CONCLUSIONS

As discussed in the section on Water Quality, in so far as mine drainage pollution is concerned, the water quality of Mahoning Creek in the study area is good. The alkalinity in the main stream averaged 34 parts per million of alkalinity and Mahoning Creek was always alkaline during the period of the study. Mahoning Creek has other pollution problems such as sewage discharges which were not within the scope of this study.

Most of the tributaries in the headwaters of Mahoning Creek are always alkaline and are in fact good trout fishing streams. The stream most affected by mine drainage pollution is a short section of Sugarcamp Run which receives a large acid discharge from the abandoned deep mine shaft at Sykesville. This discharge is neutralized by the alkaline flow of water in Stump Creek. It is unfortunate that one of the streams affected by mine drainage pollution during certain periods of the year is Clover Run on which is located the water supply dam for Punxsutawney and surrounding areas. This stream is usually marginally alkaline but is subjected to periods of acidity.

In certain sections of the study area particularly near Cramer, Elnora, and Sykesville, the discharges are high in iron content. Most of these sources are comprised of alkaline water and as a consequence the iron is precipitated onto the stream bottom almost immediately.

Thus, although there are certain sections that are adversely affected by pollution from abandoned mining operations, mine drainage pollution is not a critical problem in Mahoning Creek.

The water quality in the entire watershed of 425 square miles drained by Mahoning Creek is generally good with the exception of the 32.5 square mile watershed area drained by Pine Run. The water in this tributary is highly acidic due to discharges emanating from abandoned mining operations and discharges into Mahoning Creek at Eddyville immediately below the Mahoning Dam.

RECOMMENDATIONS

The Project Area remedial plans are for complete abatement of the mine drainage pollution en the watershed. The proposed abatement plans consist of backfilling abandoned strip mines and/or constructing diversion ditches and flumes to control the surface run-off, leveling and planting the refuse piles, and the hydraulic and surface sealing of the abandoned deep mines. Alternate methods of abatement such as neutralization of the acid mine drainage were considered. Treatment facilities were not recommended in this study area mainly because such facilities are but a temporary solution and must be operated continuously for long periods of time with attendant high costs. With the low level of pollution in the watershed, many of the proposed abatement plans are not economically feasible at the present time and have therefore been given a low priority for remedial work.

We would recommend that the following four Project Areas be given consideration for remedial work in the immediate future,

1. Project Area # 2- Clover Run Vicinity

This area consists of partially backfilled abandoned strip mine operations which, especially after hard rains, contribute acidic run-off to the Clover Run reservoir of the Punxsutawney Water Co. This area is designated as # 1 priority because of the acid slugs generated during wet weather. The abatement measures consist of backfilling and planting the affected areas.

2. Project Area # 13- Helvatia Vicinity

This area contains several small abandoned deep mines and a large refuse pile which contributes highly acidic run-off during wet weather. The mines should be sealed with clay and the refuse pile leveled, fertilized, and planted. This reclamation would eliminate slugs of acid going into Stony Creek.

3. Project Area # 15- Sykesville Area

This area contains several shafts into large abandoned deep mines from which are discharged large volumes of water which are high in iron content. The Sykesville shaft is discharging large amounts of acidic water and is the largest contributor of acid in the watershed. However, the area was not given the highest priority because of the high cost and the fact that the high heads encountered negates a total abatement. Nevertheless the sealing of these shafts and further flooding of the abandoned deep mine areas would considerably decrease the acid load flowing into Mahoning Creek. Treatment facilities are not recommended for this discharge because of the initial cost and the high operating costs. However, a small neutralizing plant would immediately abate the acid load and would serve as a temporary solution to the problem.

4. Project Area # 14- Sykesville Vicinity

Located in this area are several boreholes into abandoned deep mines which discharge water continuously with a high iron content. These boreholes should be plugged in conjunction with the remedial work in Project Area # 15.

5. Project Area # 7- Big Run Vicinity

This area contains several small abandoned deep mines from which slightly acidic water flows into Mahoning Creek. Although not a critical problem, the pollution could be abated at a relatively low cost.

6. Project Area # 16- Cramer vicinity

This area contains two shafts from a large abandoned deep mine which contribute an alkaline water with a high iron content into Mahoning Creek and an associated refuse pile which contributes small amounts of acid. Sealing of the shafts would eliminate much of the iron pollution. Backfilling and planting of the refuse pile would eliminate an eyesore and abate some small amount of acid pollution.

7. Project Area # 17- Elnora Vicinity

This area contains a shaft which discharges large volumes of alkaline water with a high iron content into Big Run a trout fishing stream. To insure against damage to this stream, the shaft should either be sealed of settling ponds constructed to abate the iron discharge. The associated refuse pile should be leveled and planted.

In the following Project Areas, we would recommend remedial work in the abandoned mining areas, many of which discharge acid in which the active mining operations do not reaffect and abate the pollution sources.

Project Area # 4- Lost Run Vicinity

This area contains several acidic discharges from aban-

doned strip mines. It is currently being actively reworked by stopping operation and much of the old mined area should be restored as this area is restopped. Remedial work is not recommended unless some of the old strip mining areas are not reaffected and restored.

Project Area # 10- East Branch Headwaters

This area contains several, abandoned strip mines, some of which are presently being reworked. As is the case in the preceeding project area, no work is recommended unless the old strip mines are not reaffected and restored by the active mining operations.

Remedial work in the following Project Areas could only be justified to correct hazardous conditions or to improve the appearance of the land.

Project Area # 8- East Branch Vicinity

This area contains several abandoned strip mines from which the water discharges are basically alkaline. Backfilling, not recommended for mine drainage pollution abatement, would improve the land and the diversion ditches would decrease the siltation of the stream during heavy runoffs.

Project Area # 9- Laurel Branch Vicinity

This area contains several small abandoned deep and strip mines which contribute only small. amounts of acid water at certain periods of the year. Abatement work would not decrease the mine drainage pollution to any degree but would improve the appearance of the land.

Project Area # 11- Stump Creek

This area contains several abandoned strip mines and a few deep mine openings from which the discharges are basically alkaline. Backfilling would eliminate hazards and improve the siltation problem during heavy runoffs.

Project Area # 12- Limestone Run Vicinity

This area contains several abandoned mines, especially strip mines whose discharges are seasonally acidic but do not contribute large amounts of acid. Diversion ditches would correct much of the pollution problem and decrease the siltation of the stream.

Project Area # 18- Wishaw Vicinity

This area contains several small deep mines whose discharges are alkaline and should be sealed only to eliminate hazards and to improve the appearance of *'.:.he land. The refuse pile should be leveled and planted since the runoff is seasonally acidic.

Project Area # 19- Wishaw Vicinity

This area also contains numerous deep mines with alkaline flows which could be sealed to improve the appearance of the land and decrease the siltation problem.

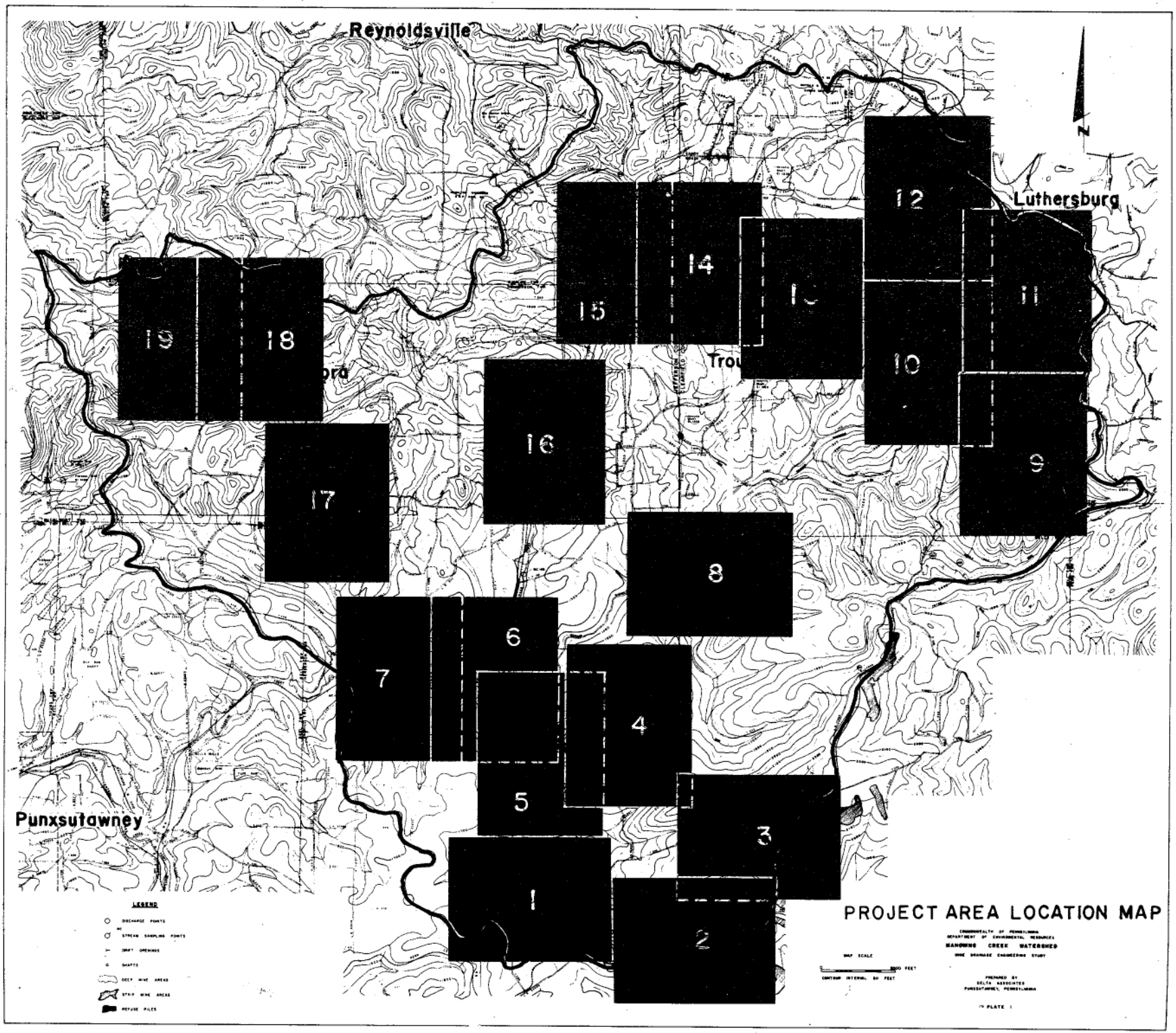
COST ANALYSIS

Work To Be Accomplished	Priorty	Project Area	Description	Acidity Pounds/Day Existing	Acidity Pounds/Day Expected	Cost	Acid Abatement % Project Area	Acid Abatement % Total Study Area
Immediate Consideration	1	2	Backfill 37 Acres Diversion Ditches	5.4	4.9	$191,200	90	1
"	2	13	Surface Seal 14 mine openings. Reclaim refuse pile.	13.6	12.9	50,500	95	1
"	3	15	Seal 4 shafts Construct standpipe	976.4	583.4	418,000	70	60
"	4	14	Seal 7 Boreholes	0	0	39,000	100	0
				Sub Total		$698,700	72	62
Future Consideration	5	6	Seal 4 deep mine openings	3.8	3.6	28,000	80	1
"	6	17	Seal shaft. Reclaim refuse pile.	47.3	37.8	86,750	80	5
"	7	16	Seal 2 Shafts Reclaim refuse pile.	0	0	122,100	100	0
"	8	1	Backfill 26 Acres. Construct diversion ditch	8.9	7.5	149,300	70	1
"	9	7	Surface seal 5 deep mine openings.	.8	.7	8,500	95	¼
"	10	5	Backfill &Plant 66 A.	6.8	6.1	107,000	90	1
"	11	3	Seal 17 openings Backfill 28 Acres	.2	.2	89,500	95	1
				Sub Total		$591,150	85	7

COST ANALYSIS CONTINUED

Work To Be Accomplished	Priorty	Project Area	Description	Acidity Pounds/Day Existing	Acidity Pounds/Day Expected	Cost	Acid Abatement % Project Area	Acid Abatement % Total Study Area
3. Consideration Following Active Mining Operations	Low	4	Backfill 250 Acres	Not Available				
		10	Backfill 93 Acres	"	"			
			Sub Total				90	1
4. Consideration For Hazards Or Asthetic	Low	8	Construct Diversion Ditches	0	0	$65,000	0	0
		9	Backfill 17 Acres Seal 6 Openings	.4	.4	32,400	100	0
		11	Seal 3 Openings Diversion Ditches	.2	.2	106,500	80	¼
		12	Diversion Ditches	.6	.5	205,000	70	¼
		18	Seal 15 Openings Reclaim Refuse Pile	1.0	.9	30,500	90	-
		19	Seal 37 Openings	.3	.3	47,000	95	-
			Sub Total			$486,400	85	½
			TOTAL			$1,776,250+	70	72

Note: Abatement Work Project Area # 11 will eleminate acid slugs.
" " " Areas # 14, 16, 17 will remedy iron discharges.


Reynoldsville
Luthersburg
Punxsutawney
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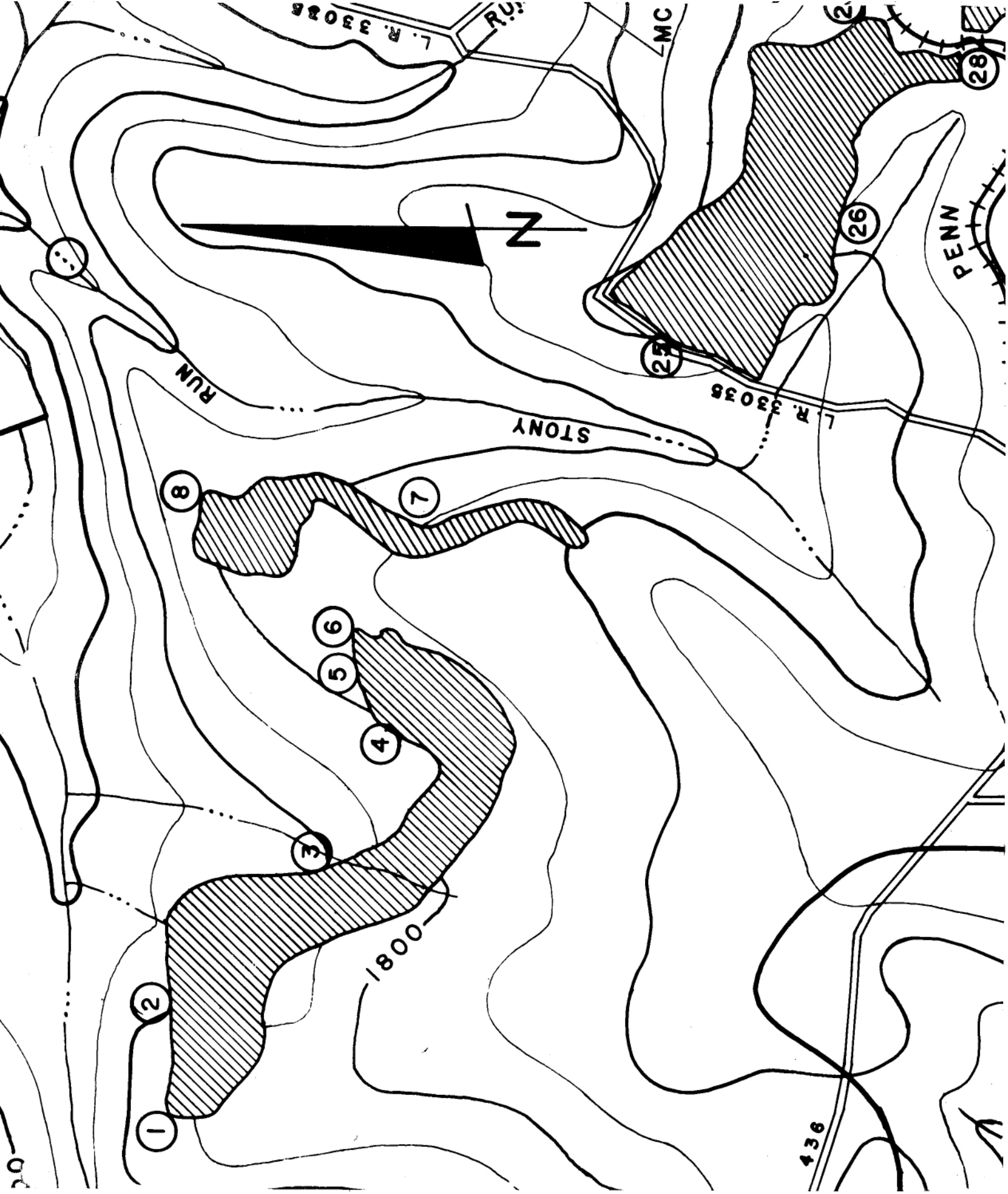
LEGEND
DISCHARGE POINTS
STREAM SAMPLING POINTS
DRIFT OPENINGS
SHAFTS
DEEP MINE AREAS
STRIP MINE AREAS
REFUSE PILES
PROJECT AREA LOCATION MAP
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
MAHONING CREEK WATERSHED
MINE DRAINAGE ENGINEERING STUDY
MAP SCALE
CONTOUR INTERVAL 50 FEET
PREPARED BY
DELTA ASSOCIATES
PUNXSUTAWNEY, PENNSYLVANIA
PLATE 1



PROJECT AREA No. I

PROJECT AREA NO. 1.

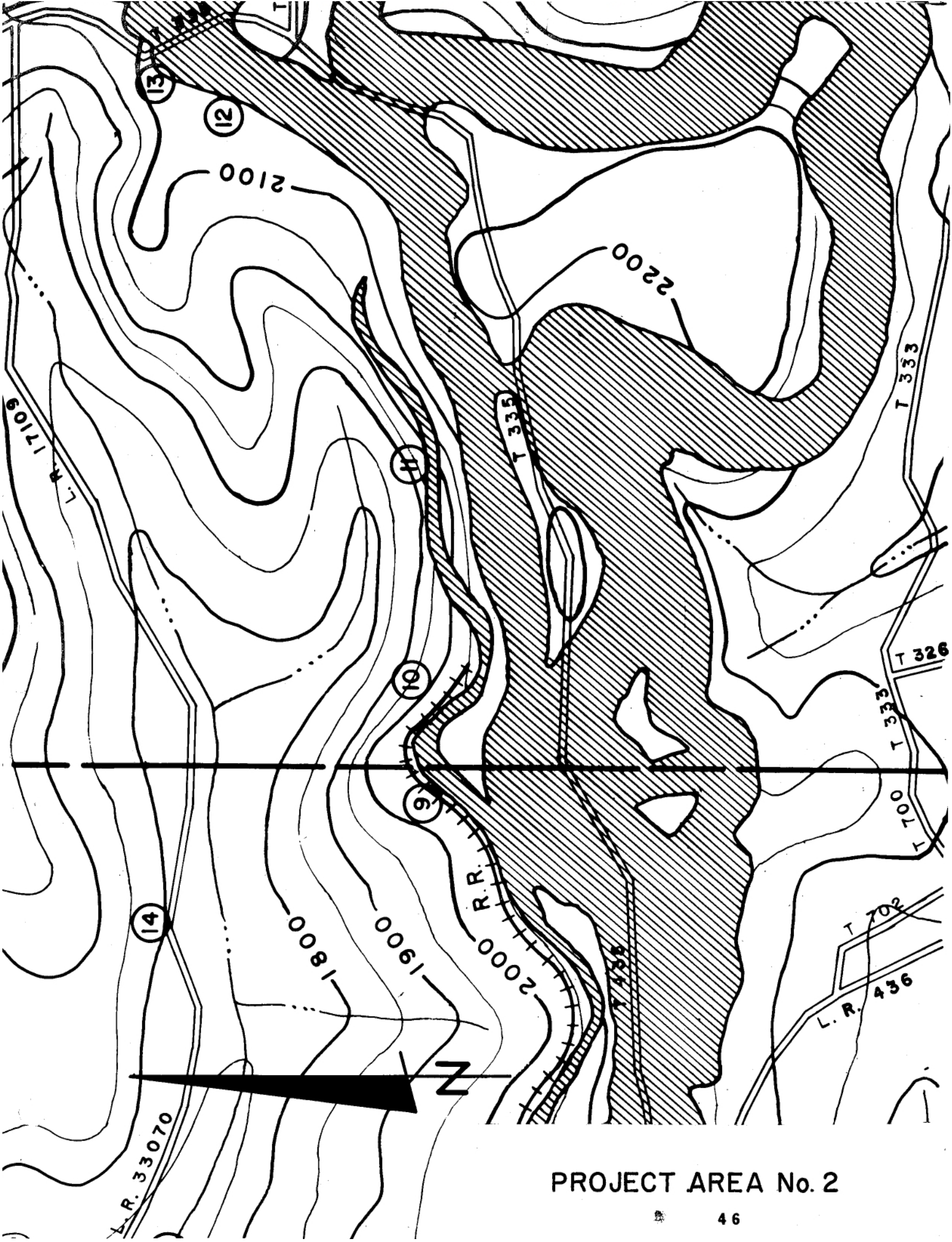
Priority No. 8

Location: Stoney Run, Gaskill Township, Jefferson County. This area consists of three strip mines in the Upper and Lower Freeport seams. The discharges flow through weir numbers 2, 3, 4, 5, 6, 7, 8, 25, and 26 into Stoney Run, a tributary of Clover Run.

The area at weirs 25, 26, and 28 is backfilled to the approximate original contour and is in need of neutralizing and planting. The proposed abatement plan for the twenty-six acres at weirs 1 through 8 consists of backfilling, neutralizing, and terracing with the usual vegetation. In addition 9000 feet of diversion ditches should be constructed above the highwalls and the construction of three flumes totaling 4000 feet from the diversion ditches to the toe of the spoil to carry off excess water and to prevent erosion and percolation through the spoil.

COST SCHEDULE

26 Acres Backfilling @ $2000 per acre	$52,000
78 Acres Neutralized and Planted @ $350	$26,300
9000 feet Diversion Ditches @ $2.00	$18,000
4000 feet of Flumes @ $10.00	$4,000
Design, Specifications, and Supervision	$13,000
Total	$149,300
Average Iron lbs/day	1.8
Average Acid lbs/day	22.1
Slugging Index	3.02



PROJECT AREA No. 2

PROJECT AREA NO. 2.

Priority No. 1

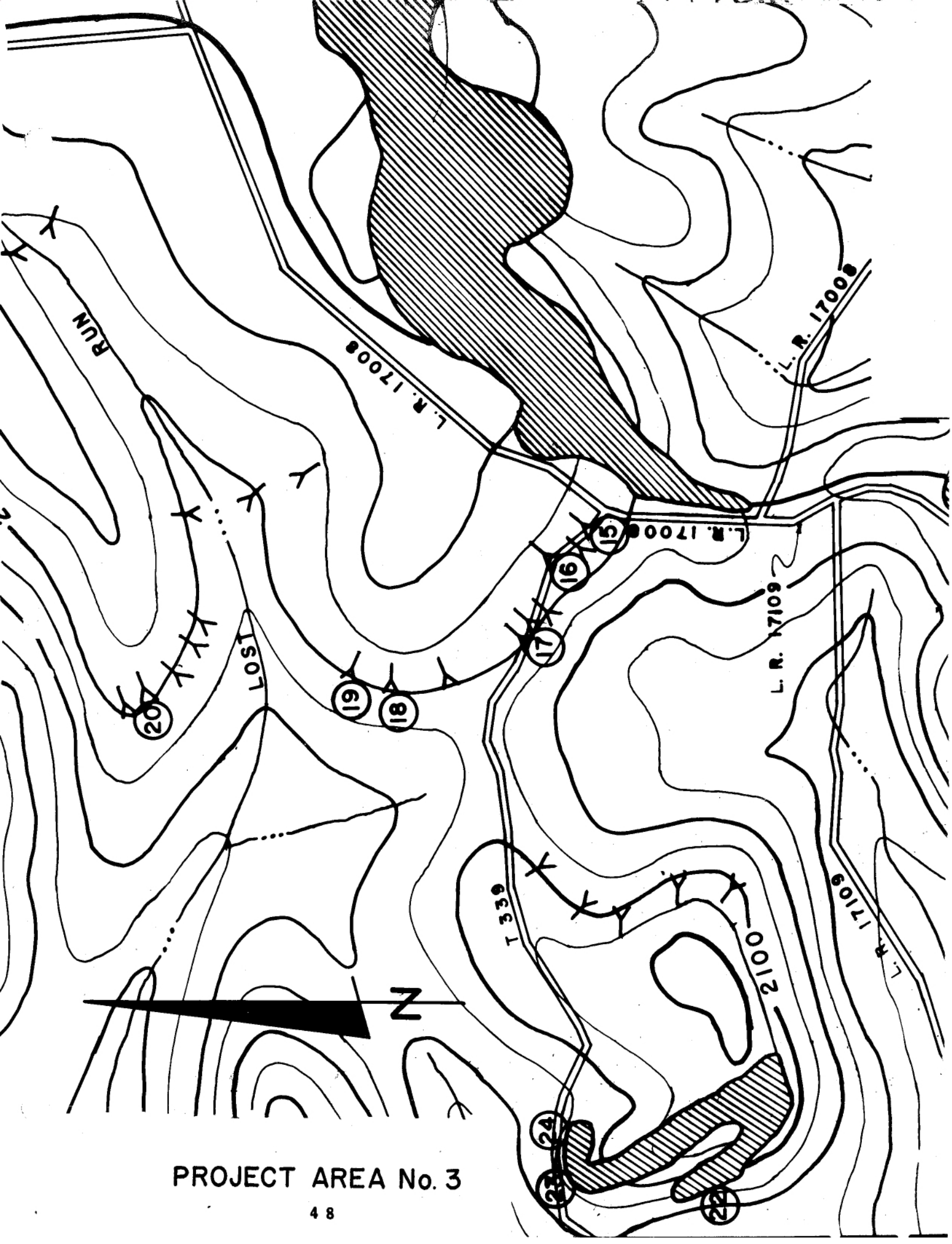
Locations Clover Run, Gaskill Township, Jefferson County, and Bell Township Clearfield County.

This area consists of 190 acres of abandoned strip mines in the Upper and Lower Freeport seams which have been partially backfilled. The discharges flow through weirs numbered 9. 10, 11, 12, and 13 into Clover Run, a tributary of The East Branch of Mahoning Creek. The reservoir of the Punxsutawney Water Company is located on Clover Run. The proposed abatement plan is to backfill and terrace 37 acres of these abandoned strip mines located at the north end of the affected area to furthur backfill the remaining 154 acres between the divide and the old cut which have been partially backfilled. This will eliminate depressions that hold water which then percolates through the spoil into the portion which has not been backfilled.. The abatement plan also is to neutralize and plant these areas and to construct diversion ditches and flumes to divert the surface water.

COST SCHEDULE

37 Acres Backfilling @ $1850 per acre	$68,450
154 Acres Partail Backfilling With Diversion Ditches and Flumes @ 700 per acre	$107,800
Design, Specifications, and Supervision	$15,000
Totals	$191,250

Average Iron lbs/day	.1
Average Acid lbs/day	6.2
Slugging Index	3.08



PROJECT AREA No. 3

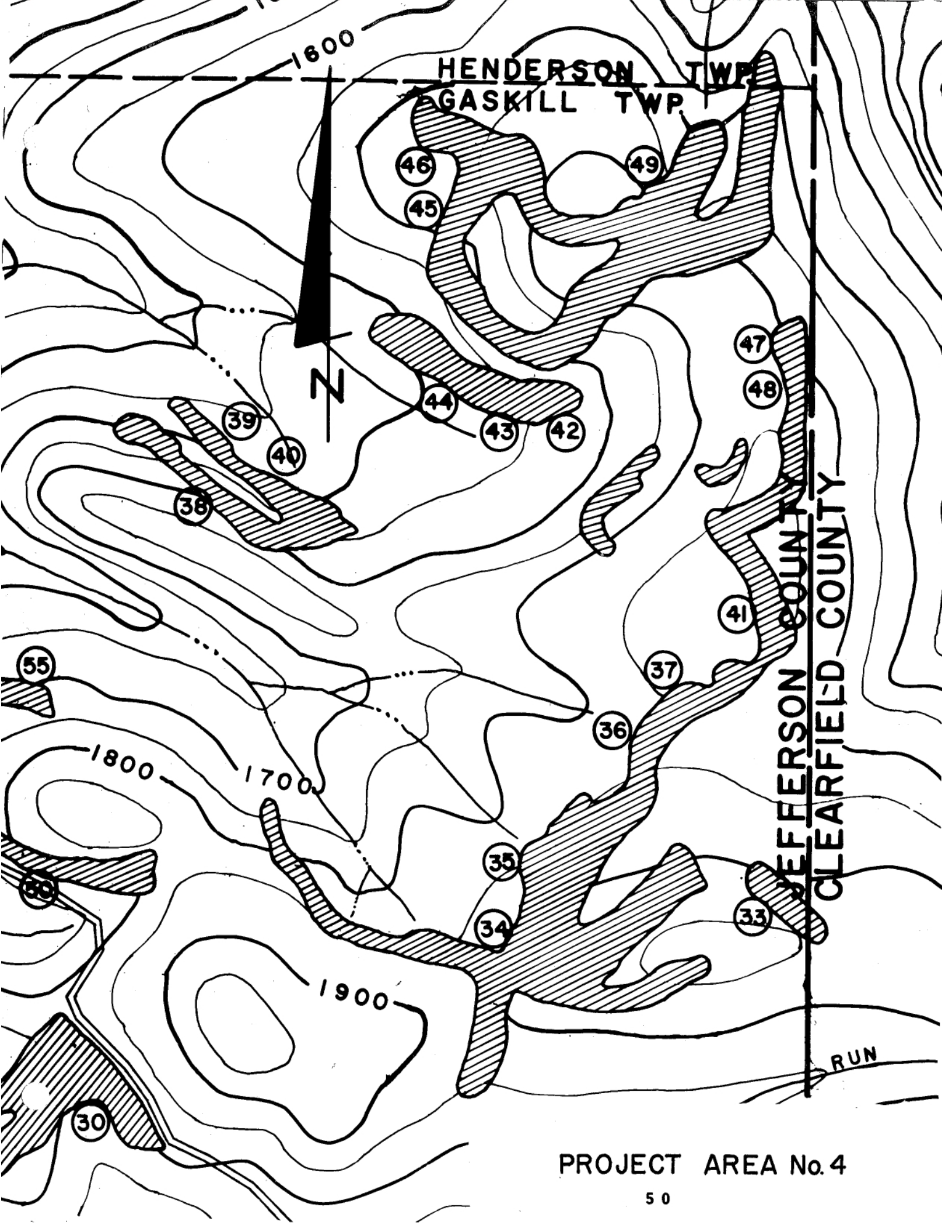
PROJECT AREA NO. 3

Priority No. 11

Location: Headwaters Lost Run, Bell Township, Clearfield County. This area consists of several small deep mines and associated refuse piles and a strip mine which has affected 28 acres. The discharges of low acidity flow through weirs 15, 16, 17, 18, 19, 20, 22, 23, and 24 into Lost Run, a tributary of Clover Run. The proposed abatement plan consists of 17 standard surface seals which should completely inundate the abandoned deep mine workings. The construction of the seals should take precedence over the backfilling of the abandoned strip mine at weirs 22, 23, and 24 to a regular terrace type of restoration.

COST SCHEDULE

Deep mine standard Surface Seals @ 1500		25,500
Backfilling and Planting 28 acres @ 2000		56,000
Designs, Specifications, and Supervision		8,000
Totals		$89,500
Average Iron lbs/day	.1	
Average Acid lbs/day	8.0	
Slugging Index	3.13	



PROJECT AREA No. 4

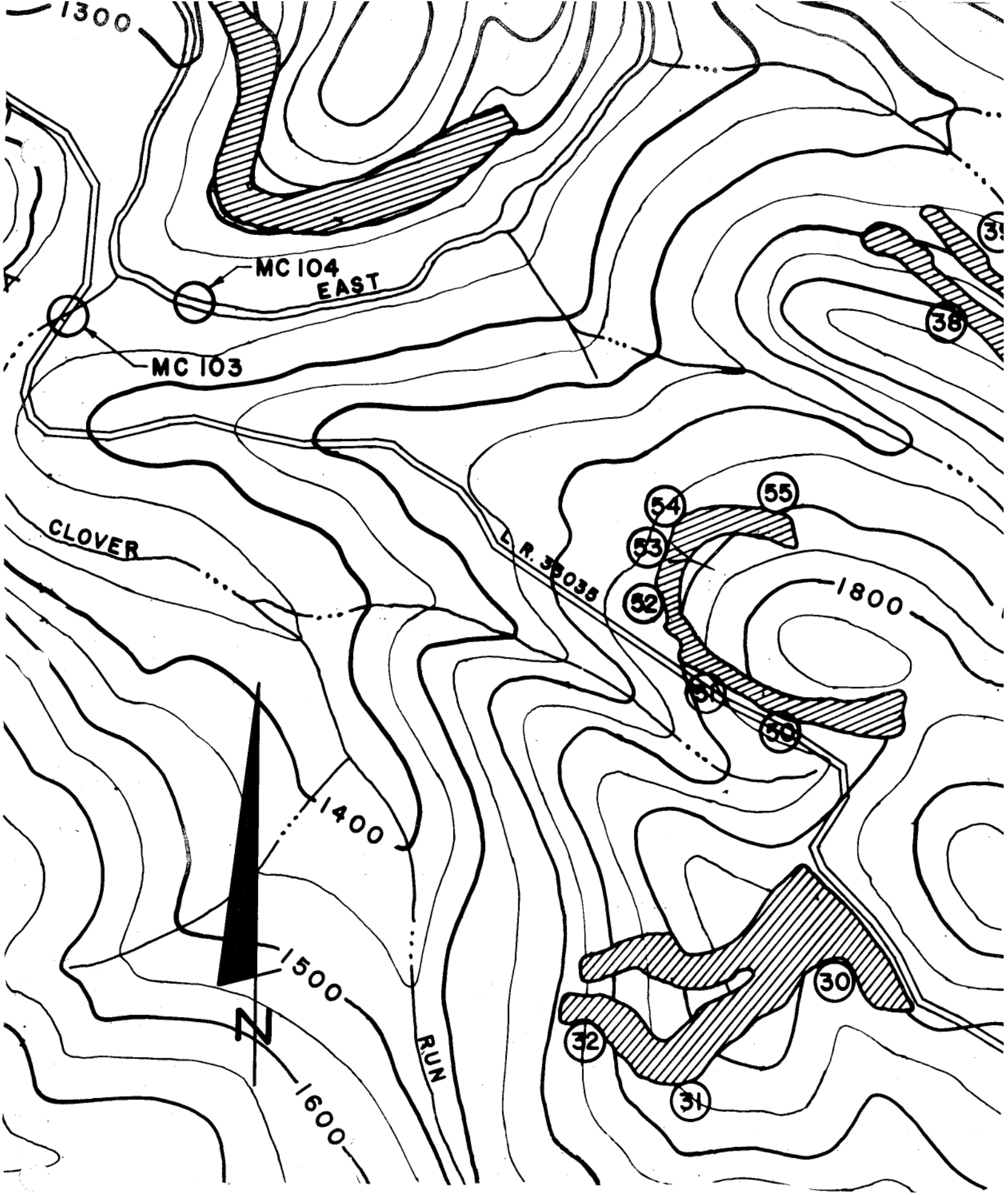
PROJECT AREA NO. 4

Priority No. Low

Location: Lost Run, East Branch, Gaskill Township, Jefferson County. This area contains 250 acres of abandoned strip mined land which has not been backfilled in the Upper Freeport and Lower Freeport seams. The discharges, several of which are acidic, flow through weirs numbered 33 through 48 into Lost Run and unnamed tributaries into the East Branch of Mahoning Creek. This area is presently being reaffected by an active operation and it is our opinion that with the proper supervision and compliance with the existing open pit mining laws that the mine drainage pollution in the areas being reaffected can be abated with a nominal cost to the Commonwealth. Therefore no abatement is being recommended at the present time. If the mining company does not remine the entire area, some work may be required in the future.

COST SCHEDULE

Supervision and/or advisory charges Per Diem		$150
Average Acid lbs/day	8.6	
Slugging Index	4.0	



PROJECT AREA No. 5

PROJECT AREA NO.

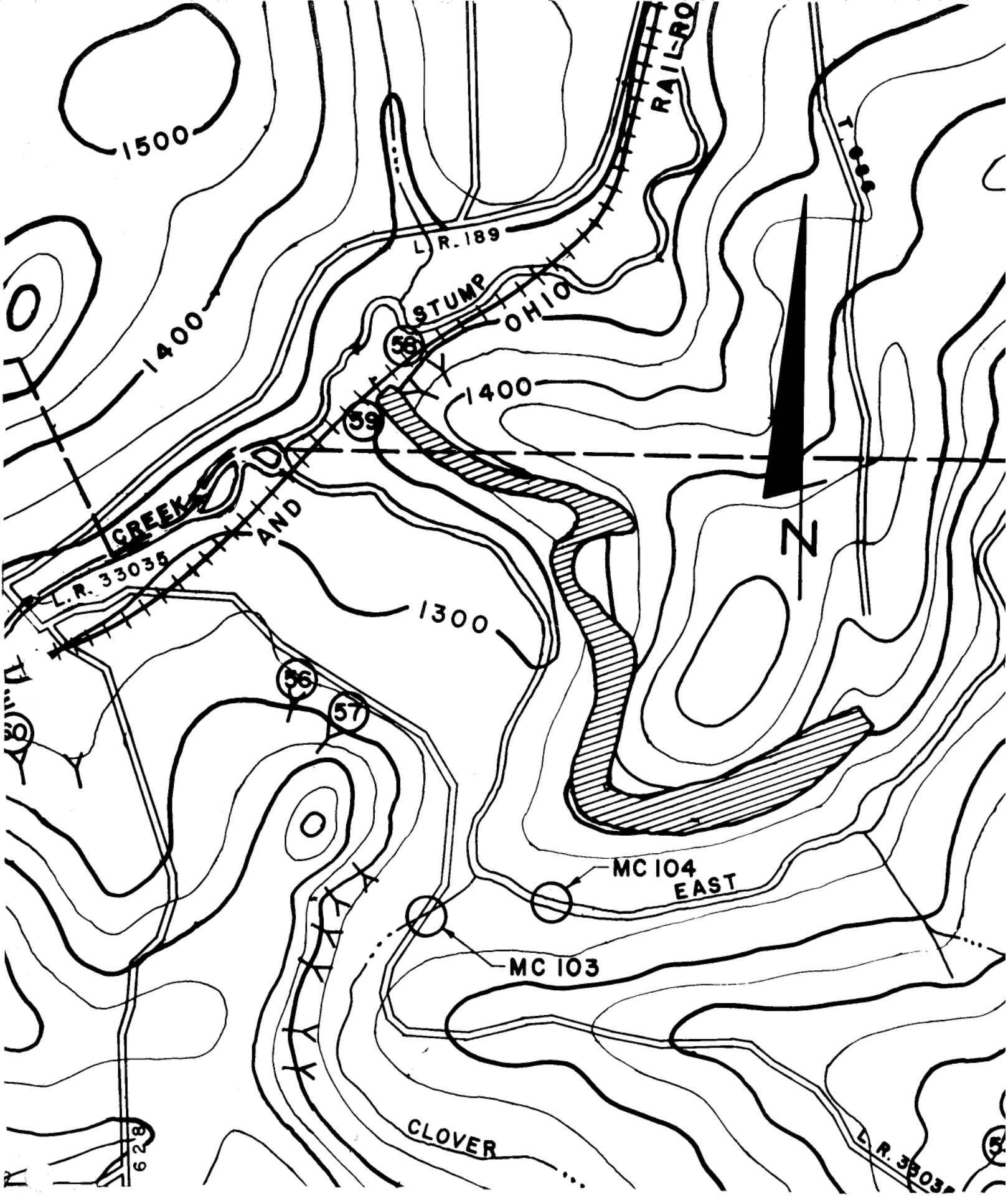
Priority No. 10

Location: Punxsutawney Reservoir, Gaskill Township, Jefferson County. This area consists of 66 acres of abandoned strip mine in the Lower Freeport seam, The discharges flow through weirs numbered 30, 31, 32, 50, 51, 52, 53, 54, and 55 into an unnamed tributary of Clover Run. The reservoir of the Punxsutawney Water Company is located on this stream. The discharges produce acid during periods of heavy runoff and should be corrected if funds are available after abatement of some of the heavier acid contributors.

The proposed abatement measures consist of backfilling, terracing, and Planting 66 acres of the old strip mines at weirs 30 through 32 and 50 through 55 and the construction of diversion ditches above the highwalls to prevent erosion while the plantings are taking effect.

COST SCHEDULE

Backfilling and Planting @ 1500		99,000
Design, Specifications, and Supervision		8.000
Totals		$107.000
Average Iron lbs/day	.1	
Average Acid lbs/day	2.8	
Slugging Index	7.9	



PROJECT AREA No. 6

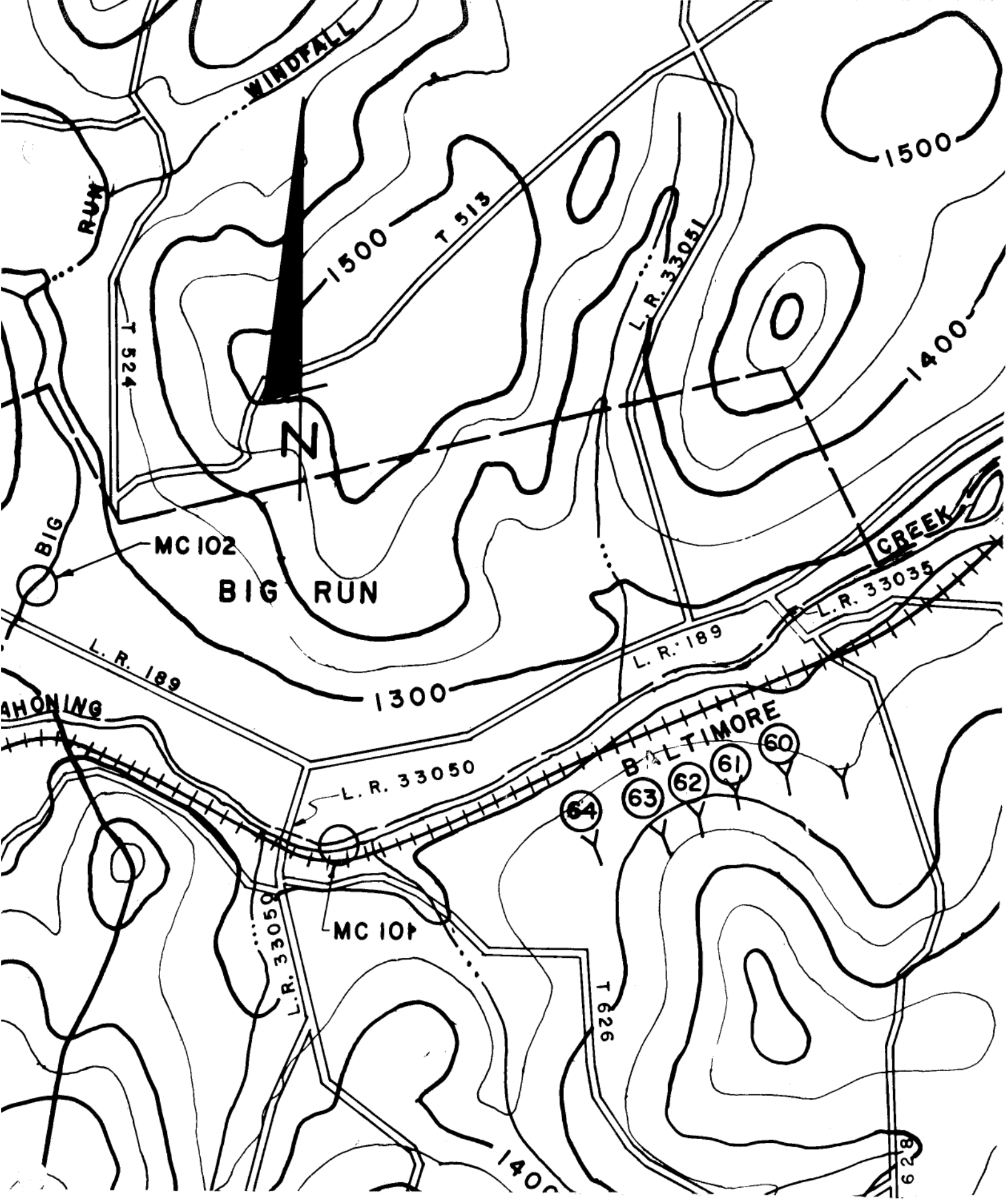
PROJECT AREA NO. 6

Priority No. 5

Location: Mahoning Creek South of Big Run, Gaskill Twp, Jefferson Co. This area contains several small deep mines in the Lower Kittaning seam of coal. The discharges flow through weirs numbered 56, 57, 58, and 59 into Mahoning Creek. It is our opinion that four standard deep mine seals at the openings at the above weirs would completely inundate the abandoned mine workings and abate the acid mine pollution from these sources.

COST SCHEDULE

Four deep mine seals @ 7000	28,000
Design, Supervision, and Inspection	3,500
Totals	$31,500



PROJECT AREA No. 7

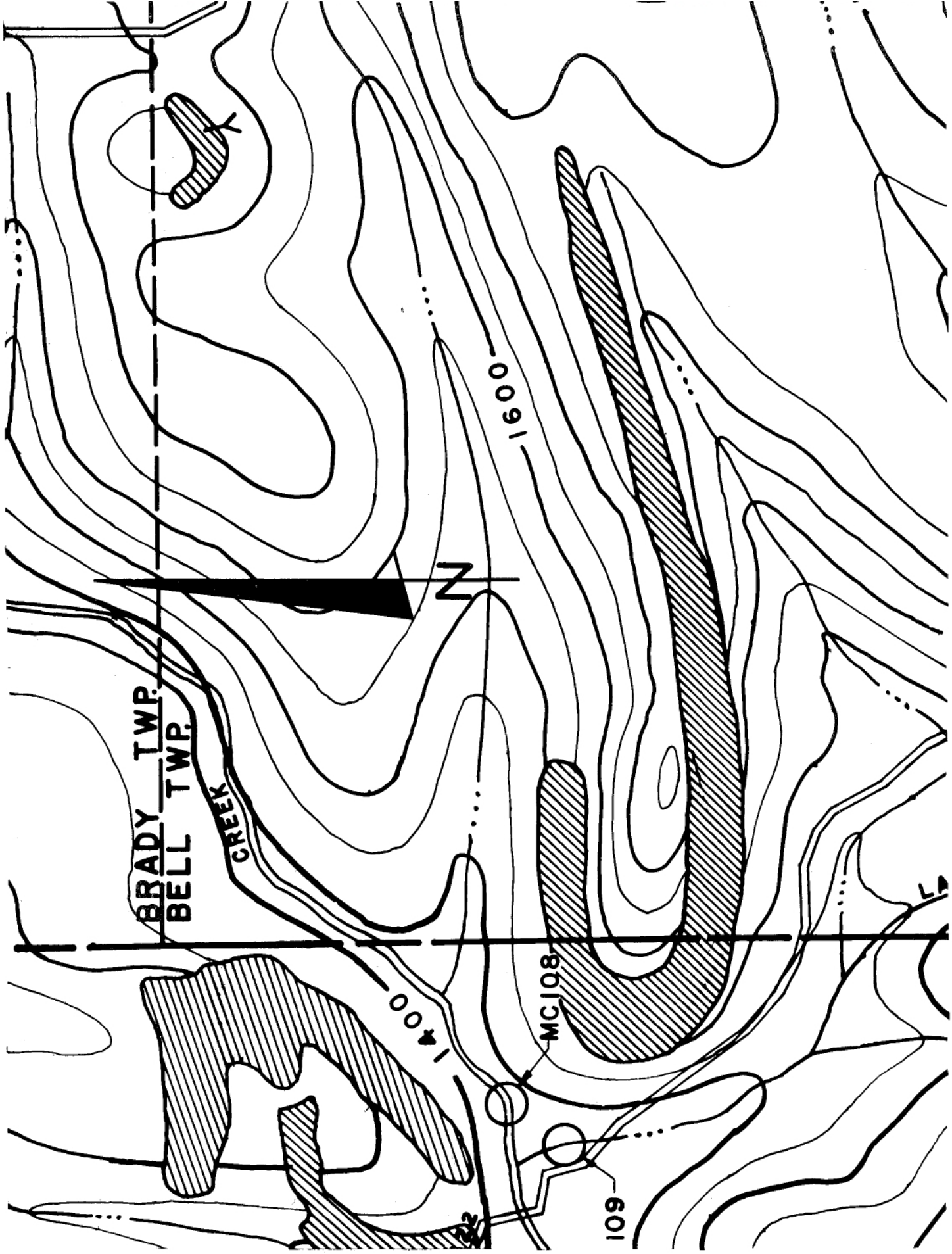
PROJECT AREA NO. 7

Priority No. 9

Location: South of Big Run, Gaskill Township, Jefferson County. This area contains several. small mines in the Lower Kittaning seam of coal. The discharges flow through weirs numbered 60, 61, 62, 63, and 64 into Mahoning Creek. The discharges are slightly acidic. The proposed abatement plans consist of standard surface seals at the above weirs since the areas mined are small. These seals should completely inundate the old mine workings.

COST SCHEDULE

Five Deep Mine Surface Seals @ 1500	7,500
Design, Specifications, and Supervision	1,000
Totals	$8,500



PROJECT AREA No. 8

PROJECT AREA NO. 8

Priority No. Low

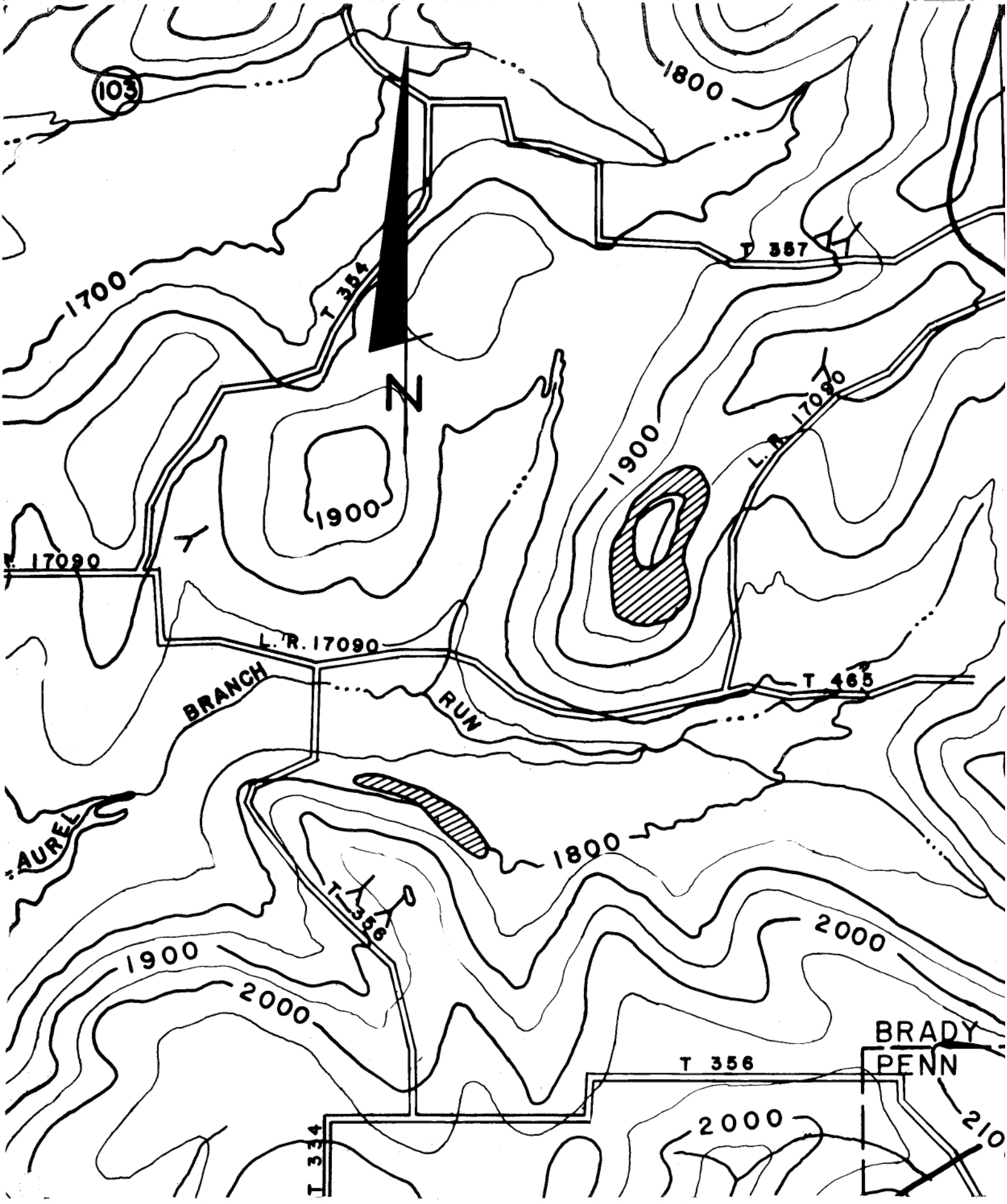
Locations East Branch Mahoning Creek, Henderson Township, Jefferson County, Bell Township Clearfield County.

This area contains 152 acres of abandoned strip mines in the Lower and Upper Freeport seams of coal.. The discharge is basically alkaline.

The proposed abatement plan consists of diversion ditches above the highwall with the construction of flumes to carry the excess runoff from the diversion ditches to a point 'below the toe of the spoil.

COST SCHEDULE

15,000 feet of diversion ditches @ $2.00	30,000
3000 feet of flumes @ $10.00	30,000
Design, Specifications, and Supervision	5,000
Totals	$65,000



PROJECT AREA No.9

PROJECT AREA NO. 9
Priority No. Low

Location: Laurel Branch, Brady Township, Clearfield County. This area contains two abandoned strip mines totaling 17 acres and six small abandoned deep mines in the Lower and Upper Freeport seams of coal. The discharges are basically alkaline and flow into Laurel Branch Run.

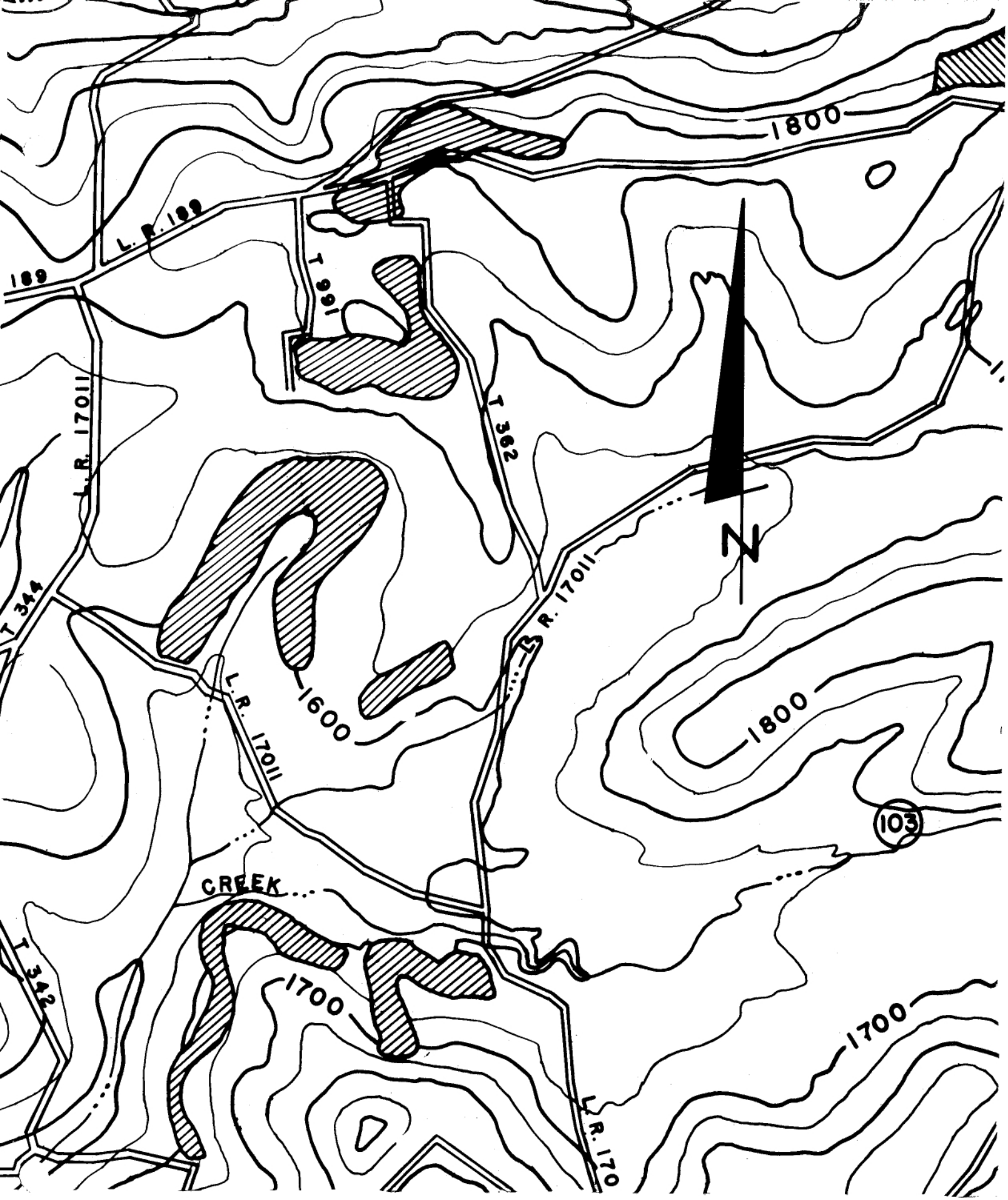
The abatement plans consist of standard terrace backfilling of the strip mined areas and the construction of standard deep mine seals in the deep mine openings. These seals would allow

the water to completely inundate the abandoned deep mine workings.

No slugging index is computed for this area since only small amounts of acid mine drainage were found.

COST SCHEDULE

Backfilling 17 acres @ 1200	20,400
Six surface seals @ 1500	9,000
Design, Specifications, and Supervisions	3.000
Totals	$32,400



PROJECT AREA No. 10

PROJECT AREA NO. 10
Priority No. Low

Location: East Branch-Mahoning Creek, Brady Township, Clearfield County.

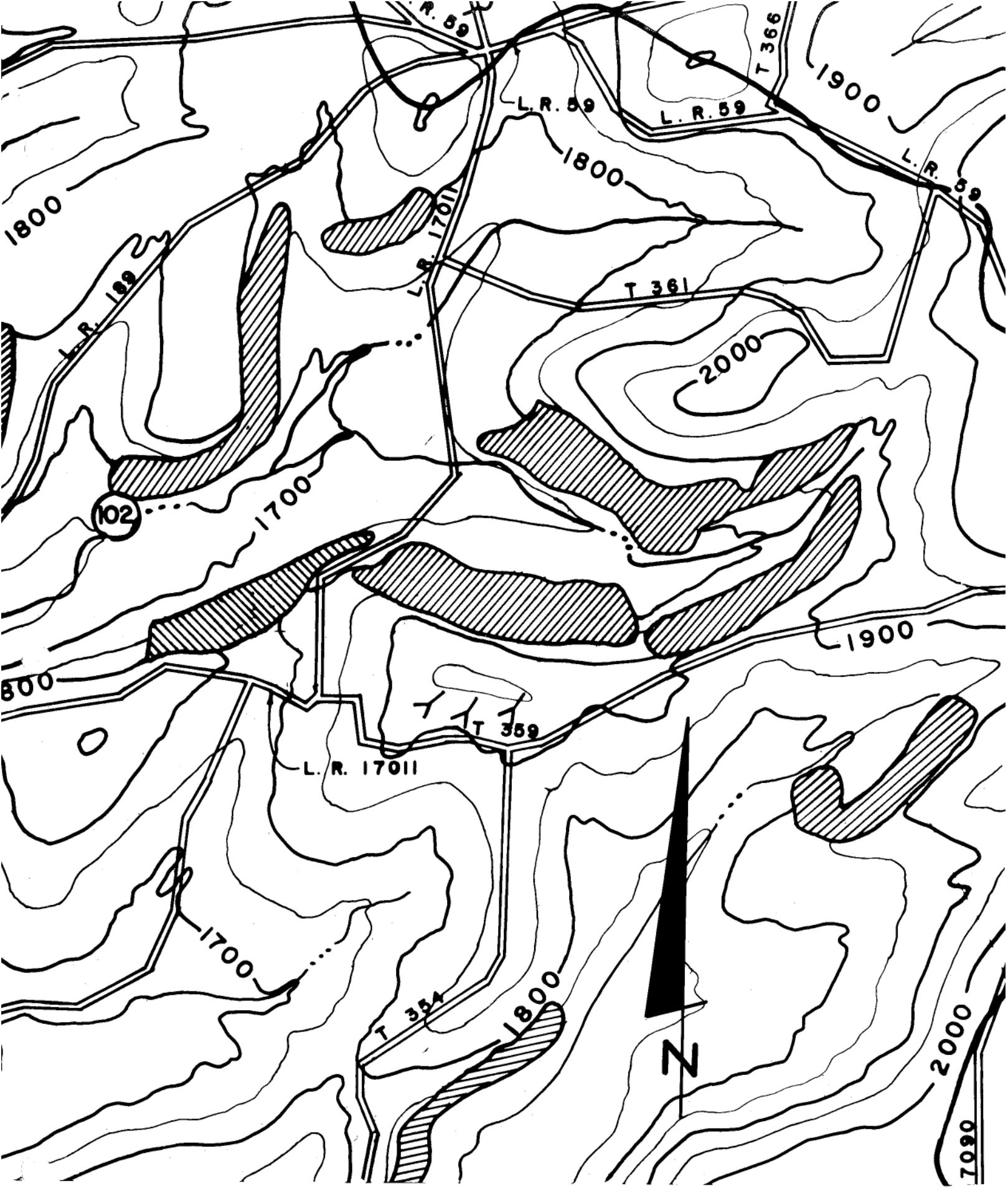
This area contains 93 acres of abandoned strip mines in the Upper and Lower Freeport seams of coal. The discharges are seasonally slightly acidic and flow into the East Branch of Mahoning Creek.

This area is presently being mined and no abatement plans are recommended at the present time. A large portion of the abandoned pits should be backfilled while in the process of taking additional cuts above them. It is our opinion that since these abandoned reaffected pits will be backfilled in compliance with present laws, these areas can be restored at a nominal cost to the Commonwealth with only supervision involved.

Only small amounts of acid are produced with a. slugging index of 4 to 5.

COST SCHEDULE

Supervision and Advisory Charges Per Diem	$150



PROJECT AREA No.11

PROJECT AREA NO. 11

Priority No. Low

Location: Headwaters Stump Creek, Brady Township, Clearfield County. This area contains 128 acres of abandoned strip mines and three small deep mines in the Upper and Lower Freeport seams of coal.

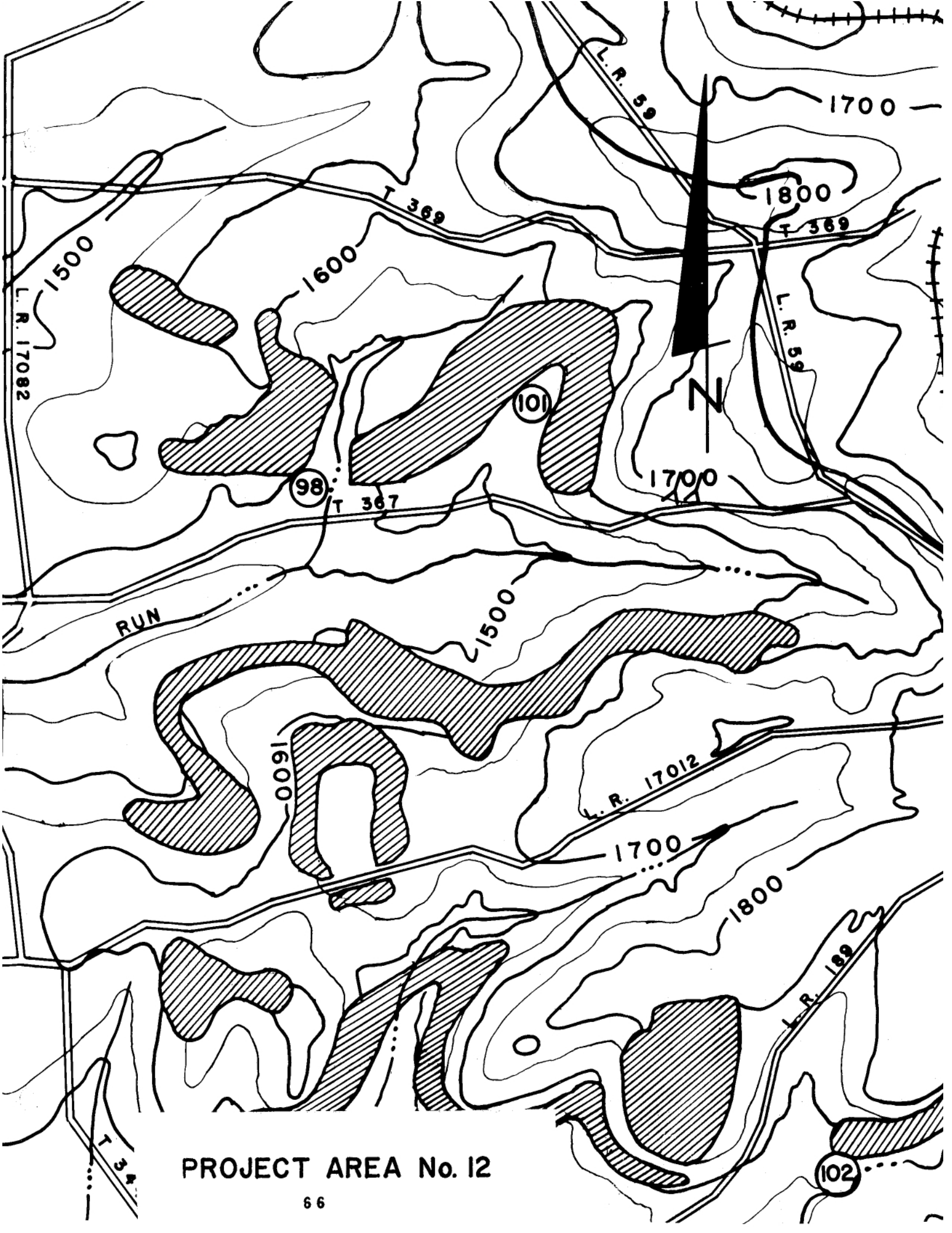
The discharges are basically alkaline but are seasonally slightly acidic and flow into the headwaters of Stump Creek.

The proposed abatement plans will call for diversion ditches across the spoil to prevent siltation of the stream. Standard surface seals in the deep mine openings should completely inundate the abandoned deep mine workings.

No slugging index was computed since the acid discharges were small and the data was insufficient.

COST SCHEDULE

22,000 feet of Diversion ditches @ 2.00	44,000
5000 feet of flumes @ 10.00	50,000
Three surface seals @ 1500	4,500
Design, Specifications, and Supervision	8,000
Totals	$106,500



PROJECT AREA No. 12

PROJECT AREA NO. 12

Priority No. Low

Location: Limestone Run and Stump Creek, Brady Township, Clearfield County.

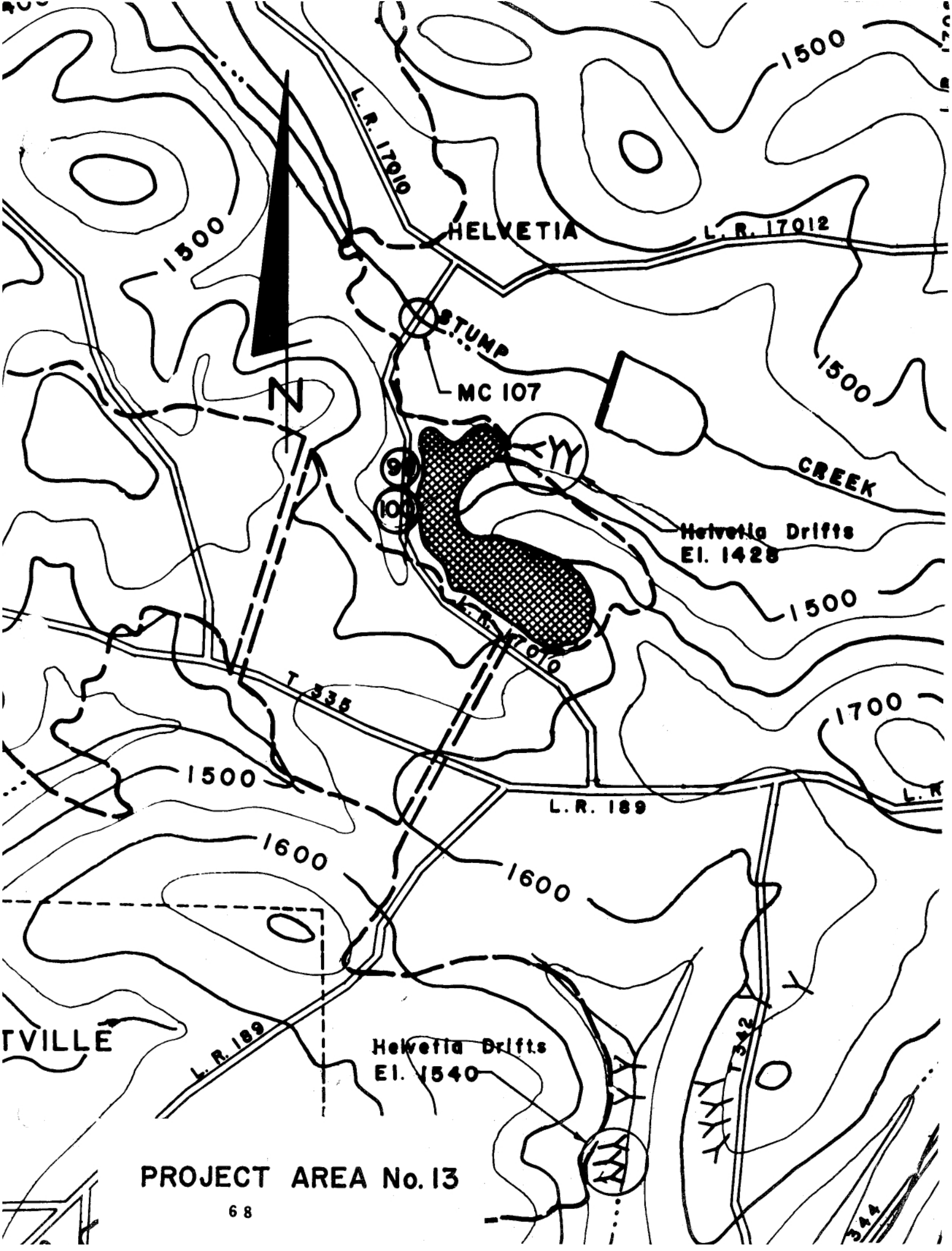
This area contains 243 acres of abandoned strip mines and two small deep mines in the Upper And Lower Freeport seams of coal. The discharges are basically alkaline but are seasonally slightly acidic and flow into Limestone Run and Stump Creek.

The proposed abatement plans call for the construction of diversion ditches above the highwalls and flumes from the diversion ditches to the toe of the spoil to prevent siltation of the stream. Abatement will also require the construction of two surface seals in the deep mine openings. These seals will inundate the deep mine workings.

No slugging index was computed because the acid discharges were small and insufficient data was available.

COST SCHEDULE

45,000 feet of diversion ditches @ 2.00	90,000
10,000 feet of flumes @ 10.000	100,000
Two surface seals @ 1500	3,000
Design, Specifications, Supervision	12,000
Totals	$205,000



PROJECT AREA No. 13

PROJECT AREA NO. 13

Priority No. 2

Location: Helvatia, Brady Township, Clearfield County.

This area consists of 13 drift openings and a 35 acre refuse pile. The drift openings have seasonal acidic discharges and after heavy rains, the refuse pile has a highly acidic runoff which flows through weirs 99 and 100 into Stump Creek.

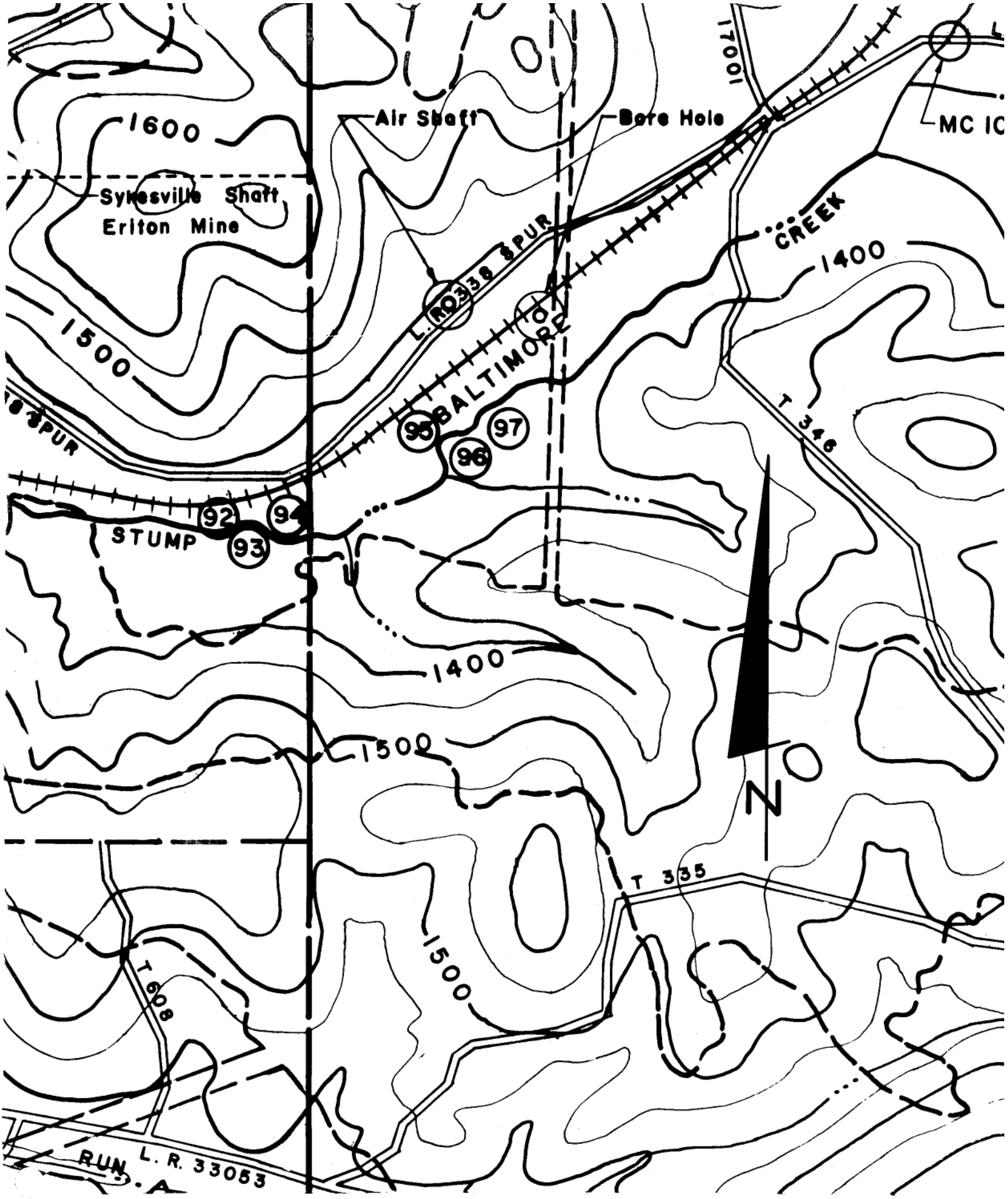
The proposed abatement plans require, first, two standard deep mine seals at the main openings at the refuse pile and the construction of 11 standard surface seals at the remaining openings, and, second, that the refuse pile be leveled, neutralized, and planted. This will prevent large slugs of acid from being dumped into Stump Creek. The deep mine seals would also prevent the infiltration of surface water into the Helvatia mine.

COST SCHEDULE

2 STANDARD Deep mine Seals @ 12,000	24,000
11 Standard Surface Seals @ 750	8,250
Reclamation of the Refuse Pile	35,000
Design, Specifications, and Supervision	5,000
Totals	$72,250

Average Iron lbs/day	2.7
Average Acid lbs/day	19.7
Slugging Index	1.9

Note: The slugging index in our opinion is much higher during heavy runoffs. Because of the limited data available the figure does not reflect the actual amounts discharged.



PROJECT AREA No. 14

PROJECT AREA NO. 14

Priority No. 4

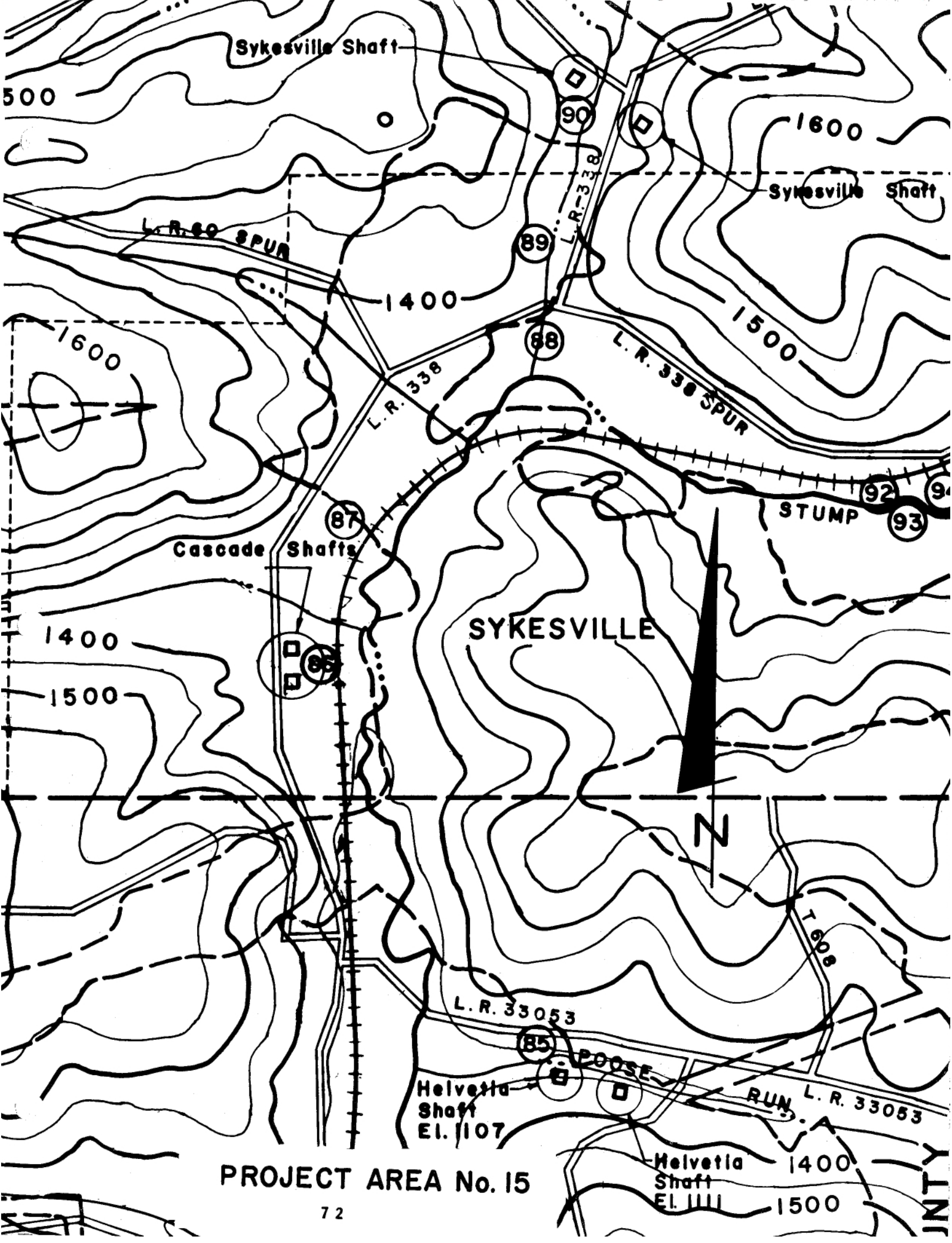
Location: Stump Creek, Brady Township, Clearfield County, and Winslow Township, Jefferson County.

This area contains seven of more boreholes into the Lower Freeport seam of coal. The discharges flow in through weirs numbered 92, 93, 94, 95, 96, and 97 into Stump Creek are basically alkaline, but are high in iron content. These boreholes should be sealed in conjunction with the shafts in Project Area No. 15.

The proposed abatement plans call for sealing these boreholes along with the shafts in Project Area No. 15. Without more information it is difficult to tell what percentage of the abandoned mine workings are presently inundated. However, since the water is only marginally polluted, sealing of the boreholes should particularly improve the acid content at the shafts.

COST SCHEDULE

Sealing seven boreholes @ 5,000	35,000
Design, Specifications, and Supervision	4,000
Totals	$39,000



PROJECT AREA No. 15

PROJECT AREA NO. 15

Priority No. 3

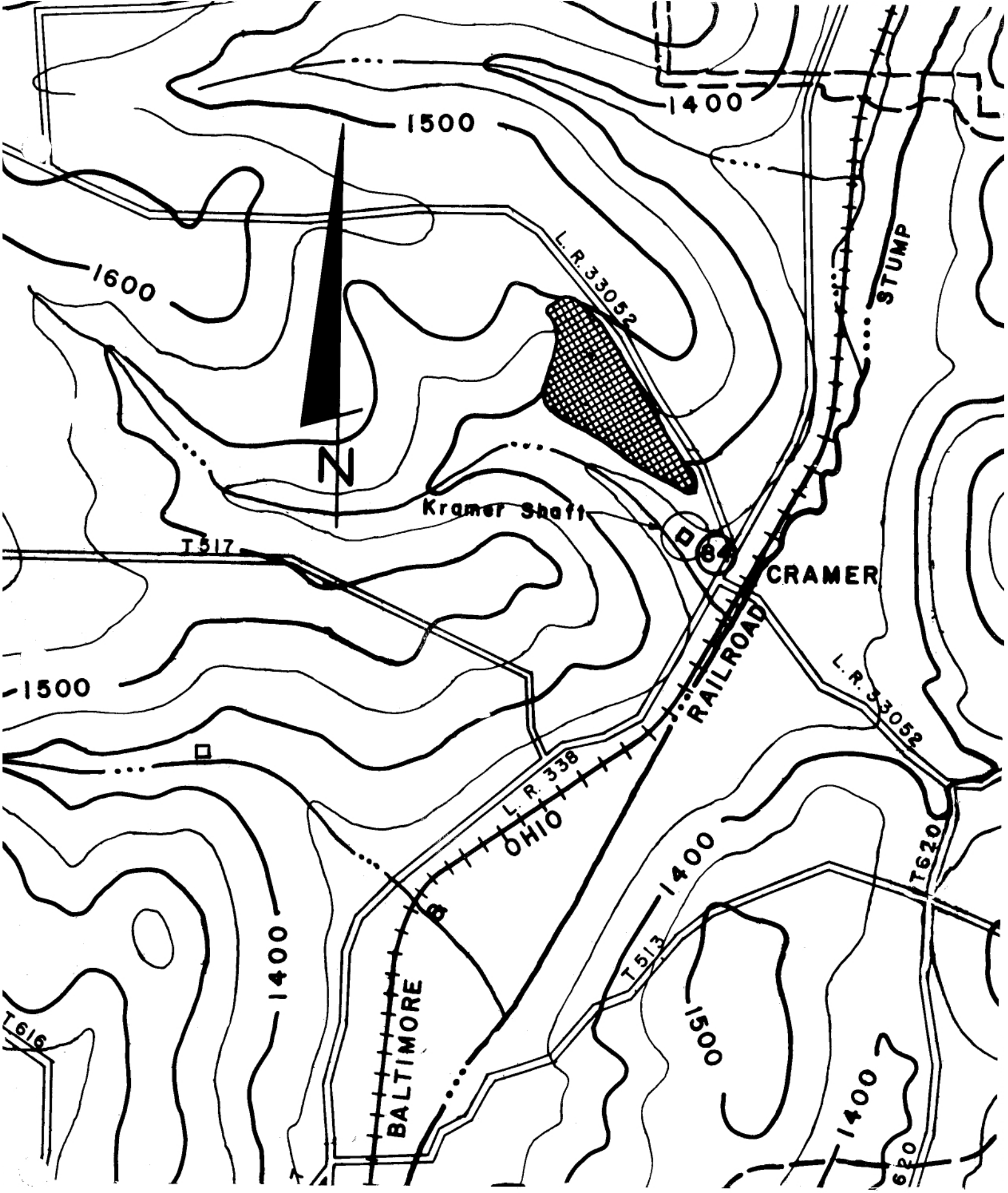
Location: Sykesville, Winslow Township, Jefferson County,

This area contains four shafts into the Lower Freeport seam of coal at weirs 86, 89, and 90. The large discharges flow through weirs 87, 88, 89, 90, and 91 into Sugarcamp Run and Stump Creek. These discharges contribute by far the largest amount of acidity and iron in the area under study.

The proposed abatement plan is to seal these four shafts in conjunction with the boreholes in Project Area No. 14. In addition, a standpipe is to be constructed at the Sykesville shaft to control the head of the water to be impounded. It is our opinion that the head should be limited to a maximum of 60 feet to prevent breakouts. It is impossible to completely inundate the old workings because of the steep rise of the coal seam on both sides of the syncline. This would require a head of water of over 200 feet. It is not possible to determine the extent of the present mine pool without further exploratory work, because of possible caves with resultant dams and without knowing the integrity of the barrier pillars. However, the further flooding of the abandoned workings and the sealing of the shafts should result in considerable improvement of the water quality of these discharges which contribute the main portion of the pollution in Mahoning Creek.

COST SCHEDULE

Four shaft seals @ 80,000	320,000
Standpipe Construction	60,000
Design, Specifications, and Supervision	38,000
	$418.000



PROJECT AREA No. 16

PROJECT AREA NO. 16

Priority No. 7

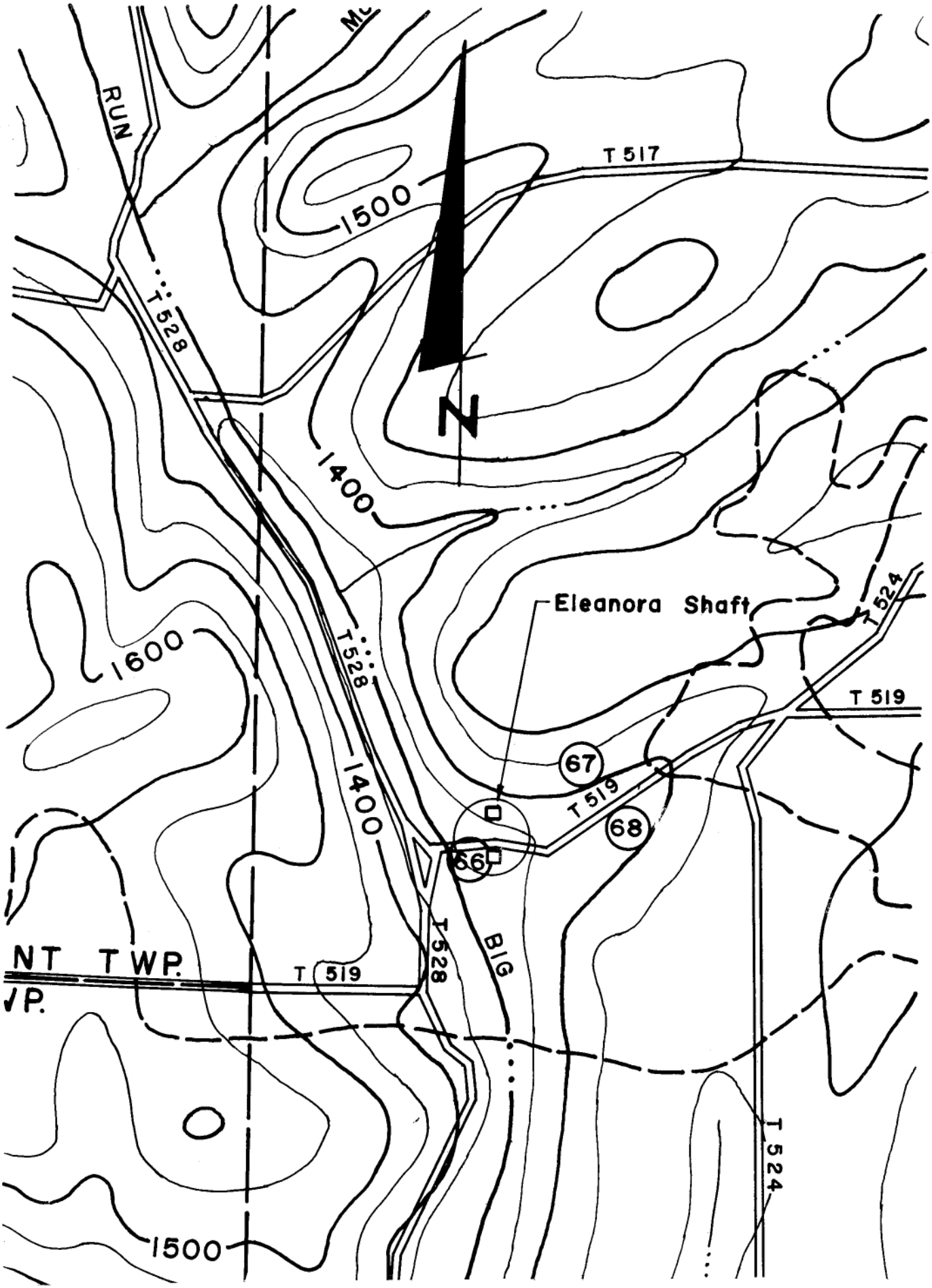
Location: Carmer, Henderson Township, Jefferson County.

This area contains two shafts at weir 84 into the Lower Freeport seam of coal and a 22 acre refuse pile which is the source of some acid pollution during hard rains. The discharge from the deep mine flows into Stump Creek through weir 84. Although it is alkaline in quality, the iron content is high and is dropping the iron in the stream.

The proposed abatement plans call for sealing the shafts and leveling, neutralizing, and planting the refuse pile. It is difficult to map the extent of the present mine pool without further exploratory work. However, since the barrier pillars appear to be intact, sealing of the shafts should inundate most of the old abandoned mine workings with a resultant decrease in the iron discharge.

COST SCHEDULE

Reclamation of Refuse Pile @ 550 per acre	12,100
Shaft Seals @ 50,000	100,000
Design, Specifications, and Supervisions	10,000
Totals	$122,100



PROJECT AREA No. 17

PROJECT AREA NO. 17

Priority No. 6

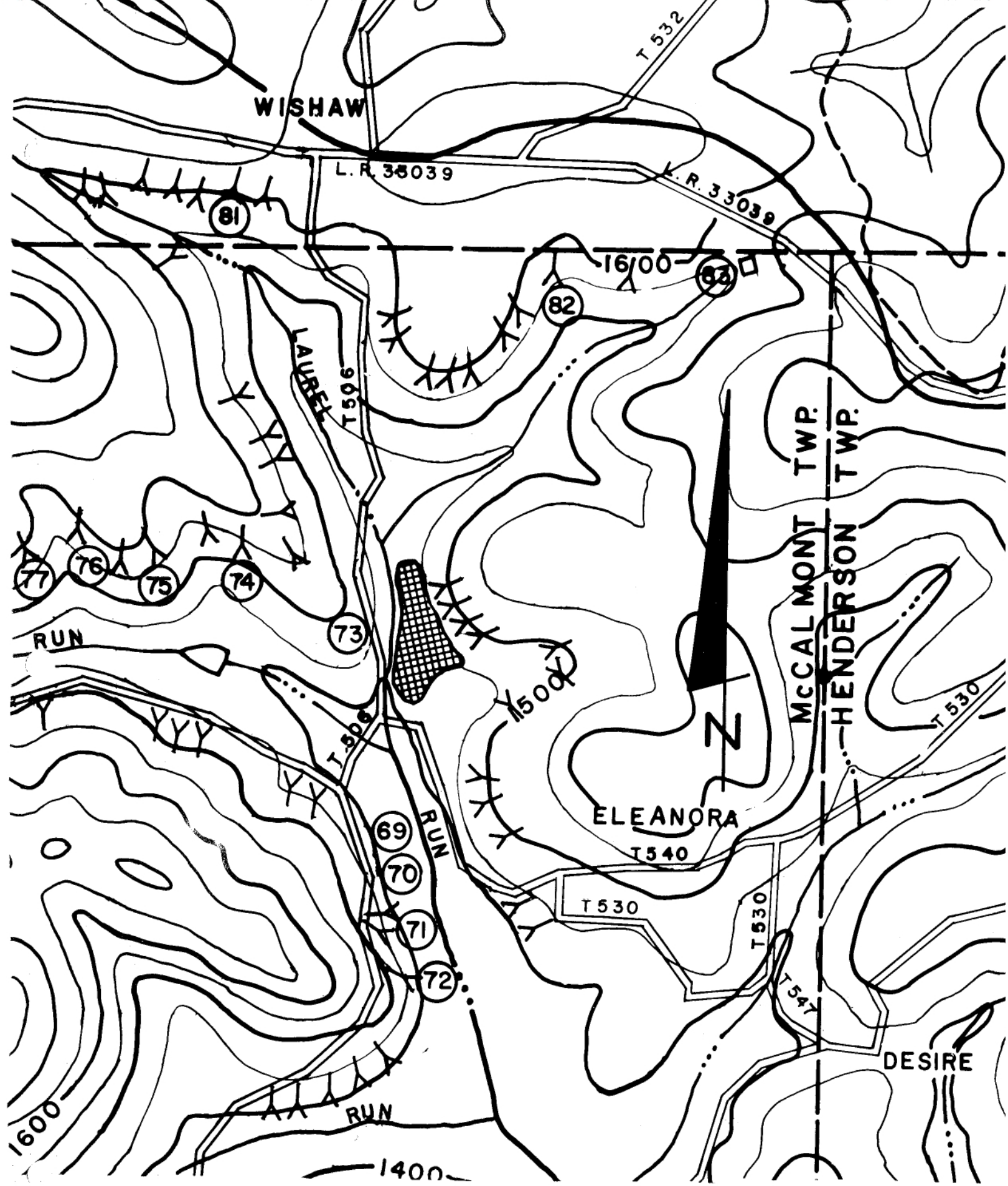
Location: Eleanora, Henderson Township, Jefferson County.

This area contains a shaft at weir 66 into the Lower Freeport seam of coal and a 5 acre refuse pile. The discharges from this mine flow through weirs numbered 66, 67, and 68 and are alkaline; however, they have a high iron content and a seasonal acid discharge from the refuse pile which flow into Big Run.

The proposed abatement plans call. for sealing the outlet pipes at the shaft and the shaft itself. This would inundate a portion of the old works causing the water to discharge about 50 feet higher. This would improve the quality of the water flowing into Big Run. It is proposed to level, neutralize, and plant the refuse pile.

An alternative plan would be to close the outlet pipes and allow the water to overflow the collar of the shaft and construct a pond in which to precipitate the iron.

COST SCHEDULE	
Shaft Seal @ 75,000	75,000
Refuse Pile Reclamation @ 750 per acre	3,750
Design, Specifications, and Supervision	8,000
Totals	$86,750
Alternative Plan	
Seal Outlet Pipes	5,000
Construction of Dam	50,000
Refuse Pile Reclamation	3,750
Design, Specifications, and Supervision	29,000
Totals	$77,750



PROJECT AREA No. 18

PROJECT AREA NO. 18

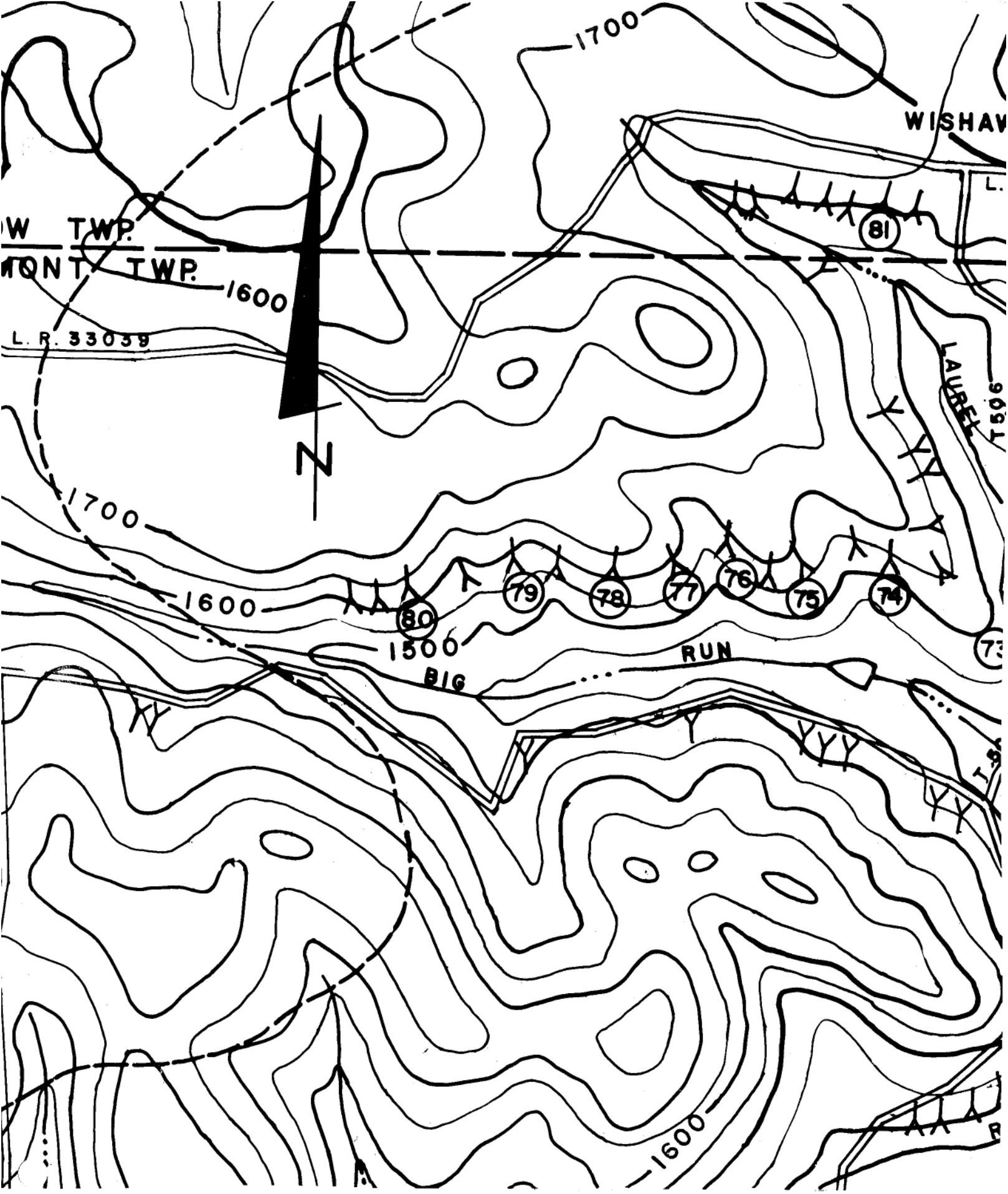
Priority No. Low
Locations Wishaw, McCalmont Township, Jefferson County.

This area contains numerous small deep mines in the Upper and Lower Freeport seams of coal and a ten acre refuse pile, The discharges from these mine workings are predominately alkaline, but the discharge from the refuse pile is seasonally acidic and flows into Laurel Run.

Since the stream is a. good trout stream, the proposed abatement plan is of a, low priority. It calls for reclaiming the refuse pile and for constructing standard surface seals in the deep mine openings. These seals should completely inundate the abandoned mine workings.

COST SCHEDULE

15 Surface Seals @ 1500	22,500
Refuse Pile Reclamation @ 500 per acre	5,000
Design, Specifications, and Supervision	3,000
Totals	$30,500



PROJECT AREA No. 19

PROJECT AREA NO. 19
Priority No. Low

Location: Wishaw, McCalmont Township, Jefferson County.

This area contains numerous small abandoned deep mines in the Upper Freeport seam of coal. The discharges are alkaline in quality and flow into Laurel and Big Runs which have excellent trout fishing.

The proposed abatement plans have a low priority. These call for constructing standard surface seals to prevent siltation and possible future pollution. These seals should completely inundate the old mine workings.

COST SCHEDULE

34 Surface Seals @ 1000	34,000
3 Standard Deep Mine Seals @ 6000	18,000
Design, Specifications, and Supervision	5,000
Totals	$47,000