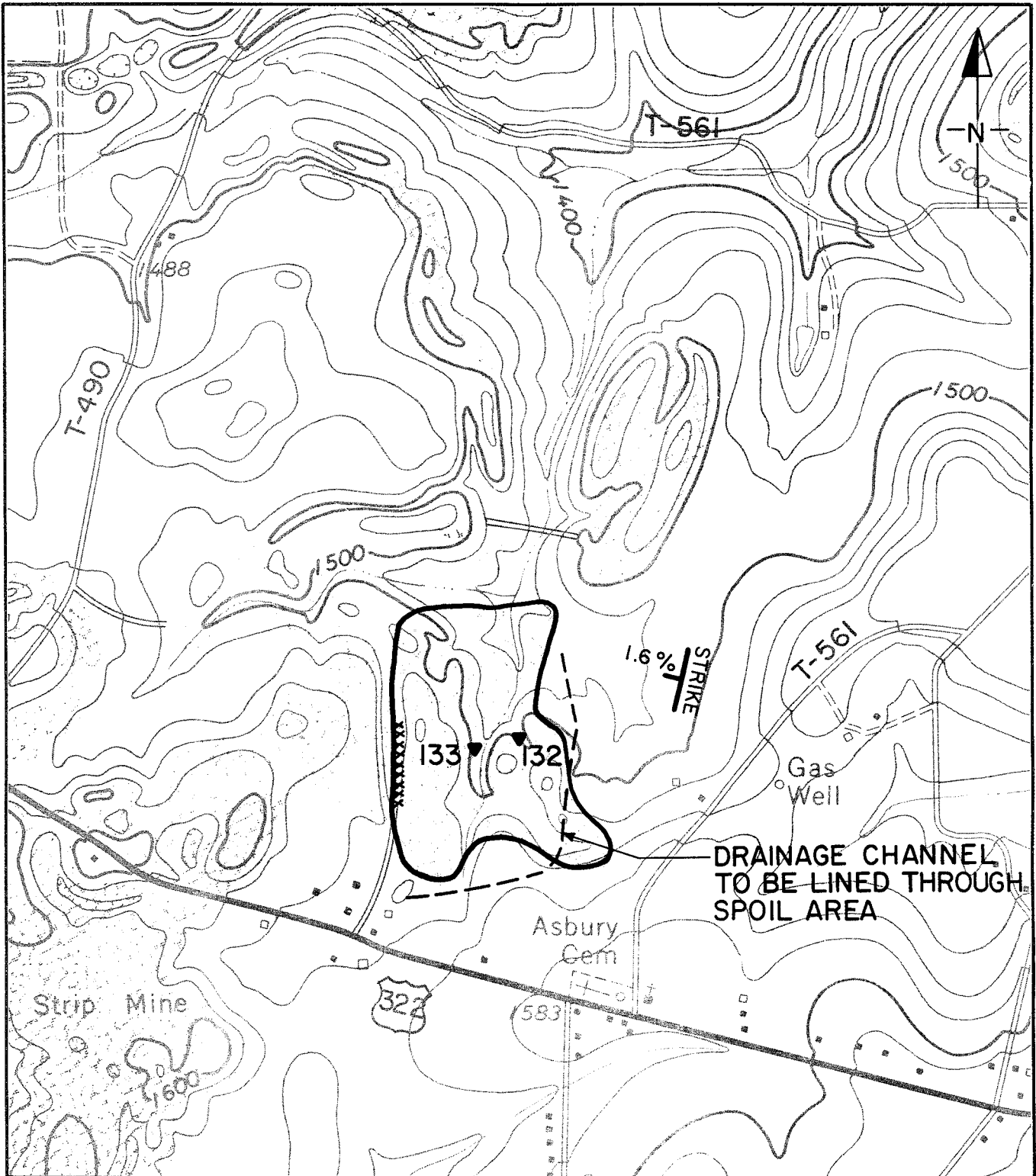
Proposed Reclamation Plan - Priority No. 8

It has been impossible to ascertain the origin of these discharges whose high flows seem quite out of proportion with the upgradient recharge area of each. A pond located about 1300 feet south of the discharges may be the source of the drainage at this location. The pond is perennial and has no visible discharge, apparently being fed and discharged by subsurface flow. The pond was probably the source of a stream which flowed through the area prior to strip mining. To abate the mine drainage the pond should be drained and a channel-constructed to carry water around the stripped area where possible and a lined channel utilized where crossing the spoil. The strip mined area should have minimal regrading to eliminate surface depressions and promote positive drainage and should then be revegetated.

Estimated Cost:

Drainage Channel	1200 Feet @ \$30/Ft.	= \$ 36,000
Drainage Channel (Lined)	700 Feet @ \$50/Ft.	= 35,000
Minimal Regrading	48 Acres @ \$500/Acre	= 24,000
Revegetation	48 Acres @ \$700/Acre	= 33,600
	Total Cost	= \$128,600
Approximate Amount of Acid to be Abated		70%
Total Acid Abated		498 lbs/day
Cost of Abatement per lb. of acid per day		\$258

PROJECT AREA XVII



AREA XVIII

This project area consists of an elongate hillside strip cut. The Lower Kittanning coal was stripped at this location. The steep highwall, often exceeding 50 feet in height, remains along the entire length of the cut. The spoil area supports a growth of moderate size evergreens.

There is a single discharge present at this location. A small discharge of acid mine drainage seeps out at the eastern terminus of the strip cut.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)
134	5.4	.09	5

Proposed Reclamation Plan - Priority No. 39

Terrace backfill the entire strip mined area and revegetate. Construct a surface water diversion ditch along the top of highwall.

Estimated Cost:

Terrace Backfill	36 Acres @ \$2000/Acre	= \$ 72,000.
Diversion Ditch	3000 Feet @ \$3.00/Ft.	= \$ 9,000
Revegetation	36 Acres @ \$700/Acre	= \$ 25 200

Total Cost = \$106,200

Approximate Amount of Acid to be Abated 85%

Total Acid Abated 5 lbs/day

Cost of Abatement per lb. of acid per day \$21,240

Alternate Reclamation Plan - Priority No. 40

A channel should be constructed along the base of the highwall to expedite runoff of surface water and avoid impoundment of water in the strip cut. The slopes of the spoil backs should be revegetated with grasses.

Estimated Cost:

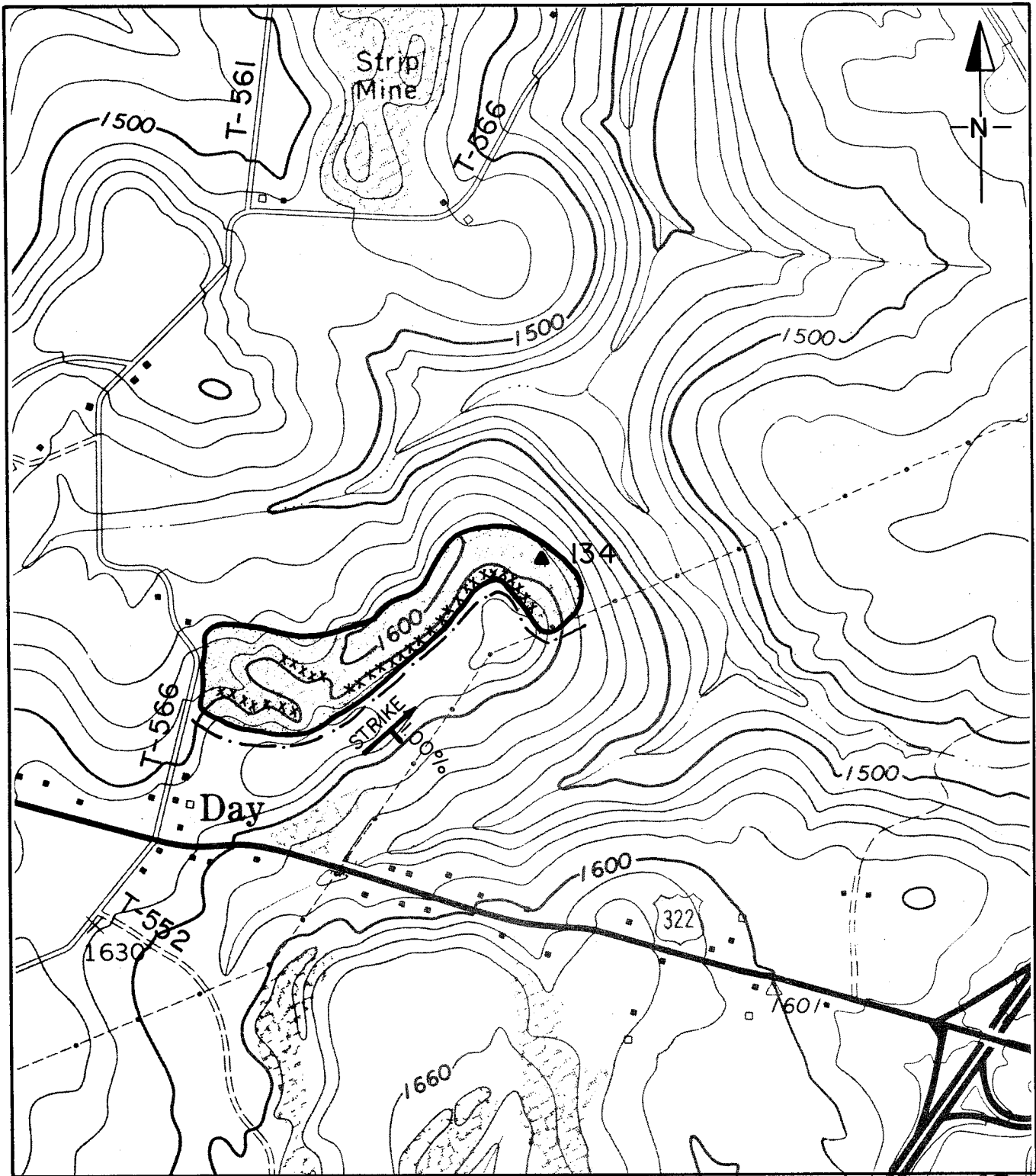
Drainage Channel	1800 Feet @ \$30/Ft.	= \$54,000
Revegetation	36 Acres @ \$700/Acre	= 25 200
	Total Cost	= \$79,200

Approximate Amount of Acid to be Abated 50%

Total Acid Abated 3 lbs/day

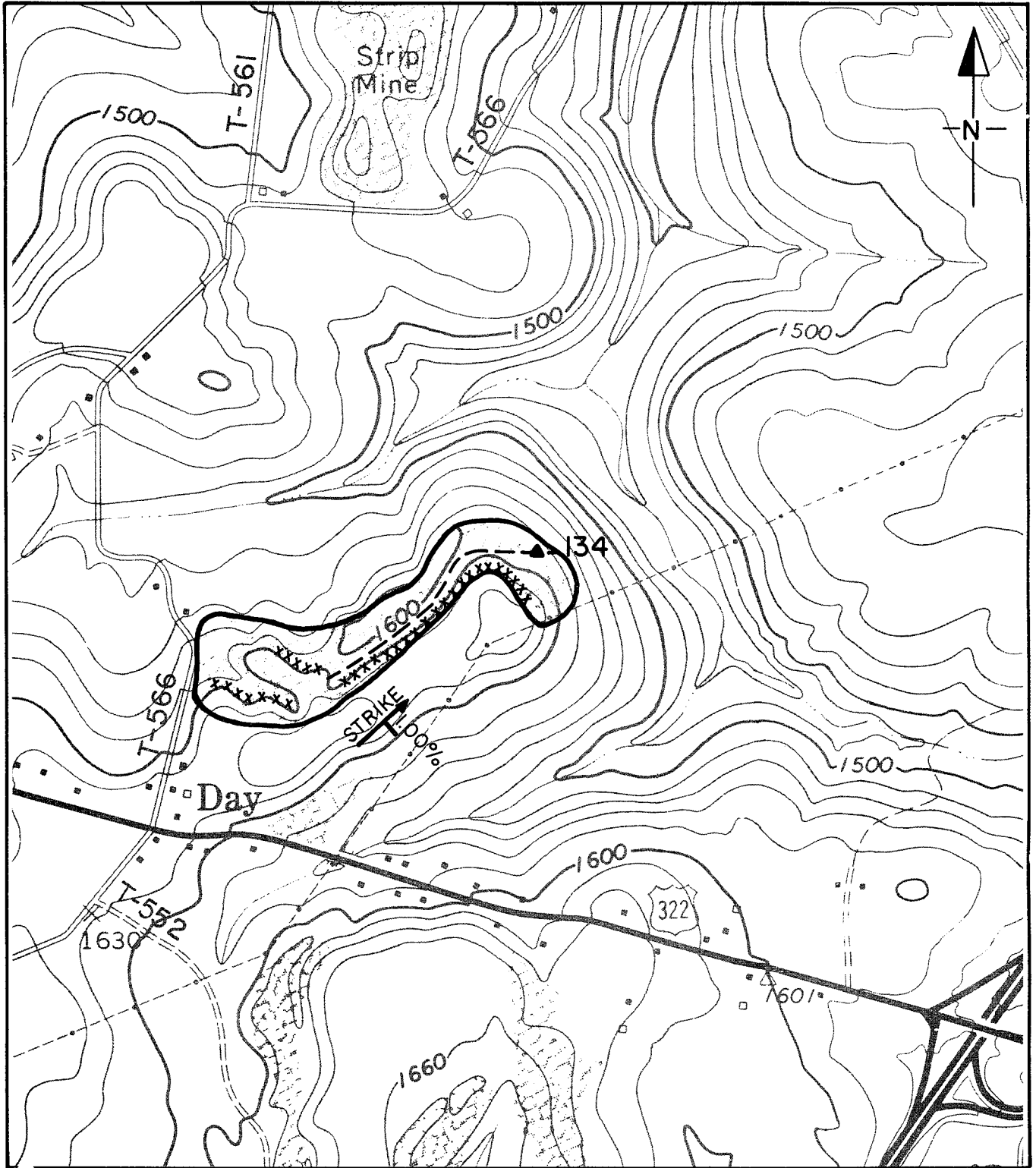
Cost of Abatement per lb. of acid per day \$26,400

PROJECT AREA XVIII



PROPOSED RECLAMATION PLAN

PROJECT AREA XVIII



ALTERNATE RECLAMATION PLAN

AREA XIX

Mine drainage at this location originates in an abandoned strip mined area. The Upper Clarion coal seam was mined here. Much of the area is without vegetation, the northern half completely so. There is no highwall and no major depressions.

The flows from the area have been primarily of a "wet weather" nature. There are two discharges one of which has been dry throughout most of the study. The acid loading of these discharges is very misleading as discharge 136 was dry for 9 of the 12 sampling periods and an unusually high flow recorded during sampling period 10 raised the average acidity unrealistically.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)
135	7.1	.05	3
136	26	.58	2
Total	33	.63	

Proposed Reclamation Plan - Priority No. 31

To abate the acid in this project area drainage channels should be constructed as necessary to insure rapid runoff of surface water, preventing infiltration. The need for such channelization predominates in the northern half of the area. The entire affected area should be revegetated with appropriate grasses.

Estimated Costs:

Drainage Channels 2200 Feet @ \$30/Ft. = \$66,000

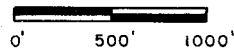
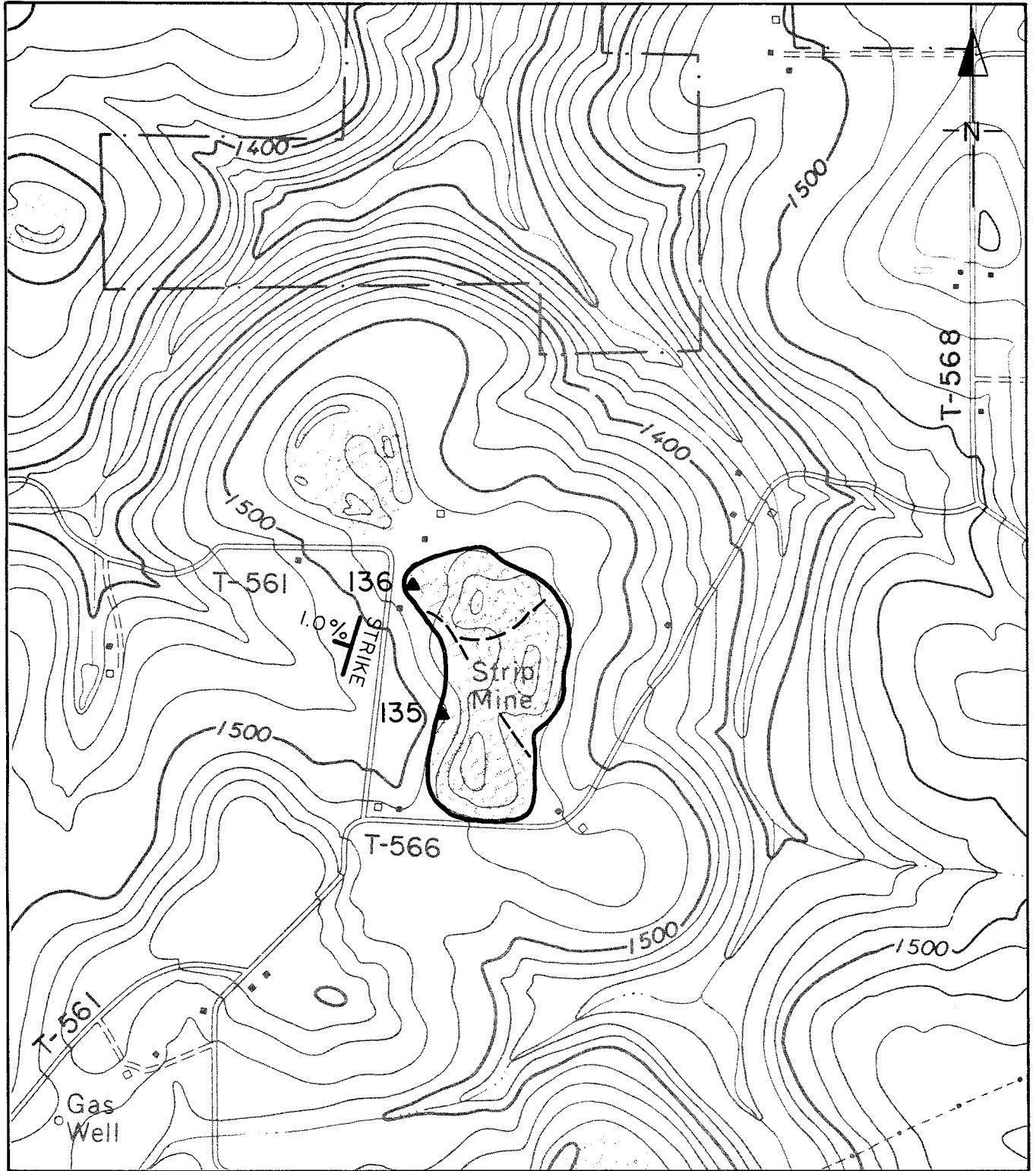
Revegetation 35 Acres @ \$700/acre = 24,500

Total Cost = \$90,500

Approximate Amount of Acid to be Abated 50%

Total Acid Abated 17 lbs/day

PROJECT AREA XIX



AREA XX

This project area is the site of a small drift. The Lower Kittanning coal was mined at this location. -The-upslope portion of the drift has apparently been removed by a recent stripping operation of W. P. Stahlman Coal Company; permit- 2767BSM12. The drift is apparently serving as a drain for at least a portion of the strip mine.

An attempt has been made to convey the water from the drift away from its natural course to discharge into an unnamed tributary to Douglass Run 300 feet to the west. This attempt has been only partially successful and as a result the drainage from this discharge is collected in two locations.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)
137	89	5.9	13
180	53	9.8	8
Stream			
Station 40	124	1.9	32
Total	266	18	

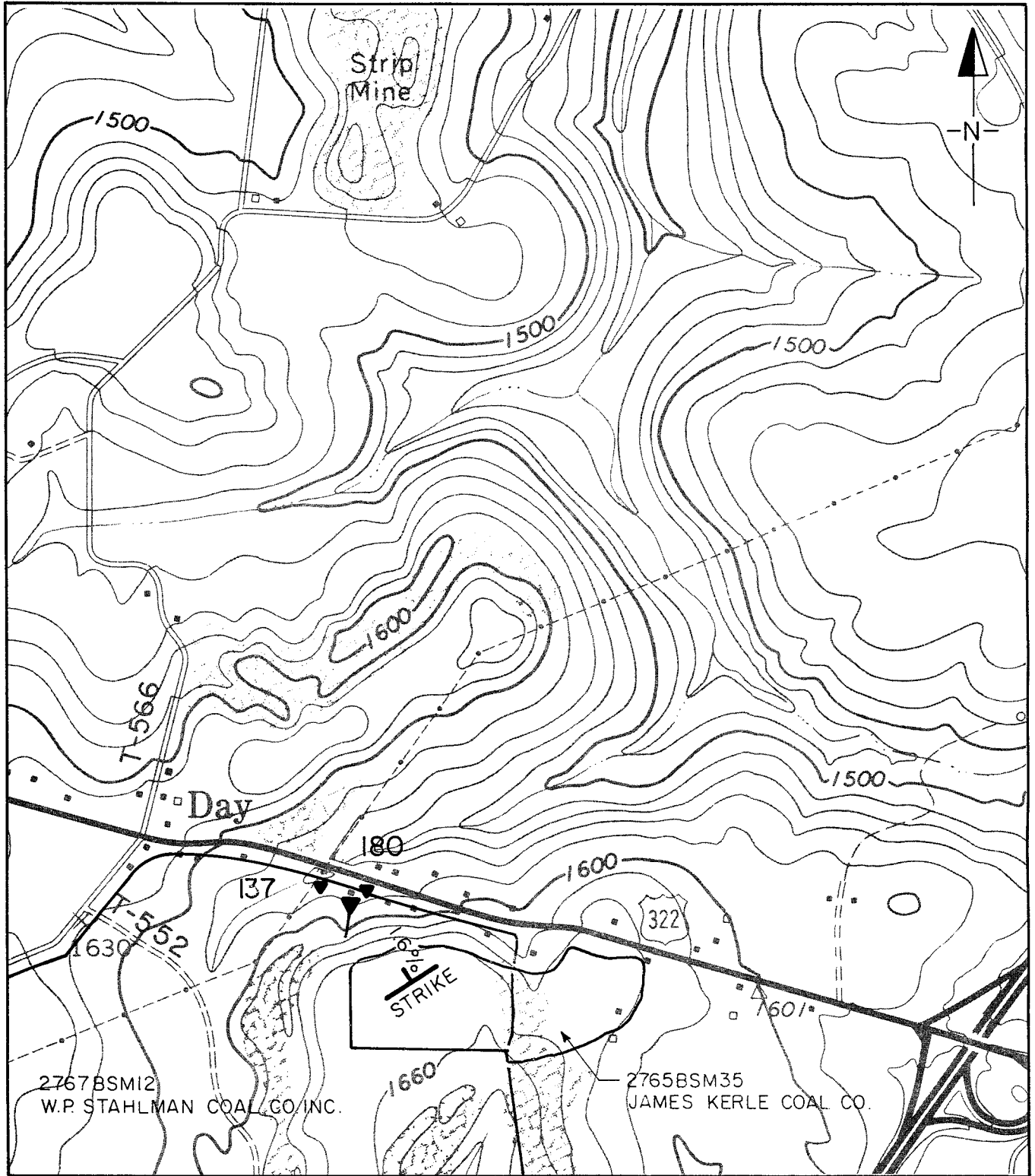
Proposed Relcamation Plan - Priority No, 5

A concrete block and clay deep mine seal should be installed in the drift by excavations This seal should serve to impound the drainage, inundating the workings. Should the water break out at a higher elevation the water quality should be improved as a result of limited oxidation attributable to the degree of inundation achieved. Such a breakout would probably occur in the strip mined area southwest of the drift.

Estimated Cost:

Concrete Block and Clay Mine Seal	\$15,000
Approximate Amount of Acid to be Abated	65%
Total Acid Abated	92 lbs/day
Cost of Abatement per lb. of acid per day	\$163

PROJECT AREA XX



0' 500' 1000'

AREA XXI

This project area is the site of an old "country bank." This small drift is collapsed and very grown up. A small amount of refuse material is all that testifies to the existence of the mine. The mine appears to be at the Mercer horizon.

A discharge flows from the collapsed drift entry. The dip of the rocks suggest that the strip mine east of the site does not contribute to the flow from the mine.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)
	138	12	.06
			10

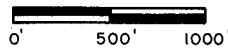
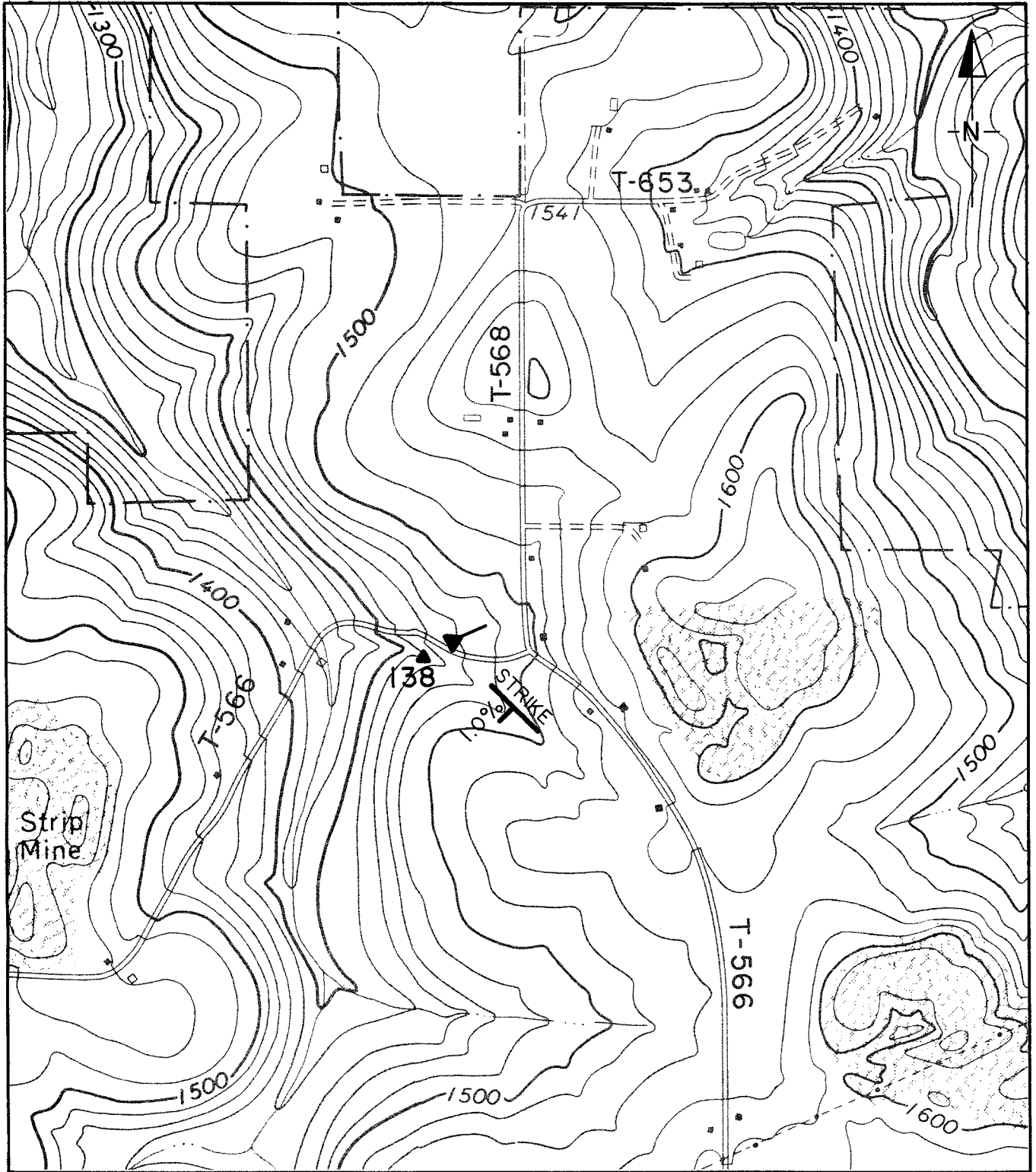
Proposed Reclamation Plan - Priority No. 26

To abate the acid mine drainage at this location a concrete block and clay deep mine seal should be placed in the entry by excavation from the surface.

Estimated Cost:

Concrete Block and Clay Mine Seal	\$15,000
Approximate Amount of Acid to be Abated-	65%
Total Acid Abated	8 lbs/day
Cost of Abatement per lb. of acid per day	\$1,875

PROJECT AREA XXI



AREA XXII

This is the site of an abandoned strip mine. The Clarion coal seams were apparently mined at this location. Although the highwall was backfilled during reclamation of this area several major depressions were left and the area is essentially unvegetated. There is a considerable amount of carbonaceous shale present on the surface.

Two small, discharges of acid mine drainage seep from the spoil along the western periphery of the affected area. These discharges are apparently related to and recharged by a major depressed area. The flow from these discharges is intermittent and largely proportional to precipitation. Although flows of less than 1 g.p.m. have been the average there is evidence to indicate much higher flows during periods of increased runoff due to rainfall. Acid loads during periods of heavy run-off may be increased ten-fold.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)
139	4.3	.03	.73
140	2.7	.02	.35
Total		7	.05

Proposed Reclamation Plan - Priority No. 36

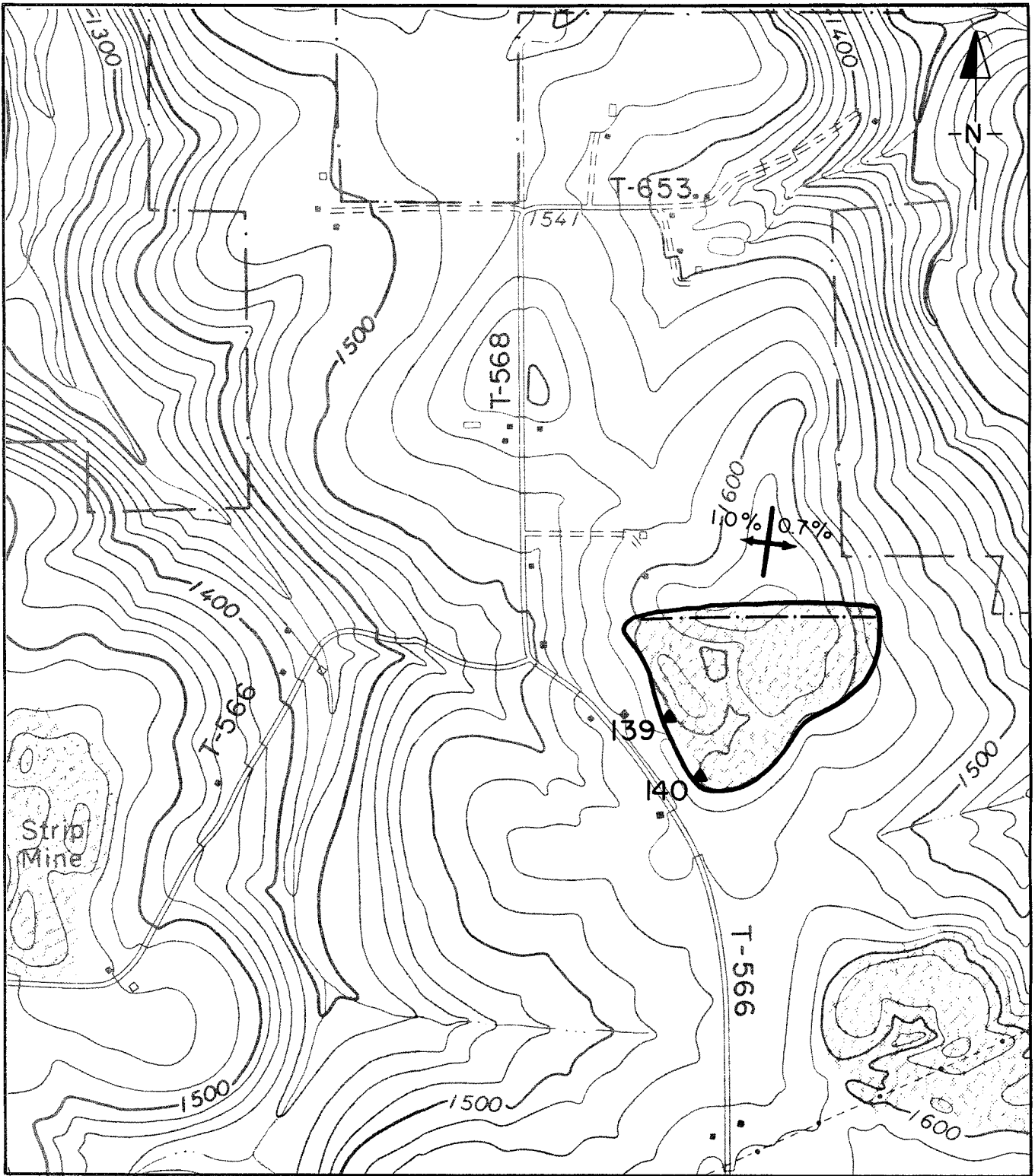
To reclaim this strip mined area the spoils should have minimal regrading to backfill major depressions and promote positive drainage, discouraging impoundment and infiltration of precipitation. A diversion ditch should be constructed above the highwall area, along the northern edge of the strip mine where there is evidence of considerable "wash" by surface flow. This will serve to prevent surface runoff from flowing onto the affected area where it can come into contact with acidic materials. The entire area should be revegetated with appropriate fast growing grasses.

AREA XXII

Estimated Cost:

Minimal Regrading	36 Acres @	\$500/Acre	\$18,000
Diversion Ditch	1800 Feet @	\$3000/Ft.	= 5,400
Revegetation	36 Acres @	\$700/Acre	= 25,200
	Total Cost		= \$48,600
Approximate Amount of Acid. to be Abated			50%
Total Acid Abated			4 lbs/day
Cost of Abatement per lb. of acid per day			\$12,150

PROJECT AREA XXII



0' 500' 1000'

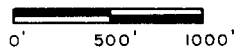
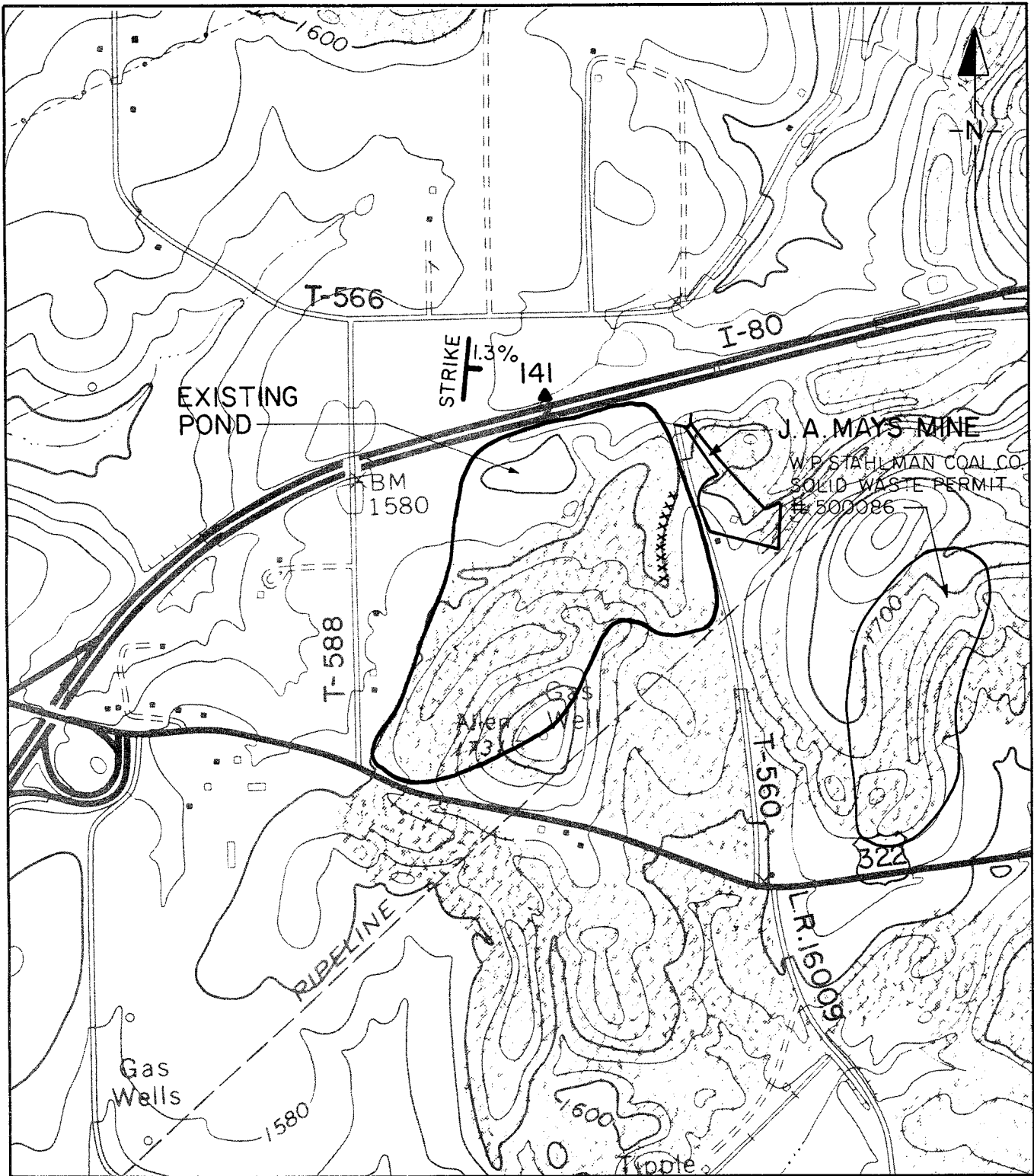
AREA XXIII

This project area is the site of a large hilltop strip mine located on the Mill. Creek - Piney Creek divide. There were probably several seams of coal mined at this location including the. Clarion, Lower Kittanning and Middle Kittanning. There is a large pond present on the north side of the stripped area, adjacent to Interstate Route 80. The pond is apparently fed primarily by subsurface flow most of which is recharged by the strip mined area. Discharge from the pond collects in an adjacent roadside drainage ditch and flows under 1-80 via culvert where it joins an unnamed tributary to Little Mill Creek. A small deep mine, the J. A. Mays Mine is located adjacent to this project although no discharge was noted from it.

The discharge from the pond averages only 12 g.p.m. with an acid loading of approximately 4 lbs./day. These findings are in blatant conflict with those. reported in the Environmental Protection Agency Cooperative Mine Drainage Study for the Clarion River Basin. At the time of that study 4263 lbs. of acid were discharged from the pond daily. There is no apparent explanation for this decrease in discharge and improvement in water quality. It is obvious, however, that in the five years since that previous study conditions at the site have improved considerably. For this reason, no abatement plan has been proposed for this area.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)
141	4	.58	12

PROJECT AREA XXIII



AREA XXIV

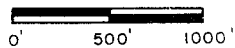
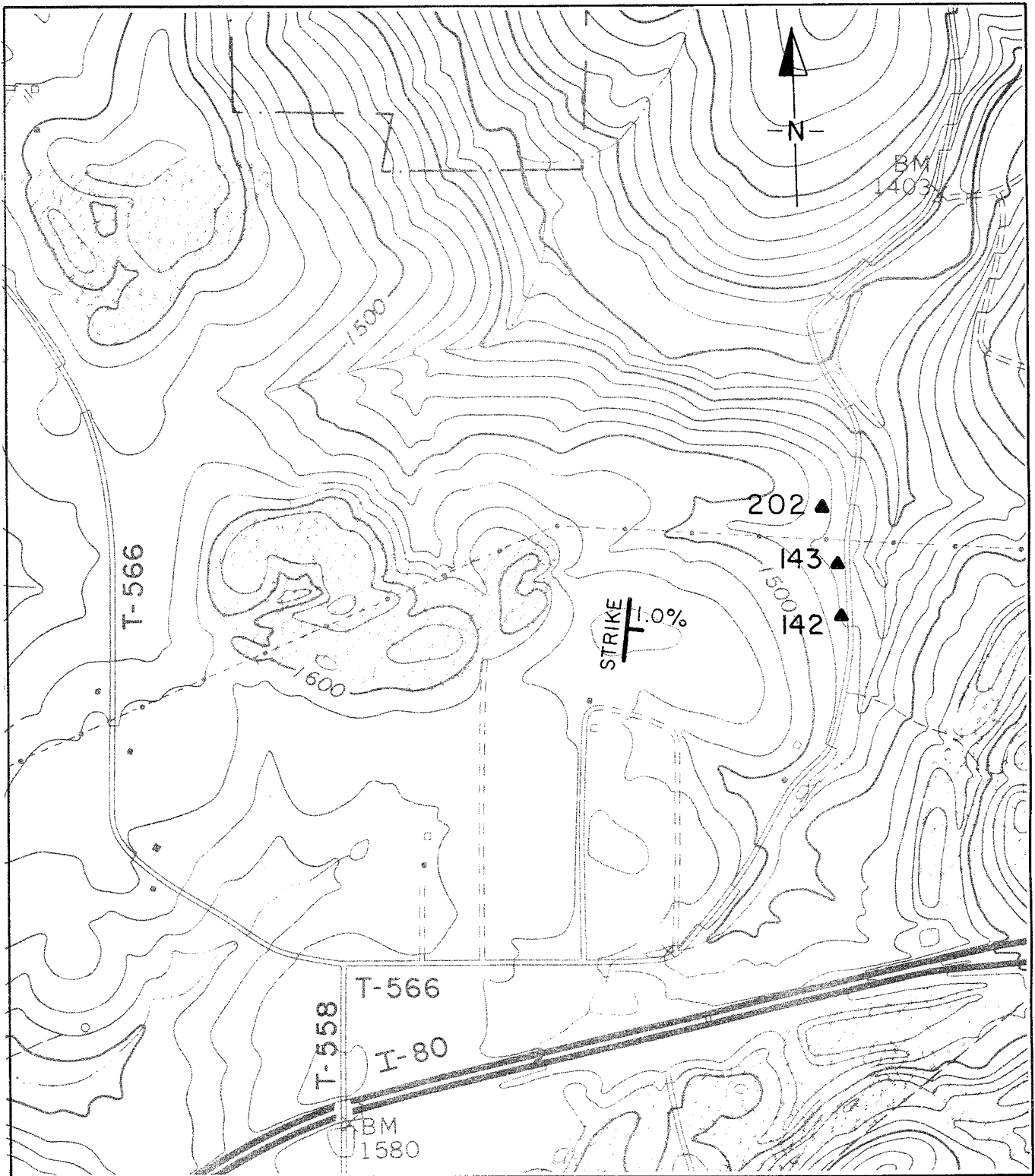
This location is the site of two springs. The springs discharge small flows of acid water. The one spring (#143) has been dry through much of the study while spring #142 flows about 12 g.p.m. A portion of the up-gradient recharge area has been strip mined possibly contributing to the acid nature of the springs.

This represents a source of "indirect" acid mine drainage; that is, although the acidity of the discharges is probably related to mining activity, at least in part, there is no direct or empirical relationship between the two.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (g.p.m.)
142	.78	.12	12
143	.23	.04	3
Total	1.0	.16	

No abatement measures are suggested for this project area.

PROJECT AREA XXIV



AREA XXV

This project area is the location of a strip mine. The Upper Clarion coal seam was mined here. The strip mine has been reclaimed to the extent that no highwall exists and much of the area is covered by a moderate growth of evergreens. One major depressed area exists in the strip mine which impounds surface water where it eventually infiltrates into the spoil material. It is probably this depression that is largely responsible for the single discharge from the project area.

Discharges:	Avg. Acidity (lbs/day)	Total Fe (lbs/day)	Avg. Flow (g,p.m.)
	144	110	2.2
			19

Proposed Reclamation Plan - Priority No. 18

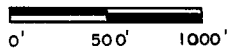
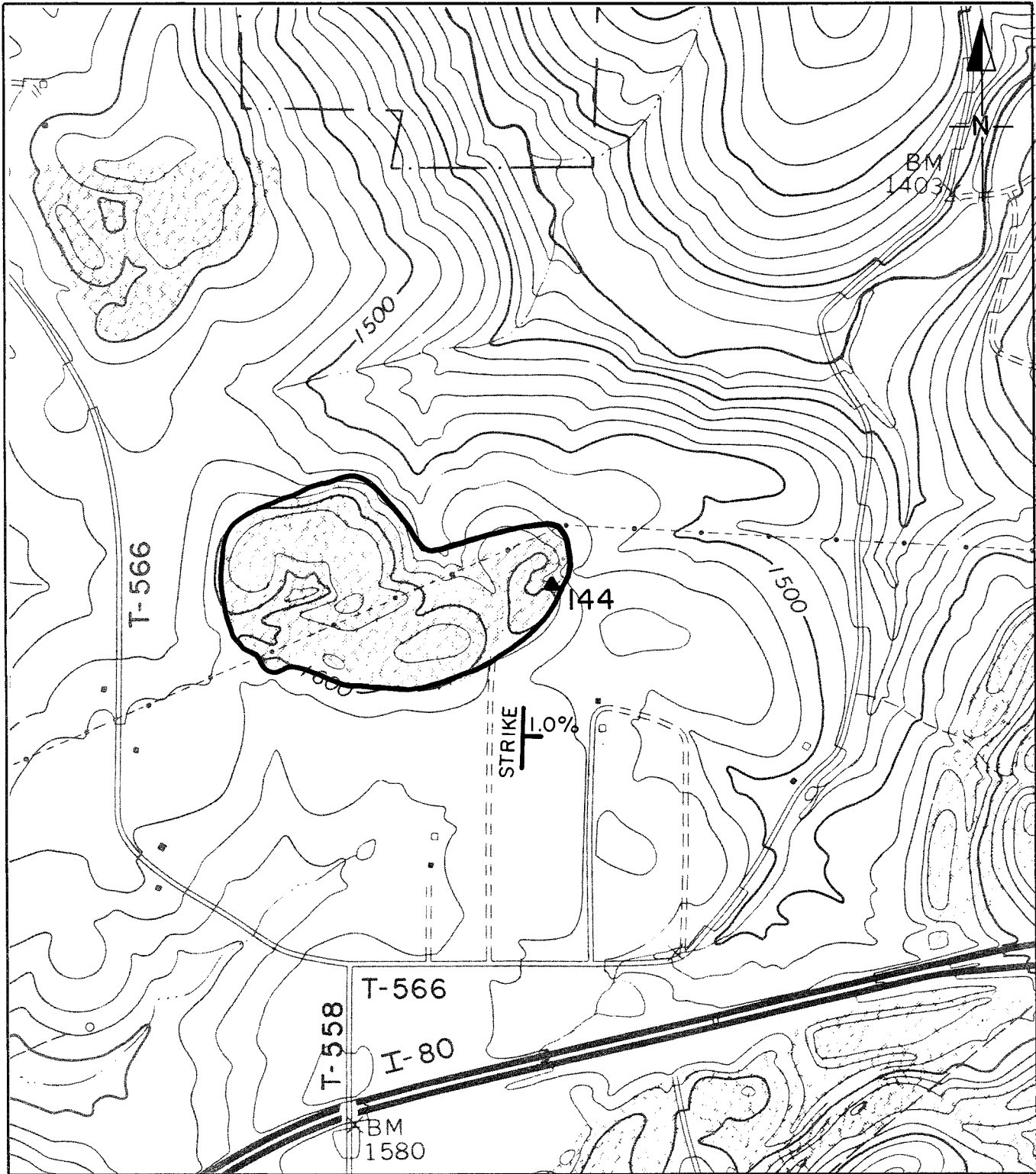
A portion of the acid mine drainage from this site could be successfully abated by minimal regrading and revegetation along. Special care should be taken to eliminate depressions and promote positive drainage.

Estimated Cost:		
Minimal Regrading	59 Acres @ \$500/Acre	= \$29,500
Revegetation	59 Acres @ \$700/Acre	= 41,300
	Total Cost	= \$70,800
Approximate Amount of Acid to be Abated		35%
Total Acid Abated		39 lbs/day
Cost of Abatement per lb. of acid per day		\$1,815

Alternate Reclamation Plan - Priority No. 23

To abate the acid mine drainage at this location the area should have minimal regrading to eliminate major depressions and avoid impoundment of surface water. Drainage channels should then be constructed as necessary to drain surface water away from the spoil as rapidly as possible. The entire affected area should then be revegetated with grasses.

PROJECT AREA XXV

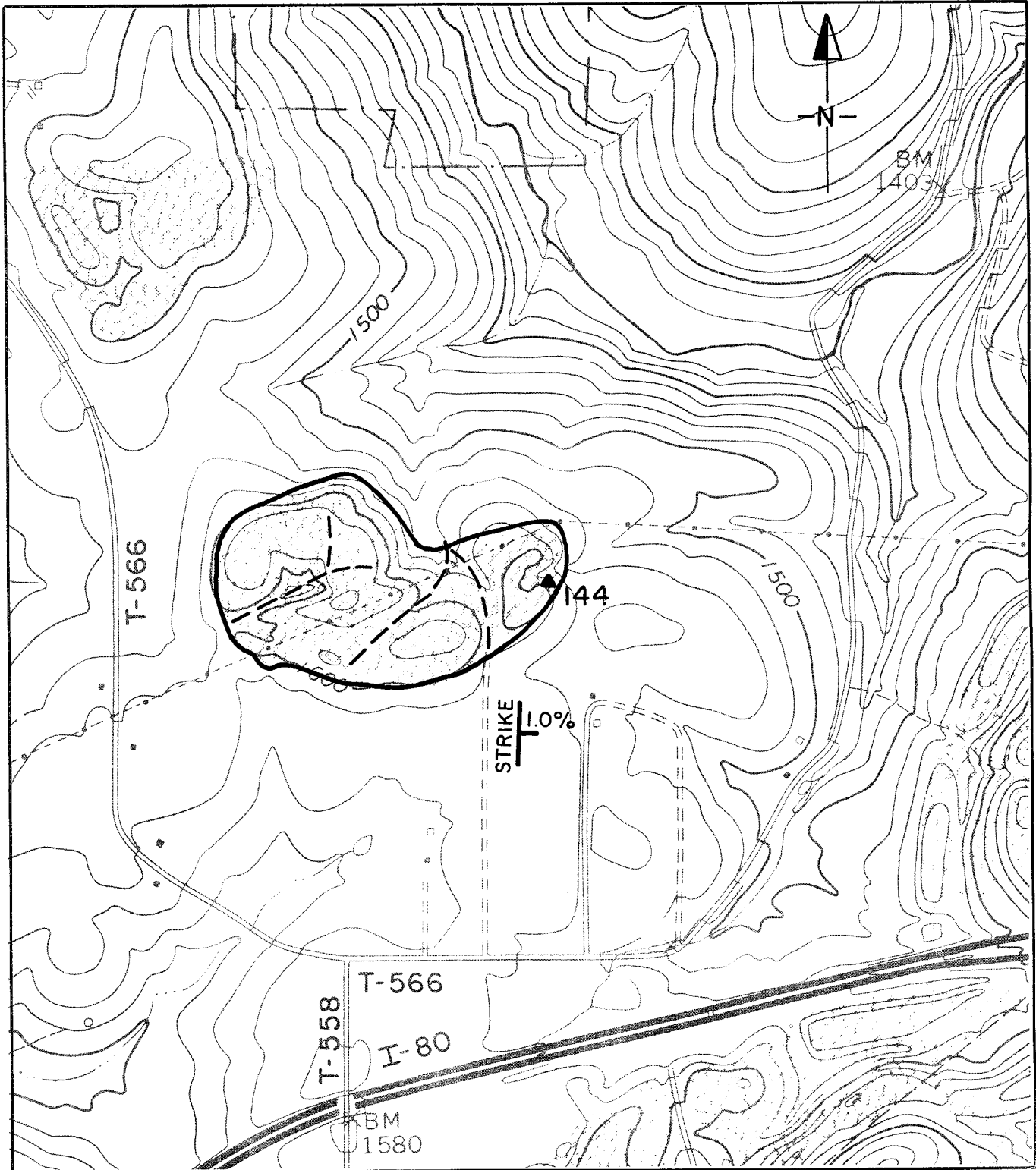


PROPOSED RECLAMATION PLAN

AREA XXV

Estimated Cost:		
Minimal Regrading	59 Acres @\$500/Acre	\$ 29,500
Drainage Channels	3500 Feet @\$30/Ft.	105,000
Revegetation	59 Acres @\$700/Acre	41,300
Total Cost		= \$175,800
Approximate Amount of Acid to be Abated		
Total Acid Abated		60%
		66 lbs/day
Cost of Abatement per lb. of acid per day		\$2,664

PROJECT AREA XXV



ALTERNATE RECLAMATION PLAN