

Sub-watershed 11L (Tomcat Hollow)

General Discussion

This sub-watershed encompasses 1.12 square miles or 715.12 acres of land area, approximately 1.73% of the total study area. The basin is drained by 3.98 miles of tributaries (1.48% of the total length of all watershed tributaries) and contains relatively no lakes or ponds. Commonwealth records show 1 surface mine and 2 deep mines in the area. Our field investigation has found 3 surface mines, 2 flowing, and 12 deep mines with 30 openings, 5 of which are flowing.

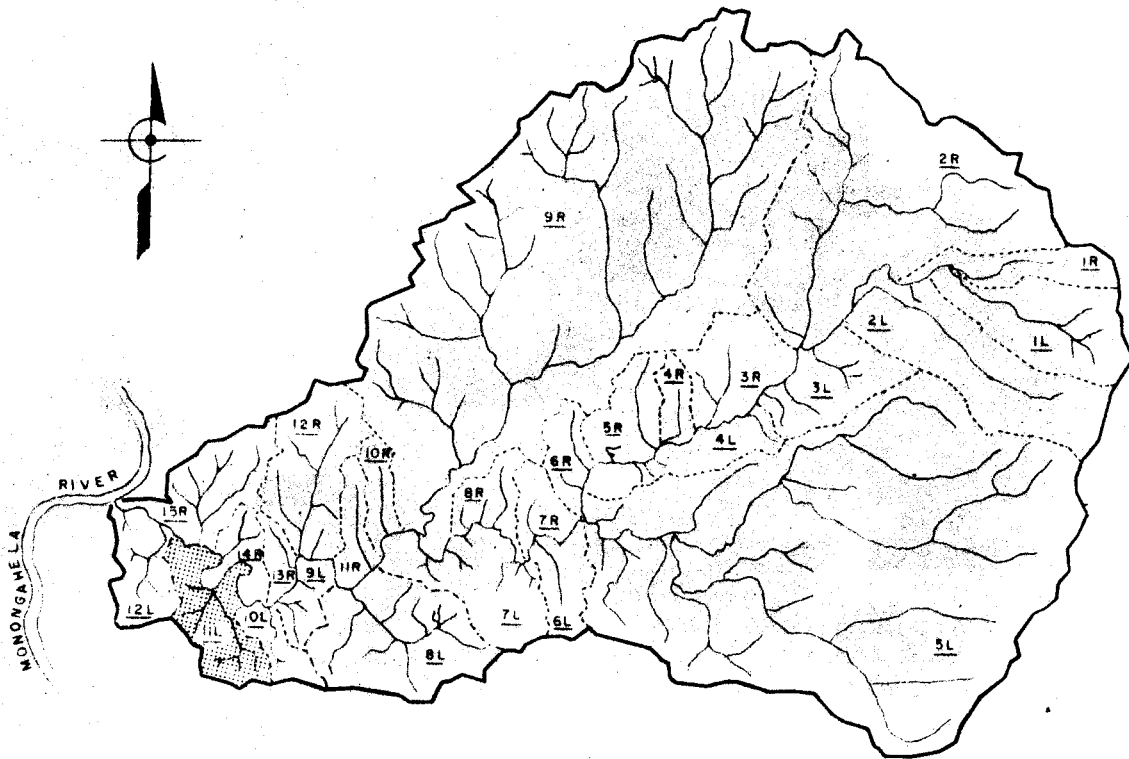
The following information gives the combined averages of the sampling stations designated as GC11L2, GC11L4, GC11L5, and GC11L6, all un-named, as well as GC11L3; Tomcat Hollow. Their locations are spotted on Drawing 7316-7, and their individual averages are shown in Table 107. In the case where more than one tributary contributes to a sub-watershed, the values have been combined. The percentages that this sub-watershed contributes in pollution load and flow to Monitoring Station GC8 near the mouth of Georges Creek are also shown.

	<u>Averages</u>		<u>Percent of Total Watershed</u>
pH	5.3		
Net Hot Acidity	9,457	PPD	39.34%
Ferrous Iron	34	PPD	10,488.00%
Total Iron	2,332	PPD	84.15%
Sulfate	10,901	PPD	15.91%
Flow	2,494,080	GPD	4.20%





TABLE 107  
 TRIBUTARY AVERAGE WATER QUALITY DATA  
 Sub-watershed  
 11L

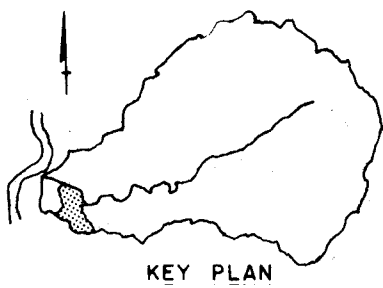
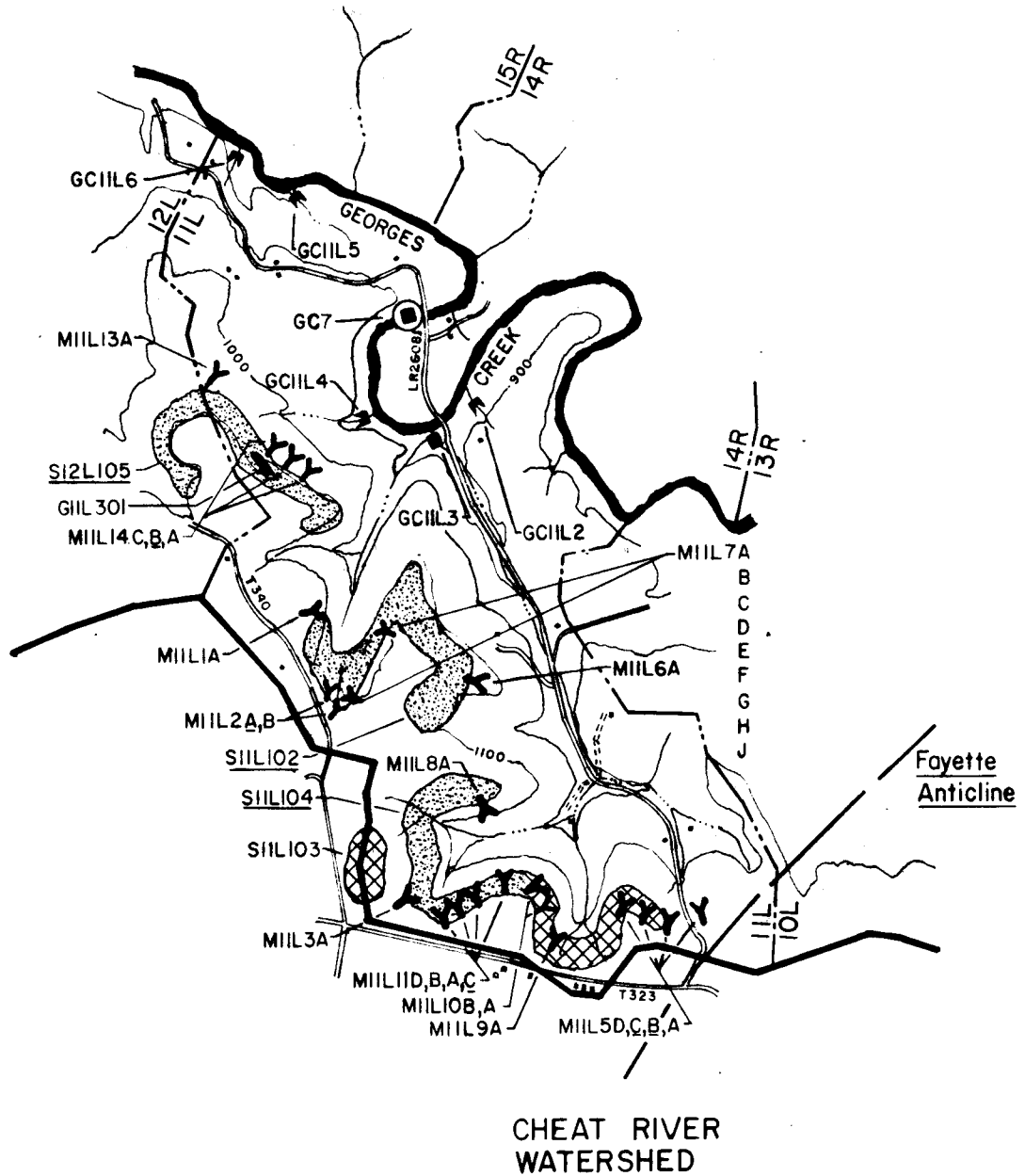
Station	pH	Hot Acid		Alkalinity		Net Hot Acid		Ferrous Iron		Iron as Fe		Sulfate		Flow	
		PPM	#/Day	PPM	#/Day	PPM	#/Day	PPM	#/Day	PPM	#/Day	PPM	#/Day	GPM	G.P.D.
GC11L2	7.8	0	0	571.33	17.61	0	0	.07	0	.41	.01	25.67	.90	3	4,320
GC11L3	2.8	461.43	9270.40	0	0	461.43	9270.40	2.57	33.52	98.95	2291.35	627.43	10620.43	1680	2,419,200
GC11L4	2.7	538.57	221.77	0	0	538.57	221.77	.23	0	73.32	38.52	697.86	250.50	33	47,520
GC11L5	6.5	38.00	3.55	95.00	14.09	0	0	1.49	.04	13.35	1.17	75.00	20.62	10	14,400
GC11L6	6.5	24.00	1.53	91.33	8.73	0	0	0	0	.27	.01	90.00	7.76	6	8,640

# Location Plan



## LEGEND FOR THE FOLLOWING PLATES

- Y DEEP MINE OPENING (M9R59A)
- ▲ DEEP MINE PIPE (SAMPLE STATIONS - MP5L2A, or BH9R2)
- ▼ WEIR (TRIBUTARY SAMPLE STATION - GC7L1)
- CROSS-SECTION (TRIBUTARY SAMPLE STATION - GC9R1)
- ⊙ GEORGES CREEK CROSS-SECTION (SAMPLE STATION - GC5)
-  STRIP MINE (ABANDONED-UNRECLAIMED - S11L102)
-  STRIP MINE (ACTIVE - S4R107)
-  STRIP MINE (ABANDONED-RECLAIMED - S7L106)
-  GOB PILE (G9R301)
- A, B, C UNDERLINED SUFFIX  
INDICATES FLOWING DEEP MINE SAMPLE STATIONS - M9R74A, B, C
- S7L101 UNDERLINE - INDICATES FLOWING STRIP MINE, GOB PILE, OR  
BORE HOLE SAMPLE STATION



**MAP OF  
 SUB-WATERSHED IIL  
 (TOM CAT HOLLOW)**  
 SCALE: 1" = 2000'

## Deep Mines

The Commonwealth records indicate that there are 2 deep mines in this sub-watershed. Our field investigations located 12 deep mines with 30 openings, of which 5 are flowing. Table 108 lists the abandoned deep mines within the sub-watershed with the following information: mine number, name of mine Or operator if known, strip mine connection, available mine maps, acres and seam mined, mine opening designation, openings with flows, and estimated elevation of the openings.

Table 109 gives the averages of the abandoned deep mine flows. Directly under the averages are the percentages of flows and pollution loads that each complex contributes to the pollution load of the sub-watershed as measured at the following sampling stations: GC11L2, GC11L3, GC11L5, GC11L6, all un-named, and GC11L4 Tomcat Hollow. When more than one major tributary drains a sub-watershed, the averages of each are combined. Similarly, when more than one deep mine opening of the same complex is flowing, the averages are also combined.

TABLE 108  
 ABANDONED DEEP MINES  
 Sub-watershed  
 11L

Mine Number	Name of Mine or Operator	Strip Mine Connection	Mine Map Obtained	Area Mined (Acres)	Seam Mined	Mine Opening No.	Elev. of Opening	Flow	Permit Number
M11L1	Unknown	S11L102	-	-	PGH*	M11L1A	1120'	No	-
M11L2	Baker #10 Ann Coal Co.	S11L102	Yes	27.54	PGH	M11L2A	1100'	Yes	10885
						M11L2B	1100'	No	
M11L3	Meucci Coal Co.	S11L104	-	-	PGH	M11L3A	1160'	No	10847
M11L5	Unknown	S11L104	-	-	PGH*	M11L5A	1160'	No	-
						M11L5B	1160'	Yes	
						M11L5C	1160'	Yes	
						M11L5D	1160'	No	
M11L6	Unknown	S11L102	-	-	PGH*	M11L6A	1130'	No	-
M11L7	Unknown	S11L102	-	-	PGH*	M11L7A	1100'	No	-
						M11L7B	1100'	No	
						M11L7C	1100'	No	
						M11L7D	1100'	No	
						M11L7E	1100'	No	
						M11L7F	1100'	No	
						M11L7G	1100'	No	
						M11L7H	1100'	No	
						M11L7J	1100'	No	

\*Assumed

TABLE 108 (contd.)  
 ABANDONED DEEP MINES  
 Sub-watershed  
 11L

Mine Number	Name of Mine or Operator	Strip Mine Connection	Mine Map Obtained	Area Mined (Acres)	Seam Mined	Mine Opening No.	Elev. of Opening	Flow	Permit Number
M11L8	Unknown	S11L104	-	-	PGH*	M11L8A	1120'	No	-
M11L9	Unknown	S11L104	-	-	PGH*	M11L9A	1140'	No	-
M11L10	Unknown	S11L104	-	-	PGH*	M11L10A	1160'	No	-
						M11L10B	1160'	No	-
M11L11	Unknown	S11L104	-	-	PGH*	M11L11A	1180'	No	-
						M11L11B	1180'	No	-
						M11L11C	1180'	Yes	-
						M11L11D	1180'	No	-
M11L13	Unknown	S12L105	-	-	PGH*	M11L13A	1150'	No	-
M11L14	Unknown	S12L105	-	-	PGH*	M11L14A	1050'	No	-
						M11L14B	1050'	Yes	-
						M11L14C	1050'	No	-

\* Assumed

TABLE 109  
 ABANDONED DEEP MINE AVERAGE WATER QUALITY DATA  
 Sub-watershed  
 11L

Station	pH	Hot Acid		Alkalinity		Net Hot Acid		Ferrous Iron		Iron as Fe		Sulfate		Flow	
		PPM	#/Day	PPM	#/Day	PPM	#/Day	PPM	#/Day	PPM	#/Day	PPM	#/Day	GPM	G.P.D.
M11L2	2.4	1879.5	453.59	0	0	1879.5	453.59	64.47	14.53	542.42	129.53	2666	698.2	29	41,760
%	-	-	-	-	-	-	4.80%	-	43.30%	-	5.56%	-	6.41%	-	1.67%
M11L5	2.4	3787.75	857.42	0	0	3787.75	857.42	182.85	39.91	1022.06	229.39	4999	2363.99	79	113,760
%	-	-	-	-	-	-	9.07%	-	118.92%	-	9.84%	-	21.70%	-	4.56%
M11L11	2.6	918.57	14.41	0	0	918.57	14.41	48.53	.75	219.71	3.53	1132.3	20.26	1	1,440
%	-	-	-	-	-	-	.15%	-	2.24%	-	.15%	-	.19%	-	.06%
M11L14	2.5	1335	106.26	0	0	1335	106.26	1.40	.10	268.22	23.58	1462.5	114.64	6	8,640
%	-	-	-	-	-	-	1.12%	-	.30%	-	1.01%	-	1.05%	-	.35%



Deep Mine Baker #10 (permit number 10885)  
(includes M11L2, M11L6, M11L7 and M11L8)

General Description:

The Baker #10 mine is a large complex which was given the above designations. A Bureau of Mines map indicates that this complex exploited the Pittsburgh coal seam and had 4 openings. All openings are shown on the map of Sub-watershed 11L. Each sub-complex is described individually to aid in comprehension and presentation.

The M11L2 complex is located about 1,500 feet north of the intersection between T 327 and T 340. The 2 openings lie about 300 feet east of T 340. Both are partially caved in and one is flowing. A small pond is formed by the discharge. They are both situated on the southern edge of Strip Mine S11L102 along a highwall. Both of these openings are shown on the Bureau of Mines map.

M11L6 is located approximately 2,000 feet west of the intersection between T 329 and L.R. 26081. The only opening is found on Strip Mine S11L102 along a highwall. It is partially caved in and not flowing. It is shown on the Bureau of Mines map.

M11L7 is situated about 2,000 feet north of the intersection between T 327 and T 340. The 9 openings lie 500 to 1000 feet east of T 340 on Strip Mine S11L102 along a highwall. These openings all seem to be deep mine rooms that were sheared off and exposed during stripping operations. All are somewhat caved in and none are flowing. These are not shown on the Bureau of Mines map.

Deep Mine M11L8 is located south of a pipe line which crosses T 340 about 600 feet north of its intersection with T 327. Only one opening was found which is on Strip Mine S11L104 along a highwall near a tipple. The opening is not

Deep Mine Baker #10 (contd.)

flowing although it is not visibly caved in. This opening also shows up on the Bureau of Mines map.

Recommendations:

In general, all of the flowing openings and mine pipes will require a hydraulic seal to contain the flow. Any that are not flowing shall be considered for potential seals. The hydraulic seal should be designed to withstand heads caused by hydrostatic pressure. A breakdown of the number of seals to each sub-complex appears in the cost section.

The cost for sealing the 4 openings that are shown on the Bureau of Mines map was computed on the basis of \$20,000 per seal per opening. The remaining 9 openings are figured at a cost of \$25,000 per seal per opening.

Costs:

<u>Designation</u>	<u>KNOWN</u> <u># of seals</u>	<u>Costs</u>
M11L2	1	\$ 20,000
	<u>POTENTIAL</u>	
M11L2	1	\$ 20,000
M11L6	1	20,000
M11L7	9	225,000
M11L8	1	<u>20,000</u>
	12	\$285,000

Summary of Costs:

Known	1 seal	\$ 20,000
Potential	<u>12 seals</u>	<u>285,000</u>
Total	13 seals	\$305,000

Deep Mine M11L5 (Priority mine number 140)

General Description:

This mine complex is located about 80 feet north along L.R. 26081 from its intersection with T 323. Four openings were found, 3 on the west side and 1 on the east side of L.R. 26081. Three of the openings are caved in, while one is sealed. Two of the three caved in openings are flowing and two of the four are located on Strip Mine S11L104 near a wooded area. A tipple, shed, and railroad tracks are some of the appurtenances to this mine. The openings are shown on the map of Sub-watershed 11L.

Recommendations:

The 2 flowing openings require hydraulic seals to eliminate the discharges. The other two openings are considered as potential pollution threats. The sealed opening should be carefully inspected and monitored because its stability and strength are unknown. The deep mine abatement program should be done prior to any reclamation of S11L104 that would conflict with the sealing.

Costs:

Known	2 seals	\$ 50,000
Potential	2 seals	<u>50,000</u>
Total		\$100,000

Deep Mine M11L11

General Description:

This complex is located about 2,000 feet northwest of the intersection of T 323 and L.R. 26081. The 4 openings are found on Strip Mine S11L104 along a highwall. All of the openings are caved in and one is flowing. A small pond is located just east of the flowing opening. It is assumed that the Pittsburgh coal seam was mined here. The openings are spotted on the map of Sub-watershed 11L.

Recommendations:

The flowing opening should be hydraulically sealed to inundate the pollution-forming materials and, thereby, reduce or eliminate the objectionable discharge. The remaining openings are considered to be potential pollution sources since they are not flowing. Since the openings are connected with a surface mine, the strip should not be reclaimed until the deep mine sealing is completed.

Costs:

Known	1 seal	\$ 25,000
Potential	3 seals	<u>75,000</u>
Total		\$100,000

Deep Mine M11L14

General Description:

This complex is situated approximately 7,000 feet north of the intersection between T 327 and T 340. The 3 openings lie about 1,800 feet northeast of T 340 on Strip Mine S12LI05 along a highwall. The openings are all caved in and one is flowing. A pond is formed and drains along the base of the highwall. An old, abandoned mine shack is the only building present. The Pittsburgh coal seam is assumed to have been mined here. The openings are shown on the map of Sub-water-shed 11L.

Recommendations:

The one flowing opening should be hydraulically sealed to impede the production of iron and acid. The air supply is drastically reduced when a mine is inundated, therefore reducing the pollution production. The other openings are considered to be potential pollution sources since they are not presently flowing. The deep mine abatement program should be completed prior to reclamation of Strip Mine S12L105.

Costs :

Known	1 seal	\$25,000
Potential	2 seals	<u>50,000</u>
Total		\$75,000

## Strip Mines

The Commonwealth records indicate there is 1 strip mine in this sub-watershed. Our field investigations located 3 surface mines with 2 having flows. Table 110 lists the abandoned strip mines within the sub-watershed with the following information: the name of the mine or operator if known, permit numbers, the acres of area mined and which seam was mined, the designation we give the mine, whether or not there is a flow, and whether there are any deep mine connections.

The total acreage of abandoned surface mines in Sub-watershed 11L is 68.85 acres or 9.63% of the total sub-watershed land area.

Table 111 gives the averages of the abandoned surface mine flows. Directly under the averages are the percentages of flows and pollution loads that each contributes to the pollution load of the sub-watershed as measured at the following sampling stations: GC11L2, GC11L3 (Tomcat Hollow), GC11L4, GC11L5, and GC11L6.

Where a single surface mine has more than one flow, the averages of the flows are added together.

When more than one major tributary drains a sub-watershed, the averages of each are also combined.

Following Table 111 are the descriptions of the flowing strip mines along with abatement recommendations.

TABLE 110  
Abandoned Surface Mines  
Sub-watershed  
111

Mine Number	Name of Mine or Operator	Permit No.	Area Mined (Acres)	Seam Mined	Flowing	Connection w/Deep Mine
S11102	Sabatine Coal Co.	461M60	29.37	PGH	Yes	1111A 1117A-J 1116A
S11103	Unknown	--	6.43	PGH*	No	--
S11104	Unknown	--	33.05	PGH*	Yes	M1113A-M1118A M1115A,B,C M1119A-M11110A,B M111A,B,C,D

\*Assumed

TABLE 111  
 ABANDONED SURFACE MINE AVERAGE WATER QUALITY DATA  
 Sub-watershed  
 11L

Station	pH	Hot Acid		Alkalinity		Net Hot Acid		Ferrous Iron		Iron as Fe		Sulfate		Flow	
		PPM	#/Day	PPM	#/Day	PPM	#/Day	PPM	#/Day	PPM	#/Day	PPM	#/Day	GPM	G.P.D.
11L102	3.0	512.5	14.89	0	0	512.5	14.89	4.54	.16	22.26	.72	571	16.59	3	4,320
%	-	-	-	-	-	-	.16%	-	.48%	-	.03%	-	.15%	-	.17%
11L104	2.8	1302	37.40	0	0	1302	37.40	4.21	.09	106.3	1.81	1524	40.37	7	10,080
%	-	-	-	-	-	-	.39%	-	.27%	-	.08%	-	.37%	-	.40%



Strip Mine S11L102 (permit number 461M60 and priority number 141)

General Description:

This strip mine is located about 2,500 feet north of the intersection between T 323 and T 340 on the eastern side of T 340. Another reference point would be the intersection of L.R. 26081 and Georges Creek which lies 1,500 feet north of the strip. The strip mine consists of 29.37 acres and mined the Pittsburgh coal seam. Deep mining connections with M11L1, M11L7 and M11L6 have been established. The strip is completely abandoned with only about 10% vegetated. A 25 foot highwall extends for the length of the strip. Many ponds and gob piles exist in the area. The only leach found originates on the north-central portion from a pond. The strip mine is shown on the map of Sub-watershed 11L.

Recommendations:

Since deep mining is prevalent at this strip, sealing of those openings should be the first abatement undertaken. To eliminate the leach would require reclamation of the entire strip. The spoil piles should be leveled off and used to fill in depressions. The entire area requires revegetation. Finally, a ditch along the base of the highwall would expedite flow from the strip.

Costs:

Grading	30 acres @ \$1,800/acre	\$54,000
Vegetation	30 acres @ \$600/acre	18,000
Ditches	4,000 feet @ \$1/foot	<u>4,000</u>
		\$76,000

Strip Mine S11LI04 (priority number 149)

General Description:

This strip mine is located about 900 feet northeast of the T 323 and L.R. 26081 intersection. The strip consists of 33.05 acres and is assumed to have mined the Pittsburgh coal seam. It is 25% reclaimed through grading and revegetation. The vegetation covers 70% of the strip and consists of both grasses and trees. Deep mine connections with M11L3, M11LS, M11L8, M11L9 and M11L11 have been established. Four leaches were found, three of which are on the northwestern side and one on the northeastern side. The strip mine is shown on the map of Sub-watershed 11L.

Recommendations:

The flows from the strip itself cannot be completely alienated from the deep mine activity. Therefore, recommendations are withheld until further study can be made.

### Recommendations

Table 112 gives the recommendations for the polluting deep and strip mines, along with the costs associated with each recommendation. The order in which they are placed is determined by the cost per pound of acid removal.

An estimated effectiveness of 75% reduction of pollution load is assigned for each recommendation.

Table 113 lists the sources abated, the amount of beneficiation, and the costs associated with each plan.

The distance from Sampling Station GC11L3 to the next polluting tributary downstream, GC15R1, is one mile. This is the minimum distance on Georges Creek that would benefit from the recommended work.

TABLE 112  
 RECOMMENDED ABATEMENT PROCEDURES - COST BENEFICATION  
 SUB - WATERSHED  
 11L

Rank	Mine No.	TOTAL COSTS		COST \$/POUND ACID REMOVAL		Total Acid Abated	Total Iron Abated	% OF TOTAL SUB-WATERSHED	
		Known Sources	Potential Sources	Known Sources	Potential Sources	Ppd	Ppd	Acid	Iron
1	M11L2	\$20,000	\$305,000	\$ 58.79	\$ 896.55	340.19	97.15	4%	4%
2	M11L5	50,000	100,000	77.75	155.50	643.07	172.04	7%	7%
3	M11L14	25,000	75,000	313.68	941.03	79.7	17.69	1%	1%
4	M11L11	25,000	100,000	2,312.67	9,250.67	10.81	2.65	1%	1%
5	S11L102	76,000	76,000	6,803.94	6,803.94	11.17	.54	1%	1%

TABLE 113  
 BENEFICATION - RECOMMENDED PLANS  
 SUB-WATERSHED  
 11L

Plan	Sources Abated	ACID		IRON		SULFATE		TOTAL CONS'T COSTS	
		Ppd	% of Total Sub-Watershed	Ppd	% of Total Sub-Watershed	Ppd	% of Total Sub-Watershed	Known Sources	Potential Sources
A	5	1,085	12%	290.07	12%	2,410	22%	\$ 196,000	\$ 656,000
B	3	1,063	11%	286.88	12%	2,383	22%	95,000	480,000

It is recommended Plan "B" be initiated for this Sub-Watershed