5A. Upper Portion, Main Stream, Two Lick Creek Watershed

a. General

The upper portion of the main stream of Two Lick Creek is located between Wandin Junction and the breast of the Two Lick Creek Dam.

Major tributaries discharging into this portion of Two Lick Creek are: North and South Branches, Buck Run, Dixon Run, and Penn Run. As previously described, the above tributaries are excluded from this portion and are treated as separate watersheds earlier in this section of the report.

The total stream length including all tributaries, except those mentioned above, is approximately 34.5 miles. Total area is approximately 19.4 square miles.

Principal tributaries involved in the above figures are: Browns Run, Sample Run, and Allen Run.

b. Stream Condition

An analysis of mine drainage contamination within the watershed provides the following breakdown on stream condition.

Approximately 47 percent of the watershed is seriously degraded by mine drainage pollution. About 30 percent of the main stream is severely polluted and the remaining 17 percent is moderately polluted.

Sample Run, which is severely polluted, contributes most of the mine drainage pollution to this portion of the main stream (excluding the major watersheds).

Plate 43 show the locations of sampling stations and the extent of mine drainage pollution within the watershed.

Table 45

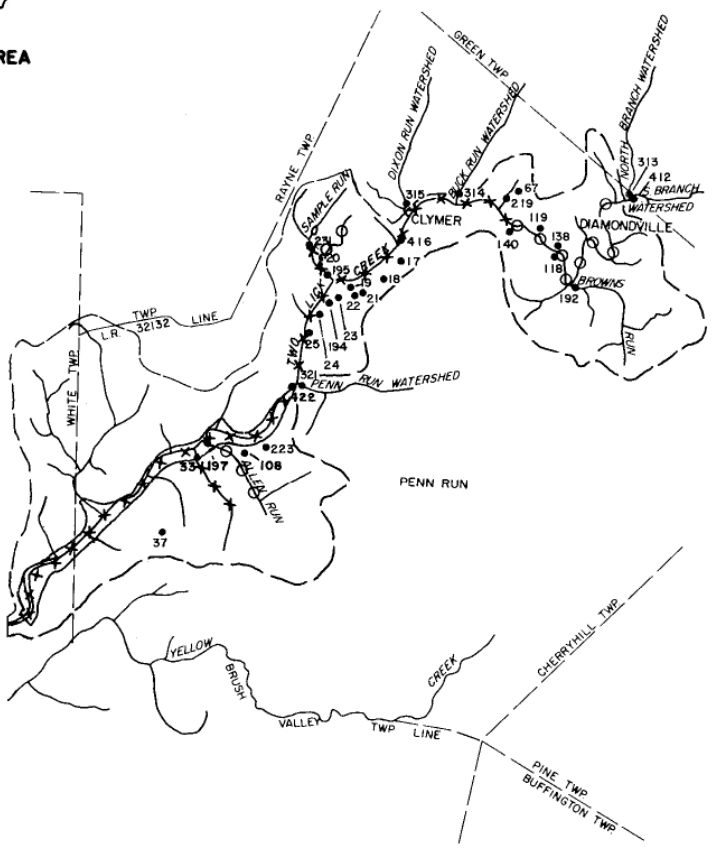
Stream Condition

Upper Portion, Main Stream, Two Lick Creek Watershed

Stream Classification	Stream Length Miles	Percent Total Stream Length
Non-Polluted	18.3	53
Severely Polluted	10.5	30
Moderately Polluted	5.7	17

MAIN STREAM
UPPER PORTION: TWO LICK CREEK WATERSHED

WATERSHED AREA



LEGEND

- TWO LICK CREEK DRAINAGE BASIN
- • SAMPLING STATION
- O MODERATELY ACID
- × SEVERELY ACID

1 0 2 MILES
SCALE

MARCH 1970

PREPARED BY		PREPARED FOR
L. ROBERT KIMBALL *Consulting Engineers* EBENSBURG, PENNSYLVANIA	TWO LICK CREEK MINE DRAINAGE POLLUTION ABATEMENT PROJECT INDIANA COUNTY, PENNSYLVANIA	PENNSYLVANIA DEPARTMENT OF MINES AND MINERAL INDUSTRIES

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c. Sampling Station Data

Twenty-six (26) sampling stations were installed and monitored. The minimums, maximums, and yearly averages of water quality data obtained from these stations are listed in Table 46 on Page 162.

Plate 44 graphically illustrates the monthly relationship between stream flow, contamination load, and weather elements within the watershed based on measurements taken at Sampling Station #422 located above the headwaters of the Two Lick Creek Dam. It should be noted that the measurements include the pollution load contributed by the upstream major tributaries.

Flow and pollution loads vary corresponding with rainfall and temperature. Peak flow and pollution load occurred during the months of April and May when the runoff was the greatest.

The lowest pH levels were reached during the fall months when flow was low and the acid load was concentrated.

The pollution load in Two Lick Creek reaches its first high peak at Sampling Station #422. From this station downstream to the junction of Yellow Creek, the pollution load decreases due to the following factors: (1) Two Lick Creek Dam acts as a large settling basin; (2) Several non polluted tributaries enter the main stream; (3) A minimum amount of mine drainage enters the main stream; and (4) Indiana Borough's raw sewage enters the main stream at Sampling Station #419.

Upper Two Lick Creek as measured at Sampling Station #422 contributed the following percentages of flow and pollution load to the total pollution load measured downstream at Sampling Station #419: Flow - 48%; Acidity - 302%; Iron - 780%; and Sulfate 111%.

An average flow of approximately 33,711,000 gallons of water per day was measured at Sampling Station #422 during the study period.

d. Coal Mining Activity General

The area has been mined from about 1905 to the present time. Map Sheets 2 , 3, 6 , and 7 , Appendix A show the locations and extent of both deep and strip mines.

Deep Mines

Five (5) deep mines are presently in operation within this portion of the Two Lick Creek Watershed. They are: M. and Y. #1, Chestnut Ridge, Peles Brothers, Penn Hill #2, and Dixon Run #1. Drainage from these mines is presumably being treated in accordance with state law.

Table 46 Continued

Water Quality Data

Upper Portion, Main Stream, Two Lick Creek

Sampling Station	Flow GPM	pH Range	Acid Load Lbs./Day	Acidity Mg./L.	Iron Mg./L.	Sulfate Mg./L.
192	Max. 1,017	4.9 - 5.5	20	Max. 12	Max. 1	Max. 40
	Min. 48			Min. 2	Min. 0	Min. 8
	Ave. 195			Ave. 8	Ave. 0.4	Ave. 19
140	Max. 93	2.8 - 3.9	1,452	Max. 5,000	Max. 1,750	Max. 12,000
	Min. 1			Min. 2,042	Min. 625	Min. 3,000
	Ave. 36			Ave. 3,317	Ave. 1,174	Ave. 7,229
138	Max. 745	3.1 - 4.1	1,691	Max. 1,500	Max. 450	Max. 3,600
	Min. 3			Min. 434	Min. 50	Min. 900
	Ave. 255			Ave. 549	Ave. 220	Ave. 2,370
119	Max. 346	2.9 - 4.5	2,731	Max. 2,700	Max. 400	Max. 3,900
	Min. 2			Min. 560	Min. 5	Min. 1,800
	Ave. 256			Ave. 883	Ave. 169	Ave. 2,443
118	Max. 548	3.3 - 5.5	1,225	Max. 1,160	Max. 520	Max. 3,000
	Min. 200			Min. 98	Min. 6	Min. 375
	Ave. 335			Ave. 303	Ave. 189	Ave. 2,170
108	Max. 445	3.9 - 5.3	21	Max. 110	Max. 3	Max. 1,030
	Min. 1			Min. 19	Min. 0.3	Min. 200
	Ave. 38			Ave. 47	Ave. 2	Ave. 541
67	Max. 23	3.2 - 4.5	5	Max. 108	Max. 60	Max. 450
	Min. 1			Min. 40	Min. 1	Min. 150
	Ave. 6			Ave. 65	Ave. 17	Ave. 287
37	Max. 314	4.5 - 6.1	3	Max. 60	Max. 5	Max. 1,750
	Min. 1			Min. 4	Min. 0.2	Min. 100
	Ave. 18			Ave. 15	Ave. 0.5	Ave. 212

Table 46 Continued

Water Quality Data

Upper Portion, Main Stream, Two Lick Creek

Sampling Station	Flow GPM	pH Range	Acid Load Lbs./Day	Acidity Mg./L.	Iron Mg./L.	Sulfate Mg./L.
33	Max. 139	3.5 - 4.5	449	Max. 880	Max. 150	Max. 2,275
	Min. 15			Min. 260	Min. 5	Min. 700
	Ave. 88			Ave. 421	Ave. 43	Ave. 1,637
25	Max. 314	4.4 - 6.7	9	Max. 54	Max. 1	Max. 2,400
	Min. 20			Min. 2	Min. 0.05	Min. 425
	Ave. 70			Ave. 10	Ave. 0.2	Ave. 1,385
24	Max. 115	3.2 - 5.5	8	Max. 600	Max. 12	Max. 1,850
	Min. 1			Min. 8	Min. 0	Min. 200
	Ave. 15			Ave. 45	Ave. 2	Ave. 587
23	Max. 66	2.7 - 4.9	83	Max. 940	Max. 700	Max. 6,200
	Min. 1			Min. 18	Min. 1	Min. 625
	Ave. 21			Ave. 335	Ave. 177	Ave. 2,170
22	Max. 48	2.5 - 4.5	47	Max. 990	Max. 94	Max. 4,500
	Min. 6			Min. 20	Min. 2	Min. 400
	Ave. 15			Ave. 264	Ave. 53	Ave. 1,358
21	Max. 101	2.1 - 4.5	240	Max. 2,250	Max. 375	Max. 6,500
	Min. 2			Min. 390	Min. 1	Min. 1,000
	Ave. 26			Ave. 752	Ave. 306	Ave. 2,789
20	Max. 115	3.4 - 5.1	56	Max. 510	Max. 32	Max. 1,520
	Min. 1			Min. 10	Min. 1	Min. 225
	Ave. 27			Ave. 173	Ave. 7	Ave. 546
19	Max. 200	3.1 - 5.0	173	Max. 400	Max. 100	Max. 3,000
	Min. 20			Min. 28	Min. 2	Min. 90
	Ave. 65			Ave. 220	Ave. 37	Ave. 2,110

Table 46

Water Quality Data

Upper Portion, Main Stream, Two Lick Creek

Sampling Station		Flow GPM	pH Range	Acid Load Lbs./Day		Acidity Mg./L.		Iron Mg./L.		Sulfate Mg./L.
422	Max.	130,464	3.4 - 5.3	29,685	Max.	1,040	Max.	110	Max.	1,600
	Min.	3,943			Min.	20	Min.	3	Min.	0
	Ave.	19,007			Ave.	129	Ave.	39	Ave.	589
416	Max.	98,919	3.3 - 5.5	12,042	Max.	190	Max.	32	Max.	1,300
	Min.	1,431			Min.	6	Min.	1	Min.	70
	Ave.	16,863			Ave.	59	Ave.	25	Ave.	351
231	Max.	7	3.0 - 3.6	405	Max.	14,300	Max.	2,080	Max.	25,000
	Min.	1			Min.	1,330	Min.	1	Min.	6,750
	Ave.	4			Ave.	8,617	Ave.	351	Ave.	19,349
223	Max.	20	3.6 - 4.5	35	Max.	470	Max.	175	Max.	2,000
	Min.	1			Min.	225	Min.	50	Min.	700
	Ave.	9			Ave.	321	Ave.	121	Ave.	1,471
219	Max.	139	3.2 - 5.0	140	Max.	715	Max.	12	Max.	3,000
	Min.	24			Min.	0	Min.	1	Min.	410
	Ave.	60			Ave.	194	Ave.	5	Ave.	1,417
197	Max.	2,223	4.0 - 5.3	69	Max.	24	Max.	0.3	Max.	760
	Min.	21			Min.	4	Min.	0	Min.	200
	Ave.	511			Ave.	7	Ave.	0.2	Ave.	345
195	Max.	206	3.0 - 3.8	5,505	Max.	37,800	Max.	9,200	Max.	80,000
	Min.	3			Min.	900	Min.	2,300	Min.	15,500
	Ave.	34			Ave.	13,545	Ave.	4,846	Ave.	45,620
194	Max.	6	3.8 - 5.1	2	Max.	54	Max.	2	Max.	1,200
	Min.	1			Min.	38	Min.	1	Min.	500
	Ave.	3			Ave.	54	Ave.	1	Ave.	951

STATION 422 TWO LICK CREEK RELATIONSHIP (Upper Portion) BETWEEN STREAM FLOW, POLLUTION LOAD AND WEATHER ELEMENTS

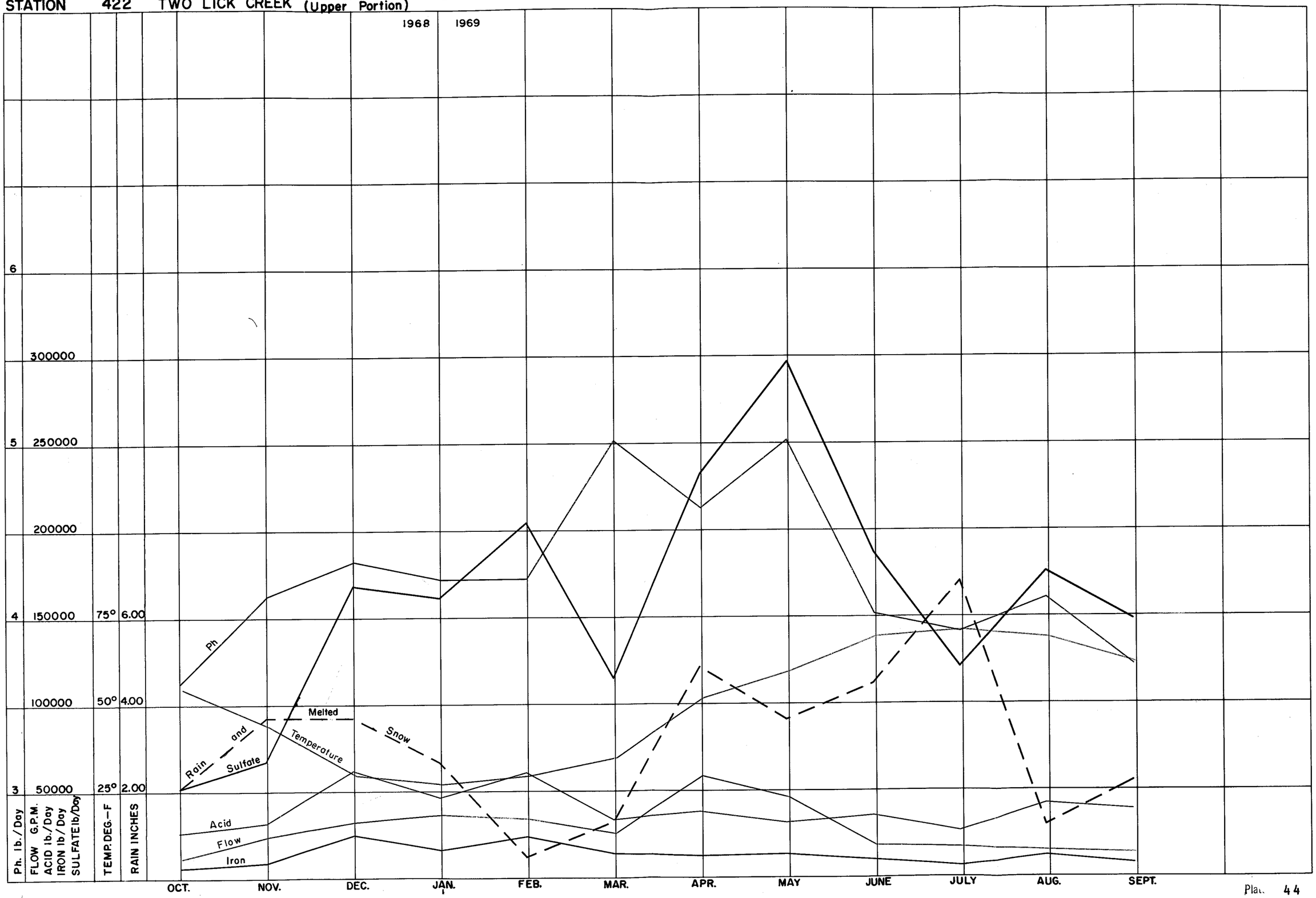


Plate 44

Table 47 below lists the abandoned mines and the following information: Type of opening, total number of openings, seam mined, maximum head, whether or not the mine is draining water, and number of apes mined.

Table 47

Abandoned Mines

Upper Portion, Main Stream, Two Lick Creek Watershed

Name of Mine	Type of Opening	Seam Mined	Draining Water	Total No. Openings	Area Mined (Acres)	Maximum Head (Feet)
1. Clymer #1*	Slope	D	X	6	309	10
2. Clymer #2	Slope	B	-	3	650	-
3. Swank #6	Drift	B	X	5	300	28
4. Cherryhill #1	Drift	B	X	8	477	30
5. Cherryhill #3	Drift	B	X	2	361	136
6. Victor #47	Drift	B	X	1	84	15
7. Mack #2	Drift	B	X	3	662	167
8. Wachisn	Drift	D	X	2	17	5
9. Penn Hill #1	Drift	B	X	2	130	80
10. Lydick #1	Drift	B	-	1	9	-
11. Enterprise	Drift	B	-	1	2	-
12. Peles	Drift	B	-	3	5	-
13. Yanity	Drift	B	-	3	98	-
14. J. Ralston	Drift	B	X	3	9	-
15. Turnbull	Drift	B	-	2	3	-

*Indicates drainage toward and discharge into Crooked Creek Watershed near Tanoma.

The Clymer #1 complex is the most extensive and portions of its workings lie outside of the watershed area. Water from this mine is draining away from the openings following the dip of the coal and is discharging from a bore hole located near Tanoma into the Crooked Creek Watershed.

The majority of the complexes are sources of mine drainage. These sources are further described in Paragraph e.

Strip Mines

Approximately 148 acres have been stripped in this portion of the Two Lick Creek Basin. Most of the strip mining took place in the late 1950's and early 1960's. There are several strips presently in operation in which coal that was previously unattainable is now being mined by utilizing modern equipment and techniques.

Most of the coal in this area outcrops on very steep slopes averaging about 40 percent in grade. Consequently, the earlier strip cuts drastically disturbed the area as little backfilling was attempted and much spoil was spilled or eroded down the steep hillsides.

Many of the highwalls are in excess of 50 feet and narrow in width. Several strips broke into or cut close to old deep mine workings, and as a result, water from the old workings is draining over and through the stripped areas compounding contamination. In several strips, additional coal was mined by coal augering, which in some cases, also broke into the deep workings further complicating the mine drainage problem.

The older strips are sparsely revegetated and consequently severe erosion and runoff is prevalent in periods of high rainfall.

e. Description of Mine Drainage Sources

The major mine drainage sources are listed on the following two pages in Table 48 beginning with the most serious contributor of acid load. Each source is associated with the sampling stations measuring the mine drainage and the respective contamination load. Plates 45, 46, 47, 48, 49, and 50 show the locations of the various sources.

Deep mines that are interconnected are listed collectively as one source. Combined maximum heads are given for deep mines that are discharging mine drainage.

Table 48

Major Mine Drainage Sources

Upper Portion, Main Stream, Two Lick Creek Watershed

Source Description	Flow GPM	Sampling Station(s)	Pollution Load - Lbs./Day Acid	Iron	Sulfate	Combined Maximum Head (Feet)
1. Clymer #1 and #2 Coal Refuse Piles	30	195 (Minus 231)	5,100	1,953	17,631	-
2. Mack #2 Mine	255	138	1,692	763	7,307	167
3. Swank #6 Mine	36	140	1,452	514	3,165	28
4. Cherryhill #3 Mine	335	118	1,225	763	8,773	136
5. Mack #2 Coal Refuse Pile	1	119 (Minus 138)	1,039	0	251	-
6. Sample Run Coal Refuse Pile	70	Catch Samples Estimated	841	50	1,847	-
7. Cherryhill #1 Strip Mine	1,000	25, 19, plus Estimate	600	20	4,000	-
8. Cherryhill #1 Mine Victor #47 Mine	93	17, 18, 21, 22, 23, 24, and 194	405	154	2,100	30
9. Active Strip Mine Active Peles Brothers Mine	89	33	449	46	1,687	-
10. Clymer #1 Mine	4	231	405	16	910	10
11. Rodkey "B" Seam Strip Mine	1,125	Estimated Plus 219 (Minus 67)	270	4	1,997	-

Table 48 Continued

Major Mine Drainage Sources

Upper Portion, Main Stream, Two Lick Creek Watershed

Source Description	Flow GPM	Sampling Station(s)	Pollution Load - Lbs./Day Acid	Iron	Sulfate	Combined Maximum Head (Feet)
12. Dixon Run #1 Strip Mine	834	Estimate	200	5	1,000	-
13. Lydic Strip Mine	208	Estimate	50	2	500	-
14. Clymer #2 Active Strip Mine	208	Estimate	50	2	500	-
15. Penn Hill #1 Mine	9	223	35	13	160	80
16. Cherryhill #3 Coal Refuse	208	Estimate	25	3	200	-
17. Allen Run and Chestnut Ridge Strip Mines	38	108	21	1	248	-
18. Yanity #1 Strip Mine	125	Estimate	15	0	150	-
19. Wachisn Mine	6	67	5	1	21	5
20. Swank #6 Refuse Pile	38	Estimate	4	0	100	-

UPPER TWO LICK CREEK

LEGEND

- KITTANNING SEAM
- FREEPORT SEAM
- UPPER FREEPORT (E) SEAM
- LOWER FREEPORT (D) SEAM
- LOWER KITTANNING (B) SEAM
- COAL REFUSE AREA (NEW)
- COAL REFUSE AREA (OLD)
- STRIP MINE AREA
- SAMPLING STATION
- DIAMOND DRILL HOLE
- MINE OPENING (DRY)
- MINE OPENING (DRAINING)
- WATERSHED PERIMETER (EXTERIOR)
- WATERSHED PERIMETER (INTERIOR)
- COAL CONTOUR LOWER KITTANNING SEAM
- COAL CONTOUR LOWER KITTANNING SEAM (COAL MISSING DUE TO EROSION)

TWO LICK CREEK MINE DRAINAGE POLLUTION ABATEMENT PROJECT

INDIANA COUNTY, PENNSYLVANIA

PROJECT Nº SL109

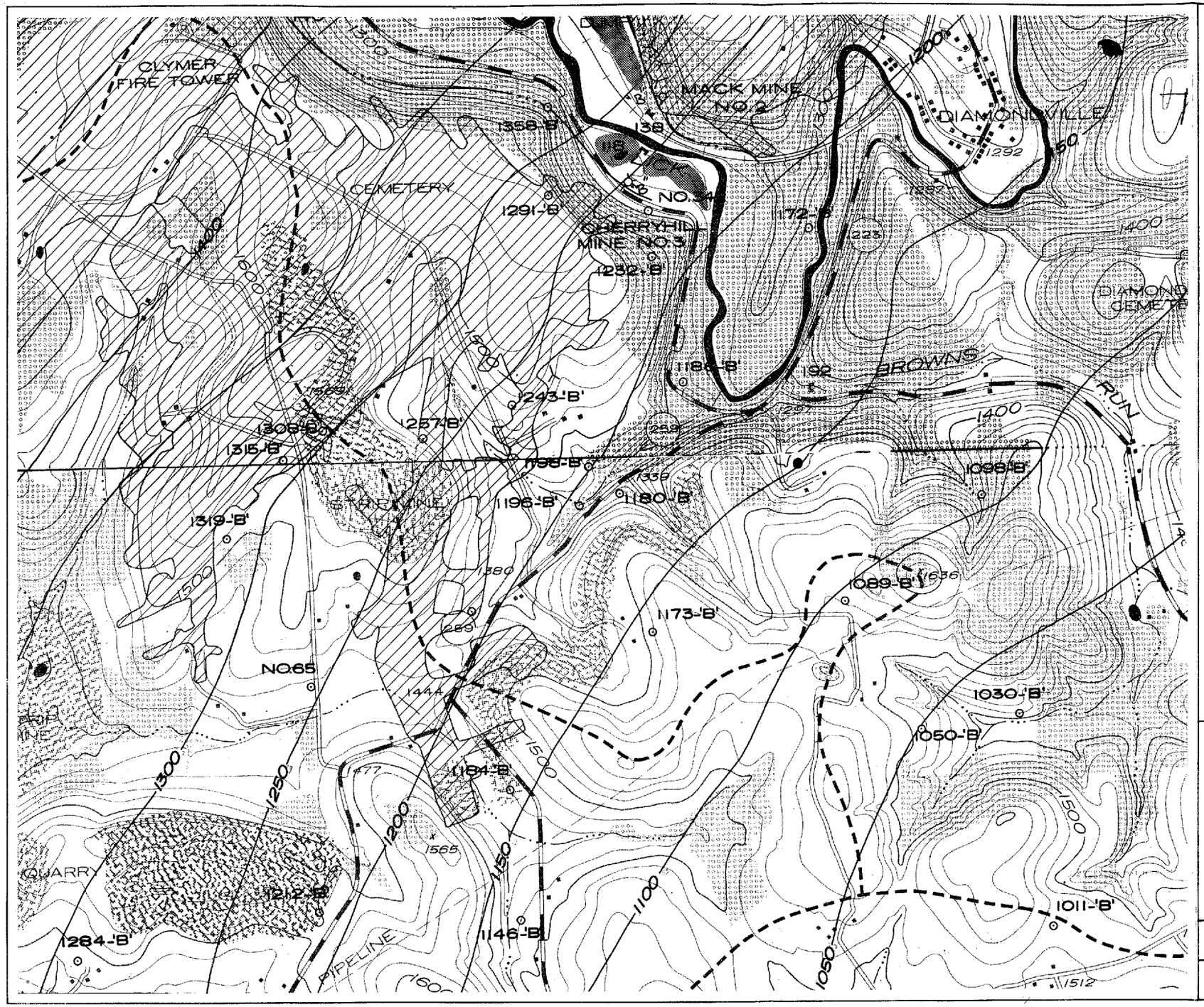
INVENTORY MAP

0 500 1000 1500 SCALE IN FEET

MARCH, 1970

L. ROBERT KIMBALL
Consulting Engineers
EBENSBURG, PENNSYLVANIA

SHEET Nº



UPPER TWO LICK CREEK

2

LEGEND

- KITTANNING SEAM
- FREEPORT SEAM
- UPPER FREEPORT (E) SEAM
- LOWER FREEPORT (D) SEAM
- LOWER KITTANNING (B) SEAM
- COAL REFUSE AREA (NEW)
- COAL REFUSE AREA (OLD)
- STRIP MINE AREA
- SAMPLING STATION
- DIAMOND DRILL HOLE
- MINE OPENING (DRY)
- MINE OPENING (DRAINING)
- WATERSHED PERIMETER (EXTERIOR)
- WATERSHED PERIMETER (INTERIOR)
- COAL CONTOUR LOWER KITTANNING SEAM
- COAL CONTOUR LOWER KITTANNING SEAM (COAL MISSING DUE TO EROSION)

TWO LICK CREEK MINE DRAINAGE POLLUTION ABATEMENT PROJECT

INDIANA COUNTY, PENNSYLVANIA

PROJECT N° SL109

INVENTORY MAP

0 500 1000 1500
SCALE IN FEET

MARCH, 1970

N

L. ROBERT KIMBALL
Consulting Engineers
EBENSBURG, PENNSYLVANIA

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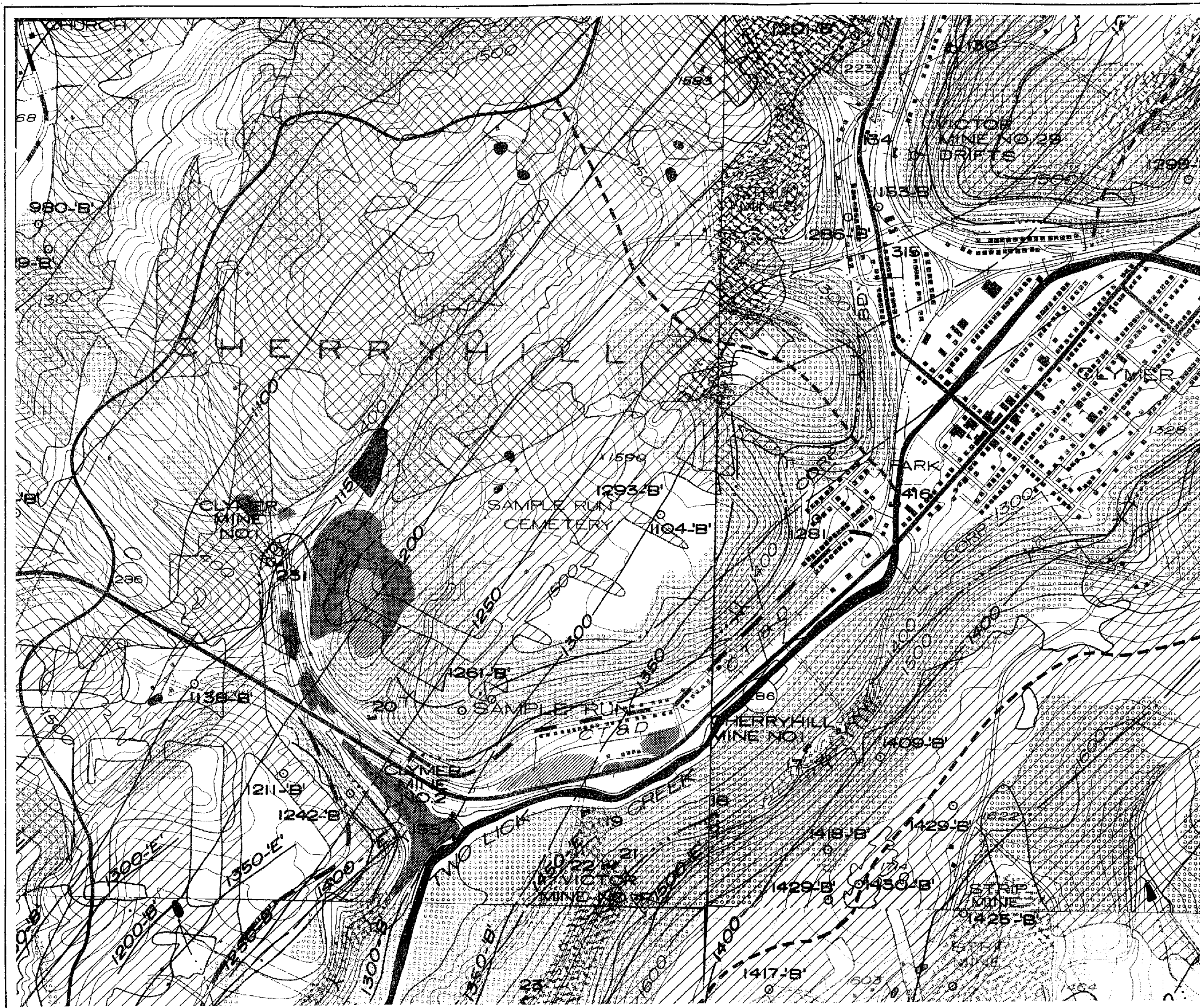

UPPER TWO LICK CREEK

LEGEND

- KITTANNING SEAM
- FREEPORT SEAM
- UPPER FREEPORT (E) SEAM
- LOWER FREEPORT (D) SEAM
- LOWER KITTANNING (B) SEAM
- COAL REFUSE AREA (NEW)
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- MINE OPENING (DRAINING)
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- WATERSHED PERIMETER (INTERIOR)
- COAL CONTOUR LOWER KITTANNING SEAM
- COAL CONTOUR LOWER KITTANNING SEAM (COAL MISSING DUE TO EROSION)

TWO LICK CREEK MINE DRAINAGE POLLUTION ABATEMENT PROJECT

INDIANA COUNTY, PENNSYLVANIA

PROJECT Nº SL109

INVENTORY MAP

0 500 1000 1500 SCALE IN FEET

MARCH, 1970

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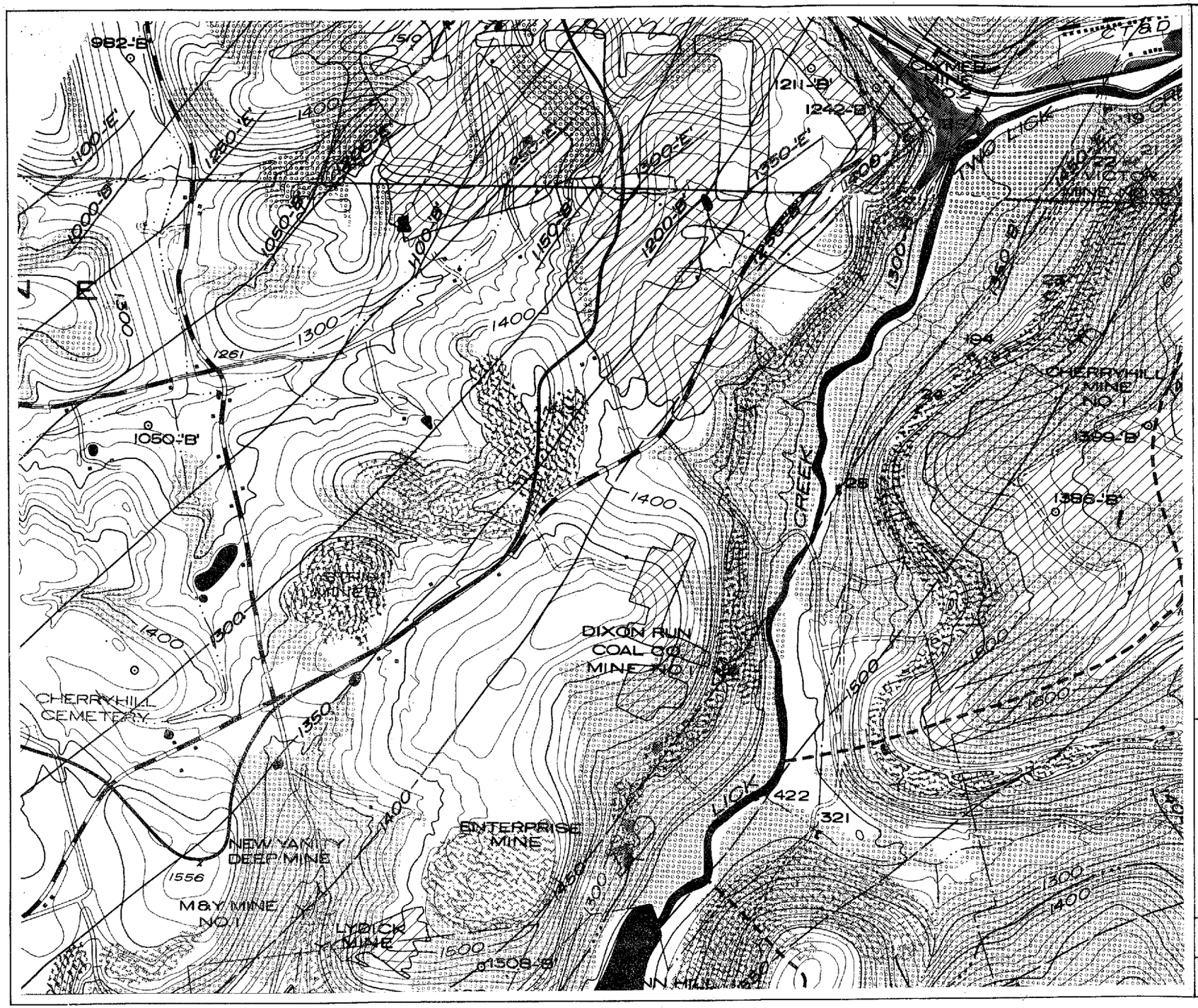
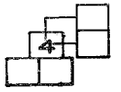
SHEET Nº 3



UPPER TWO LICK CREEK



LEGEND

- KITTANNING SEAM
- FREEPORT SEAM
- UPPER FREEPORT (E) SEAM
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- LOWER KITTANNING (B) SEAM
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- WATERSHED PERIMETER (EXTERIOR)
- WATERSHED PERIMETER (INTERIOR)
- COAL CONTOUR LOWER KITTANNING SEAM
- COAL CONTOUR LOWER KITTANNING SEAM (COAL MISSING DUE TO EROSION)

TWO LICK CREEK
MINE DRAINAGE POLLUTION
ABATEMENT PROJECT

INDIANA COUNTY, PENNSYLVANIA

PROJECT Nº SL109

INVENTORY MAP

0 500 1000 1500
SCALE IN FEET

MARCH, 1970

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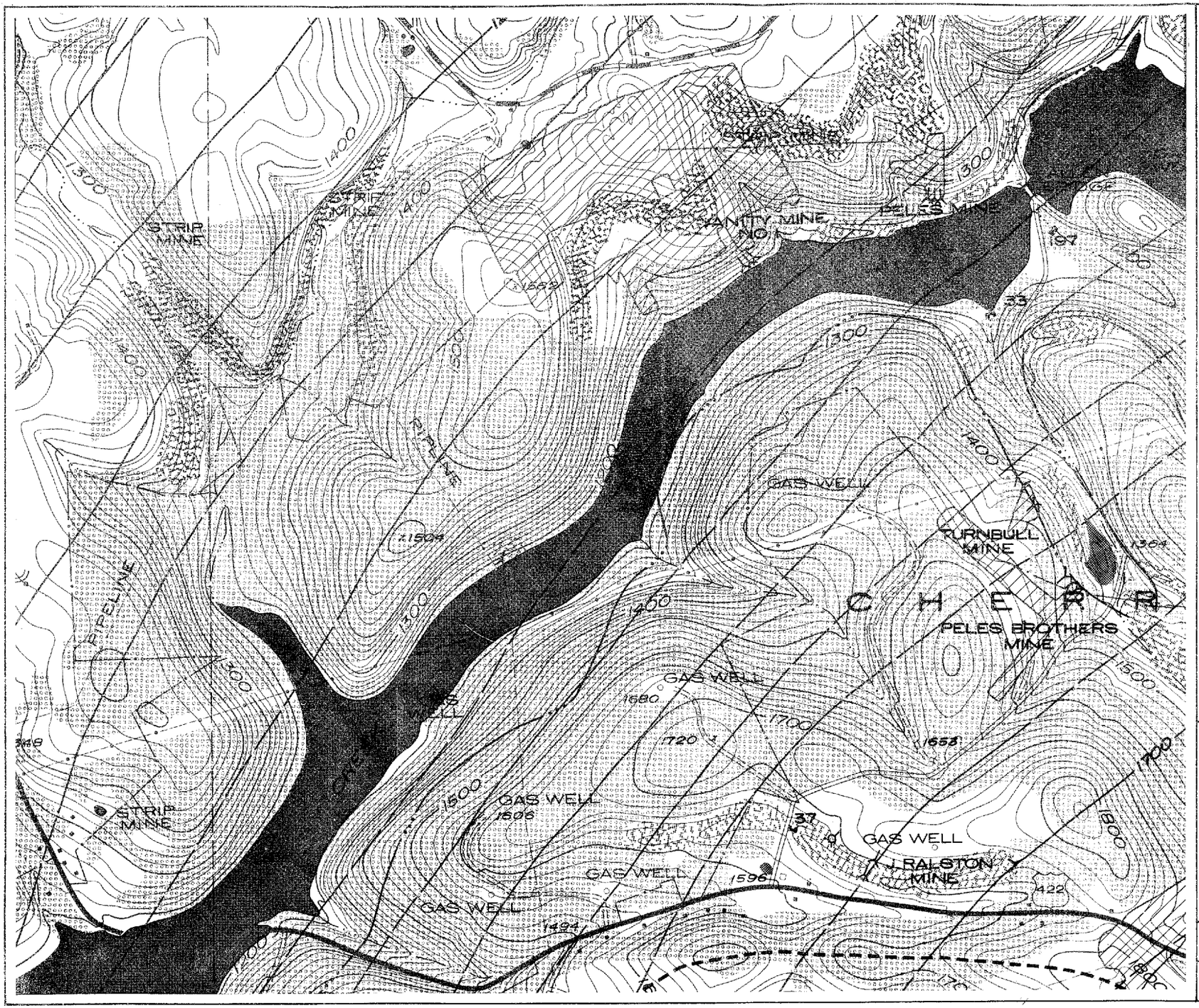
EBENSBURG, PENNSYLVANIA

SHEET Nº 4



UPPER TWO LICK CREEK

LEGEND

- KITTANNING SEAM
- FREEPORT SEAM
- UPPER FREEPORT (E) SEAM
- LOWER FREEPORT (D) SEAM
- LOWER KITTANNING (B) SEAM
- COAL REFUSE AREA (NEW)
- COAL REFUSE AREA (OLD)
- STRIP MINE AREA
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- WATERSHED PERIMETER (EXTERIOR)
- WATERSHED PERIMETER (INTERIOR)
- COAL CONTOUR LOWER KITTANNING SEAM
- COAL CONTOUR LOWER KITTANNING SEAM (COAL MISSING DUE TO EROSION)

TWO LICK CREEK MINE DRAINAGE POLLUTION ABATEMENT PROJECT

INDIANA COUNTY, PENNSYLVANIA

PROJECT Nº SL109

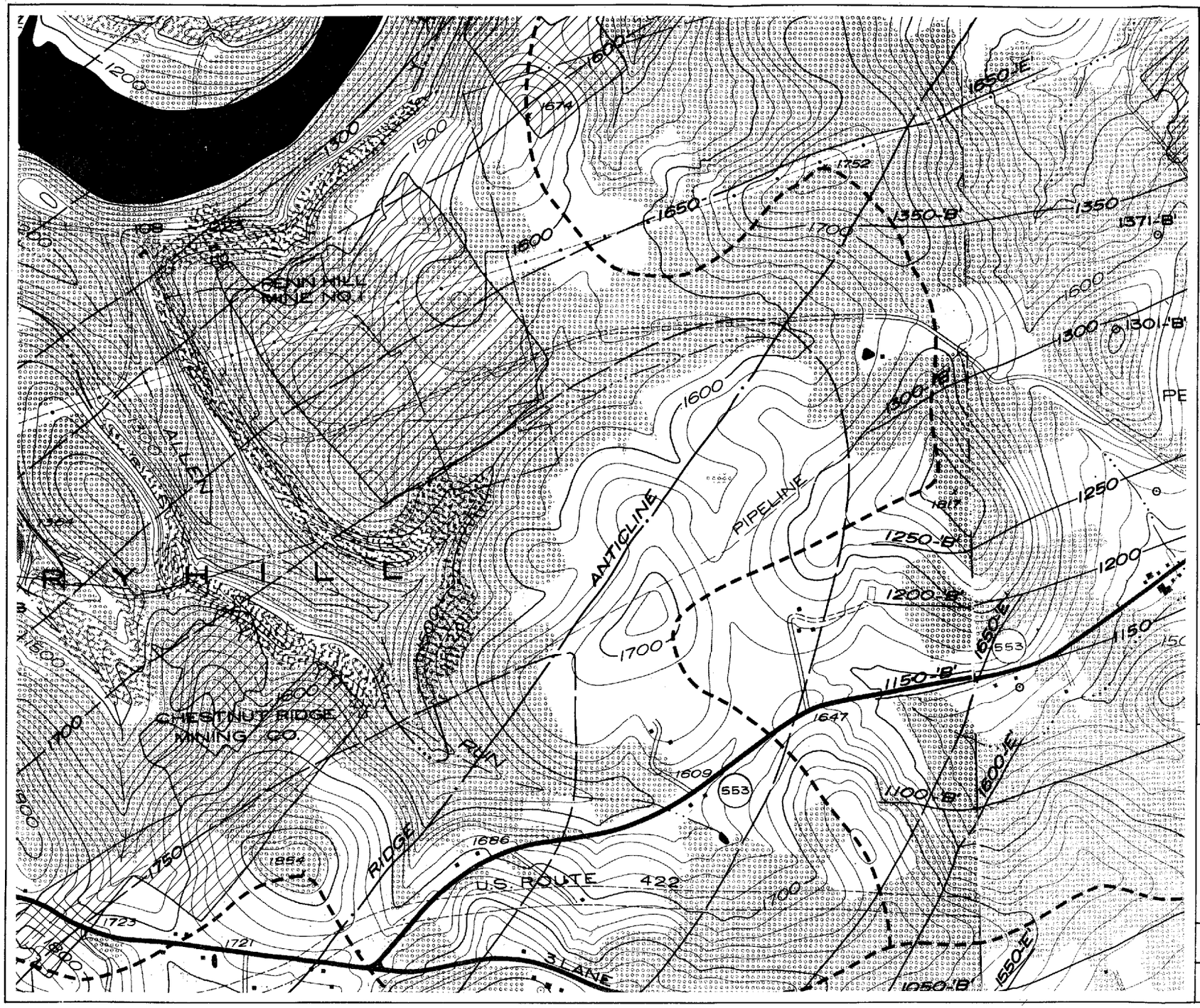
INVENTORY MAP

0 500 1000 1500
SCALE IN FEET

MARCH, 1970

L. ROBERT KIMBALL
Consulting Engineers
EBENSBURG, PENNSYLVANIA

SHEET Nº 5



UPPER TWO LICK CREEK

6

LEGEND

- KITTANNING SEAM
- FREEPORT SEAM
- UPPER FREEPORT (E) SEAM
- LOWER FREEPORT (D) SEAM
- LOWER KITTANNING (B) SEAM
- COAL REFUSE AREA (NEW)
- COAL REFUSE AREA (OLD)
- STRIP MINE AREA
- SAMPLING STATION
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- MINE OPENING (DRAINING)
- WATERSHED PERIMETER (EXTERIOR)
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- COAL CONTOUR LOWER KITTANNING SEAM
- COAL CONTOUR LOWER KITTANNING SEAM (COAL MISSING DUE TO EROSION)

TWO LICK CREEK MINE DRAINAGE POLLUTION ABATEMENT PROJECT

INDIANA COUNTY, PENNSYLVANIA

PROJECT Nº SL109

INVENTORY MAP

0 500 1000 1500
SCALE IN FEET

MARCH, 1970

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EBENSBURG, PENNSYLVANIA

SHEET Nº 6

f. Recommended Abatement Procedures - Cost Benefication

Recommended abatement treatments and related costs are listed for the various sources of pollution in Table 49.

All treatments and costs are based on data described in Section X.

A key to define the recommended abatement procedures is shown on Page 180.

Two abatement plans, a primary and alternate, are recommended for rehabilitation of the watershed.

Plan A is recommended as the primary plan and Plan B as the alternate.

An estimated effectiveness of 75% reduction of pollution load is assigned for each recommended treatment in both plans.*

Plan A is based on an arbitrary maximum cost of $1,000.00 per pound of acid load abated and will provide an estimated reduction of acid load in the magnitude of 82% for the watershed.

Plan B is based on an arbitrary cost of $400.00 per pound of acid load abated and will provide an estimated reduction of acid load of approximately 78% for the watershed.

Table 49a lists the sources to be abated, the amount of benefication, and costs associated with both plans.

*With the exception of treatment plants which are assigned an effectiveness of 100% reduction of pollution load.

Table 49

Recommended Abatement Procedures - Cost Benefication

Upper Portion, Main Stream, Two Lick Creek Watershed

Source Name	Pollution Order	Recommended Treatment Procedures	Total Cost $	Cost Per Pound $	Total Abatement Lbs. Acid/Day
1. Swank #6 Mine and Drainage Area	3	1.5A - SC 5 Seals	$ 61,450	$ 56.43	1,089
2. Clymer #1 and #2 Refuse Piles	1	32A - RP	236,544	61.85	3,825
3. Mack #2 Refuse Pile	5	7A - RP	51,744	66.37	780
4. Clymer #1 Mine	10	2 Seals	22,000	72.37	304
5. Dixon Run #1 Strip Mine	12	25A - R2 F - D	15,675	104.50	150
6. Mack #2 Mine	2	Plant	414,388	244.91	1,692
Cherryhill #3 Mine	4	Plant	300,015	244.91	1,225
7. Lydic Strip Mine	13	26A - R2	9,295	247.87	37
8. Cherryhill #1 and Victor #47 Mines	8	9 Seals	99,000	325.66	304
9. Cherryhill #3 Refuse Pile	16	1.4A - RP	10,349	550.48	19
10. Yanity Strip Mine	18	20A - R2	7,150	632.74	11
11. Cherryhill #1 Strip Mine	7	62A - R2 F - B - D	368,192	818.20	450
12. Penn Hill #1 Mine	15	2 Seals	22,000	842.91	26

Table 49 Continued

Recommended Abatement Procedures - Cost Benefication

Upper Portion, Main Stream, Two Lick Creek Watershed

Source Name	Pollution Order	Recommended Treatment Procedures	Total Cost $	Cost Per Pound $	Total Abatement Lbs. Acid/Day
13. Rodkey (B) Seam Strip Mine	11	B - F - D 54A - R2	$295,873	$ 1,459.66	203
14. Allen Run and Chestnut Ridge Strip Mines	17	F - D 76A - R2	46,035	2,859.32	16
15. Wachisn Mine	19	2 Seals	22,000	5,945.95	4
16. Swank #6 Refuse Pile	20	3A - RP	22,176	6,522.35	3
Total all Sources			$2,003,886		10,138

Table 49a

Benefication - Recommended Plans

Upper Portion, Main Stream, Two Lick Creek Watershed

Plan	Above Sources Abated	Benefication Pollution Reduction Acid Lbs./Day - % of Total	Benefication Pollution Reduction Iron Lbs./Day - % of Total	Benefication Pollution Reduction Sulfate Lbs./Day - % of Total	Total Cost
A	1 - 12	9,912 - 71%	3,356 - 82%	38,630 - 74%	$1,617,80
B	1 - 8	9,406 - 68%	3,509 - 81%	35,248 - 67%	1,210,11

KEY TO RECOMMENDED ABATEMENT PROCEDURES

R1 - Grass and legumes - Method #1

R2 - Grass and legumes - Method #2

R3 - Seedlings

F - Flumes

D - Ditching

B - Terrace backfill

A - Acreage on strip mines and refuse piles

RP - Standard Refuse Pile Reclamation

RB - Refuse Burial and Reclamation

SC - Soil Cover

Plant - Treatment Plant

Pond - Pond Construction and Reclamation

Seal - Mine Seal