4. Penn Run Watershed

a. General

Penn Run originates near the village of Penn Run and flows in a westerly direction for approximately four (4) miles where it discharges into Two Lick Creek Proper south of Clymer.

Total stream length including all tributaries is approximately 15.0 miles. The total area of the watershed is approximately 9.0 square miles.

b. Stream Condition

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

Table 40

Stream Condition

Penn Run Watershed

Stream Classification	Stream Length Miles	Percent Total Stream Length
Non-Polluted	12.2	81
Severely Polluted	2.3	15
Moderately Polluted	0.5	4

As indicated above, approximately 19 percent of the Penn Run Watershed is seriously degraded by mine drainage.

Plate 37 shows the locations of the sampling stations and the extent of mine drainage pollution within the various portions of the watershed.

c. Sampling Station Data

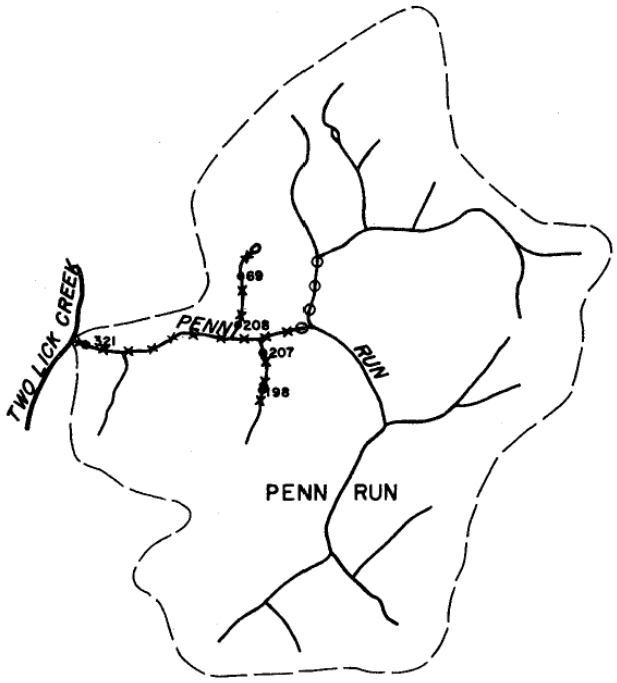
Five (5) sampling stations were installed and monitored. The minimums, maximums, and yearly averages of water quality data obtained from these stations are listed in Table 41 on Page 146.

Plate 38 graphically illustrates the monthly relationship between stream flow, pollution load, and weather elements within the watershed based on measurements taken at Sampling Station #321 located near the mouth of Penn Run.

Peak and low flows occurred during the spring and fall respectively. PH's generally corresponded with flow rates with an average

PENN RUN WATERSHED

WATERSHED AREA



LEGEND

- PENN RUN DRAINAGE BASIN
- • SAMPLING STATION
- ○ MODERATELY ACID
- × SEVERELY ACID

½ 0 1 MILE
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

Table 41

Water Quality Data

Penn Run Watershed

Sampling Station	Flow GPM	pH Range	Acid Load Lbs./Day	Acidity Mg./L.	Iron Mg./L.	Sulfate Mg./L.
321	Max. 6,525	3.2 - 5.5	3,633	Max. 730	Max. 210	Max. 3,500
	Min. 10			Min. 20	Min. 3	Min. 0
	Ave. 2,211			Ave. 136	Ave. 42	Ave. 854
208	Max. 288	3.8 - 4.8	14	Max. 110	Max. 112	Max. 760
	Min. 8			Min. 16	Min. 1	Min. 288
	Ave. 47			Ave. 25	Ave. 1	Ave. 412
207	Max. 828	3.8 - 4.9	45	Max. 159	Max. 3	Max. 600
	Min. 6			Min. 12	Min. 1	Min. 35
	Ave. 249			Ave. 15	Ave. 1	Ave. 65
198	Max. 1,219	3.5 - 5.3	23	Max. 102	Max. 16	Max. 610
	Min. 6			Min. 2	Min. 1	Min. 20
	Ave. 161			Ave. 12	Ave. 1	Ave. 40
69	Max. 3,143	3.4 - 5.6	9	Max. 60	Max. 22	Max. 700
	Min. 1			Min. 12	Min. 1	Min. 195
	Ave. 29			Ave. 25	Ave. 2	Ave. 412

RELATIONSHIP BETWEEN STREAM FLOW, POLLUTION LOAD AND WEATHER ELEMENTS

STATION 321 PENN RUN (At Mouth)

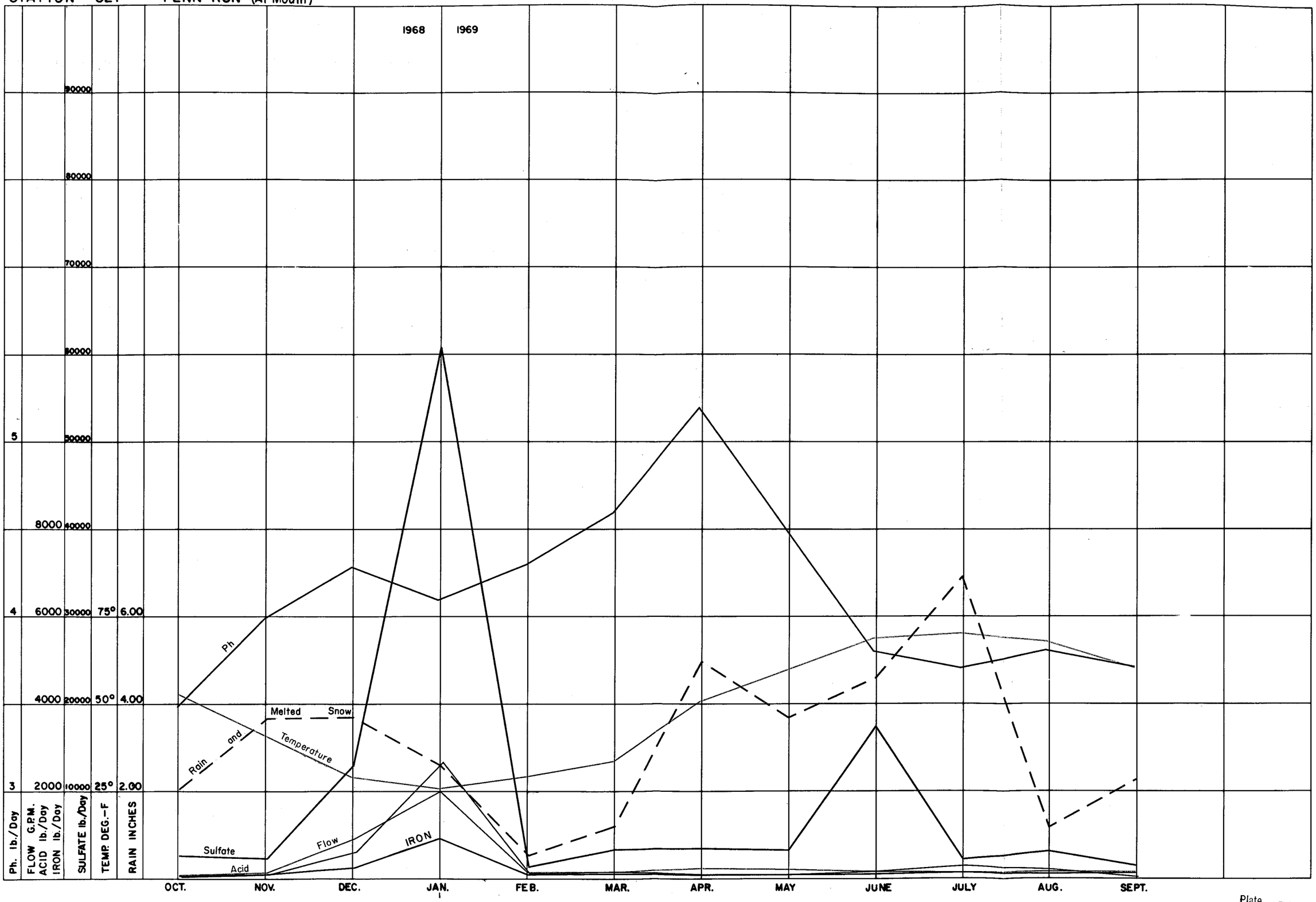


Plate 38

high pH of 5.2 occurring during March and April and a low pH of 4.0 in September and October.

Peak contamination loads were recorded during January, June, and July and the lowest loads during the fall.

The acid load was proportionally higher during the fall months which accounts for the low pH's recorded during that season.

Penn Run contributed the following percentages of flow and pollution load to the total flow and load of Two Lick Creek as measured at Sampling Station #422 near Clymer: Flow - 12%; Acidity - 12%; Iron - 12%; and Sulfate - 17%.

Penn Run discharged approximately 3,183,000 gallons of water per day into Two Lick Creek Proper during the study period.

d. Coal Mining Activity

General

The area has been sporadically mined since the 1920's. Only a few small deep mines were operated between 1920 and 1960. Both deep and surface mining activity increased tremendously during the 1960's with the advent of new mining techniques and depletion of other coal resources in the general area. Map Sheets 3, 6, and 7 , Appendix A show the locations of both deep and strip mines

Deep Mines

There are presently no deep mines in operation in the watershed. The last and largest mine to operate in the watershed, Cherryhill #4, ceased operations in 1968.

The Wayne #3, a relatively small operation, was worked during the 1950's.Several additional small coal banks were worked during the 1920's and 1930's.

Table 42 shown on the following page lists the major 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 acres mined.

Table 42

Abandoned Mines

Penn Run Watershed

Name of Mine	Type of Opening	Seam Mined	Draining Water	Total No. Openings	Area Mined (Acres)	Maximum Head (Feet)
1. Cherryhill #4	Slope	B	-	6	85	10
2. Wayne #3	Slope	B	X	3	10	0
3. Hess	Drift	B	X	5	9	0
4. Gibson	Drift	B	-	1	5	6
5. Ackerson	Drift	B	-	2	4	20

The water level in Cherryhill #4 is rising and could stabilize before reaching the elevation of the mine entries which have seals placed on them. Local drainage has been discharged from this complex.

Strip Mines

Strip mining activity reached its peak in the late 1960's when a large portion of the watershed was mined. Approximately 541 acres have been stripped.

There are presently several strips in operation in which "B" coal is being mined over 100 feet below the surface. In some cases whole hilltops have been stripped. The more recent abandoned strips have been contour backfilled in accordance with state bituminous strip mining laws. However, many of these strips are inadequately revegetated at this time resulting in considerable runoff during periods of high rainfall.

The strip mine on the outcrop of Cherryhill #4 was also auger mined
The older strips are for the better part not backfilled. At least one of these strips is a major source of mine drainage. Most of the older strips are adequately revegetated.

e. Description of Mine Drainage Sources

The major mine drainage sources are listed on the following page in Table 43 beginning with the most serious contributor of acid load. Each source is associated with the sampling station(s) measuring the mine drainage and the respective contamination load. Deep mines that are interconnected are listed collectively as one source. Plates 39, 40, and 41 show the locations of various sources.

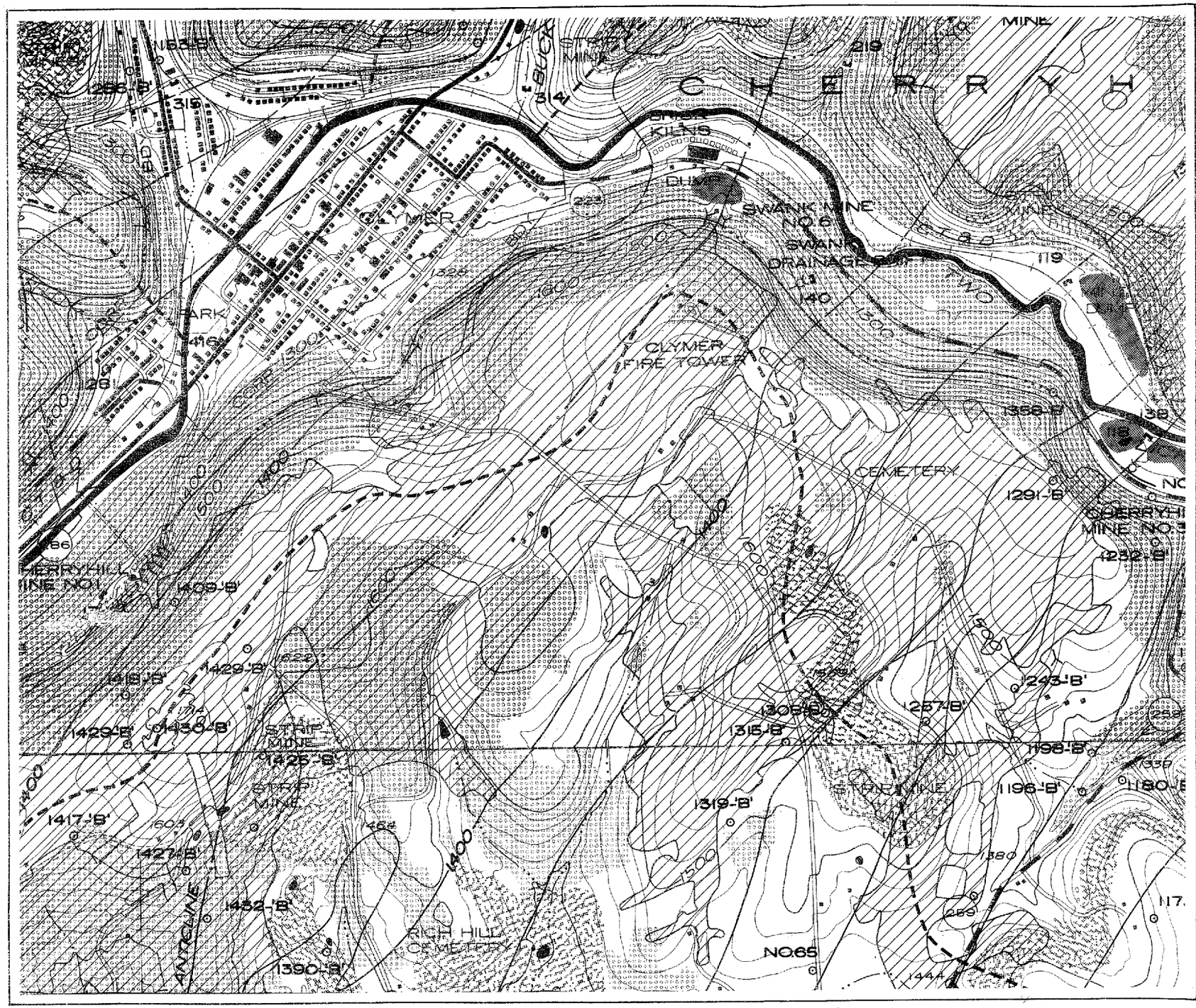
Combined maximum heads are given for deep mines that are discharging mine drainage.

Table 43

Major Mine Drainage Sources

Penn Run Watershed

Source Description	Flow GPM	Sampling Station(s)	Pollution Load - Lbs./Day Acid	Iron	Sulfate	Combined Maximum Head (Feet)
1. Active Strip Mines	2,083	Catch Samples Estimated	2,500	800	17,000	-
2. Cherryhill #4 Strip Mine Treatment Pond Tipple Site	1,000	Catch Samples Estimated	600	200	4,000	-
3. Cherryhill #1 and Wayne #3 Strip Mines	334	Estimated	200	5	1,600	-
4. Hess Mine	161	198	23	2	77	-
5. Morrone and Shick Strip Mines	29	69	9	1	143	6



PENN RUN

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

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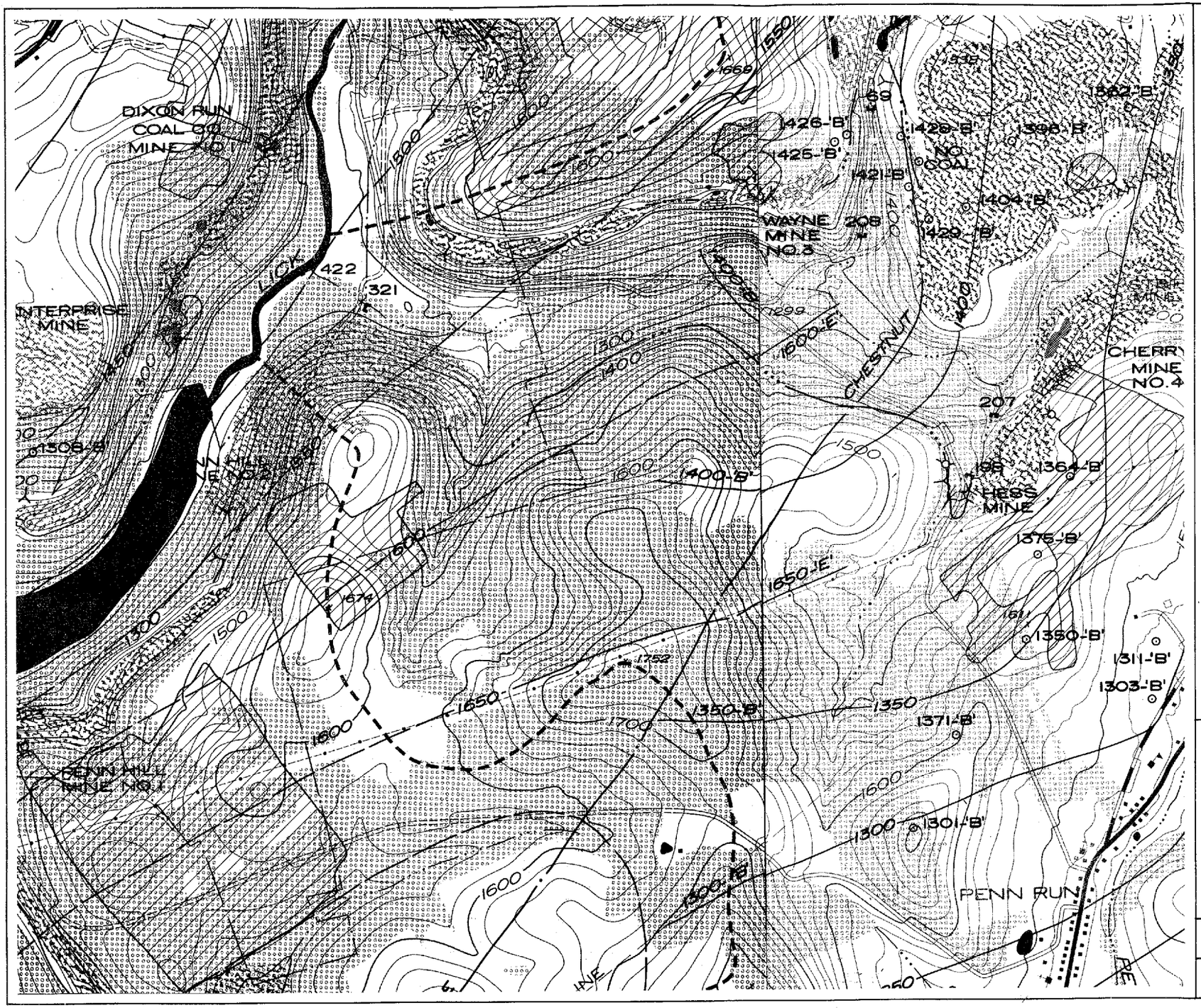
EBENSBURG, PENNSYLVANIA

SHEET Nº 1



PENN RUN

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 Nº SL109

INVENTORY MAP

0 500 1000 1500
SCALE IN FEET

MARCH, 1970

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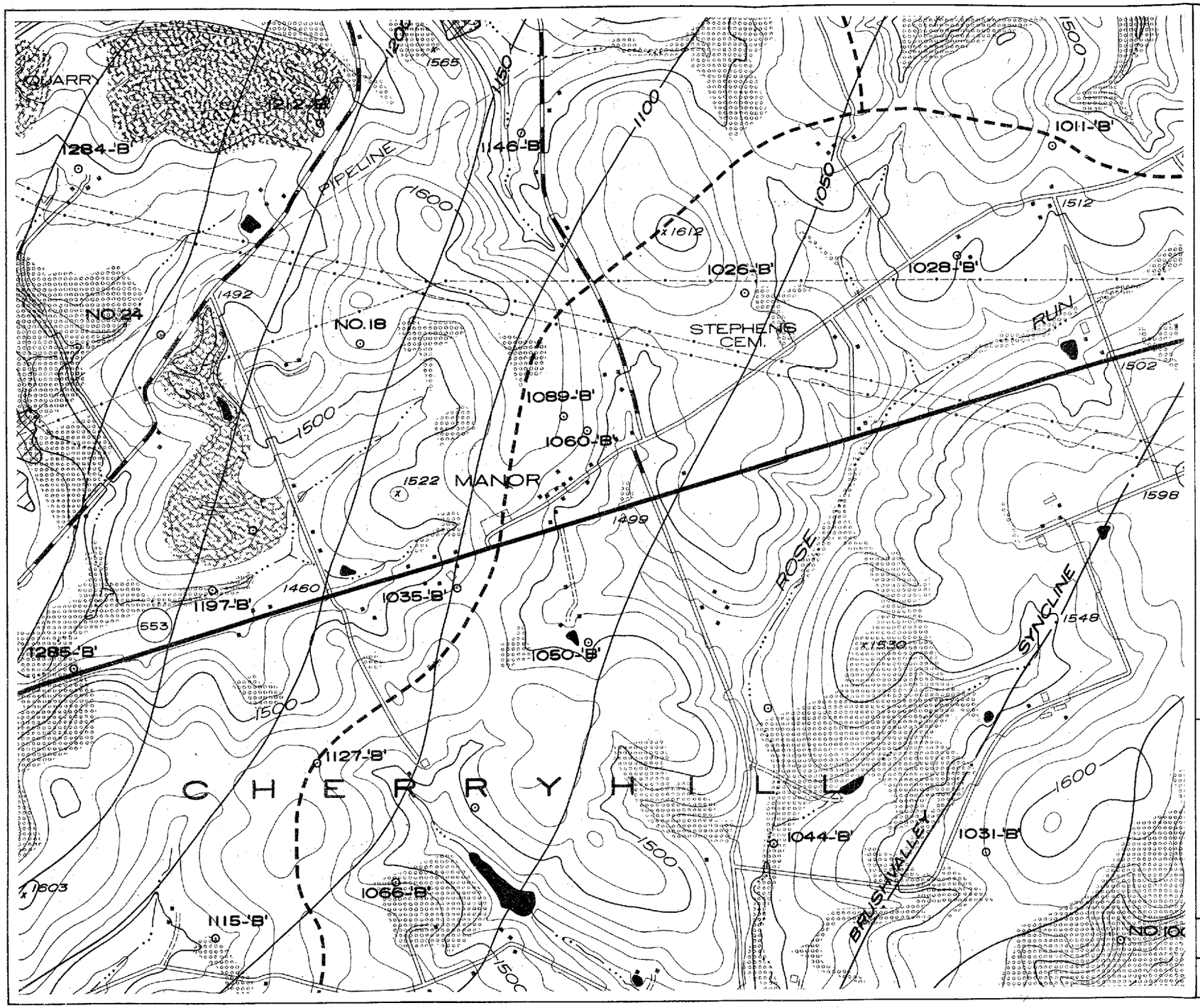
SHEET Nº 2



PENN RUN

3

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

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Consulting Engineers
EBENSBURG, PENNSYLVANIA

SHEET Nº 3

f. Recommended Abatement Procedures - Cost Benefication

Recommended abatement treatments and related costs are listed for the various sources of pollution in Table 44. All treatments and costs are based on data described in Section X. A key to define the recommended abatement procedure is shown of Page 156.

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 44a 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 44

Recommended Abatement Procedures - Cost Benefication

Penn Run Watershed

Source Name	Pollution Order	Recommended Treatment Procedures	Total Cost $	Cost Per Pound $	Total Abatement Lbs. Acid/Day
1. Cherryhill #4 Strip Mine and Refuse Pile	2	48A - R2 1A - RP	$ 24,522	$ 54.56	450
2. Cherryhill #1 and Wayne #3 Strip Mines	3	13A - R2 F - D 10A - B	41,910	279.40	150
3. Morrone and Shick Strip Mines	5	5A - Pond	3,850	592.31	6
4. Hess Mine	4	3 Seals	33,000	1,929.82	17
Total all Sources			$103,282		623

Table 44a

Benefication - Recommended Plans

Penn Run 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 - 3	606 - 18%	154 - 15%	4,307 - 19%	$70,282
B	1 - 2	600 - 18%	154 - 15%	4,200 - 18%	66,432

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

5. Two Lick Creek Proper

a. General

Two Lick Creek Proper is that portion of the main stream excluding the six major tributaries that are treated as separate watersheds elsewhere in this section of the report.

The main stream is arbitrarily split at the breast of the Two Lick Creek Dam into upper and lower portions which are, for the purpose of this study, treated as separate watersheds.

The main stream begins at Wandin Junction with the confluence of the North and South Branches and flows in a generally southeast direction for approximately 26.5 miles where it discharges into Blacklick Creek at Blacklick.

Total stream length excluding major tributaries that are considered separately as watersheds is 60.0 miles and total area is 34.9 square miles.

Plate 42 graphically illustrates the downstream fluctuation of pollution load and flow as measured at several sampling stations on the main stream.

Plates 43 and 51, Pages 160 and 182 show the locations of the sampling stations and the extent of mine drainage pollution within the various portions of the main stream.

TWO LICK CREEK

FLOW AND POLLUTION LOAD — DOWNSTREAM PATTERN

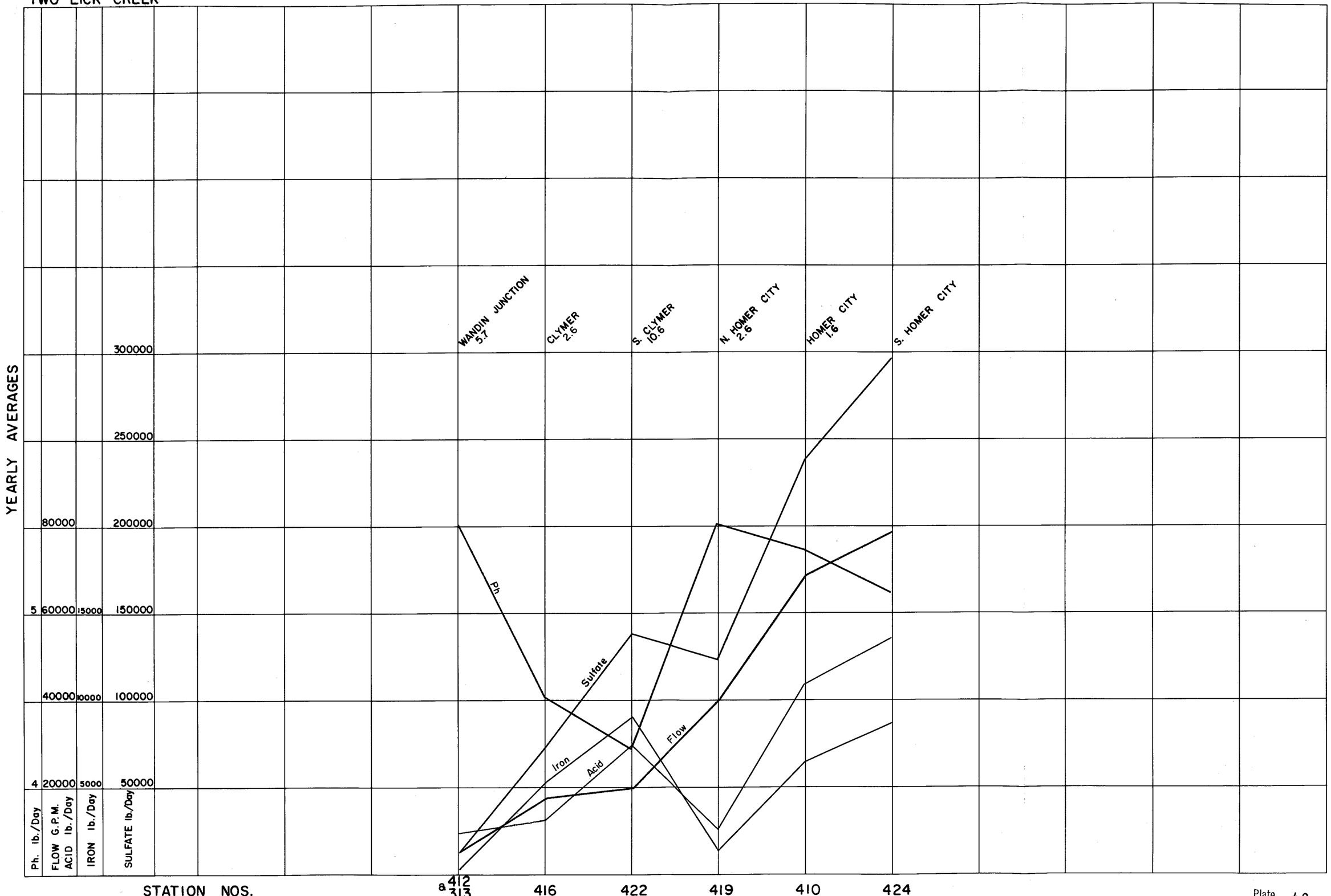

Plate 42