

Sub-watershed 6R (Un-named)

General Discussion

This sub-watershed encompasses 0.51 square miles or 324.05 acres of land area, approximately 0.79% of the total study area. This basin is drained by 1.65 miles of tributaries (0.61% of the total length of all watershed tributaries) and contains no lakes and ponds. State records indicate 3 surface mines and no deep mines in the area. Our field surveys have found 2 surface mines with 1 flowing and 2 deep mines with 2 openings, both flowing.

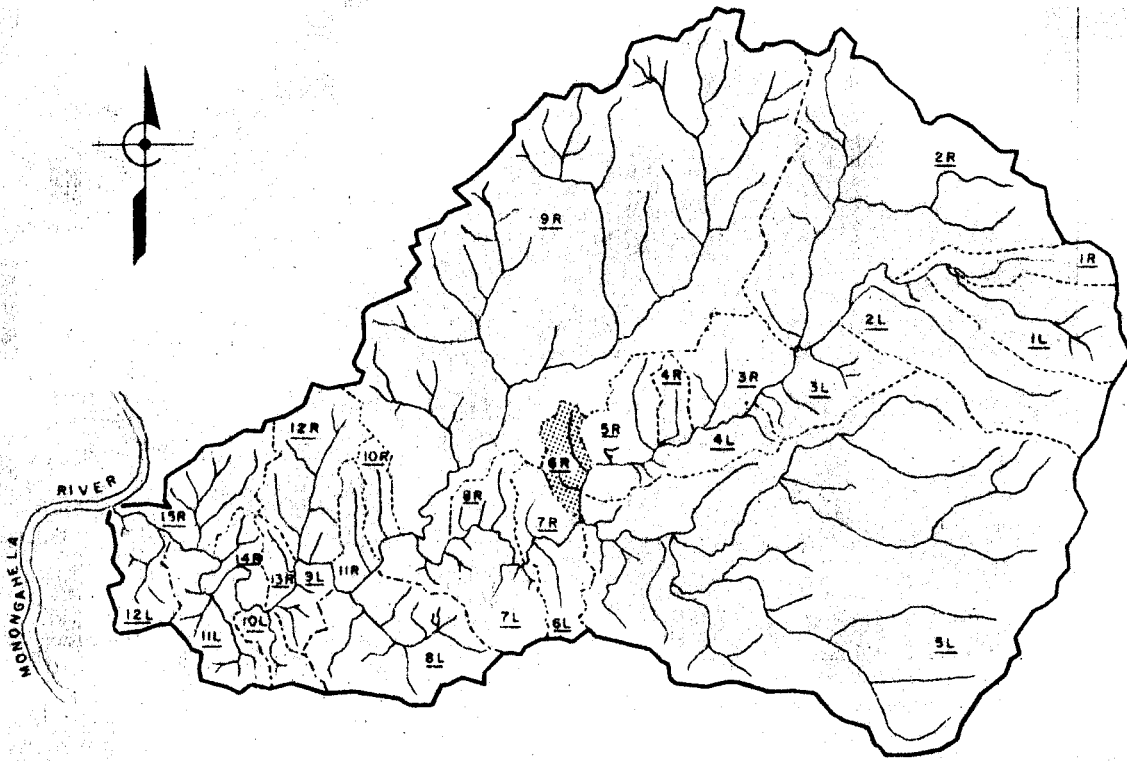
The following information gives the combined averages of the sampling stations designated as GC6R1, GC6R2, and GC6R3, all un-named. They are located on Drawing 7316-7, while their individual averages are shown in Table 44. In the case where more than one tributary contributes to a sub-watershed, the 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 listed.

	<u>Averages</u>		<u>Percent of Total Watershed</u>
pH	5.9		
Net Hot Acidity	132	PPD	0.55%
Ferrous Iron	1	PPD	12.50%
Total Iron	5	PPD	0.16%
Sulfate	474	PPD	0.69%
Flow	311,040	GPD	0.52%





TABLE 44
 TRIBUTARY AVERAGE WATER QUALITY DATA
 Sub-watershed
 6R

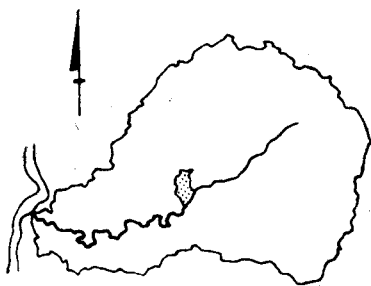
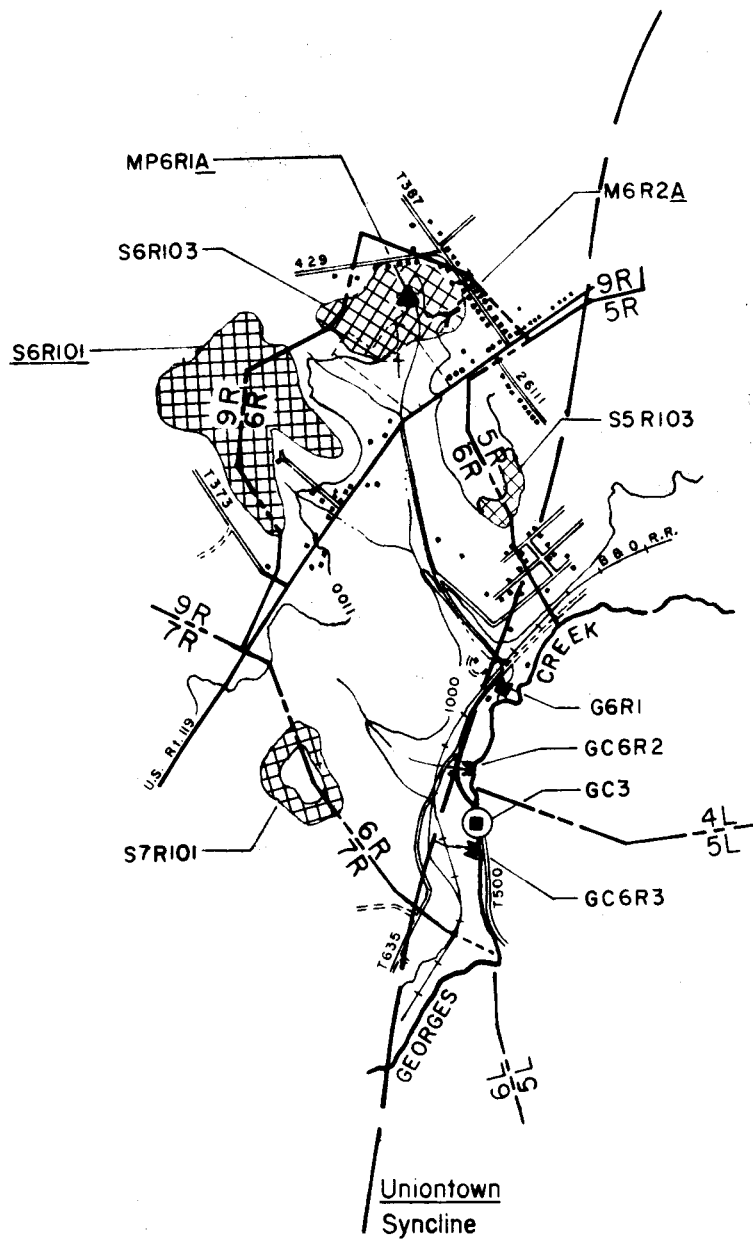
Station	pH	Hot Acid		Alkalinity		Net Hot Acid		Ferrous Iron		Iron as Fe		Sulfate		Flow	
		PPM	#/Day	PPM	#/Day	PPM	#/Day	PPM	#/Day	PPM	#/Day	PPM	#/Day	GPM	G.P.D.
GC6R1	4.3	130.00	177.57	1.33	2.60	128.67	174.97	0	0	2.73	4.20	240.83	383.02	152	218,880
GC6R2	6.4	7.00	5.83	48.00	45.26	0	0	0	0	.37	.22	107.50	87.42	61	87,840
GC6R3	6.9	39.33	.83	127.33	4.43	0	0	1.21	.04	2.56	.10	132.33	3.55	3	4,320

Location Plan



LEGEND FOR THE FOLLOWING PLATES

- Y DEEP MINE OPENING (M9R59A)
- ▲ DEEP MINE PIPE (SAMPLE STATIONS - MP5L2A, or BH9R2)
- M 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



KEY PLAN

MAP OF SUB-WATERSHED 6R

(UN-NAMED)

SCALE: 1" = 2000'

Deep Mines

The Commonwealth records indicate that there are no deep mines in this sub-watershed. Our field investigations located 2 deep mines with 2 openings, both of which are flowing. Table 45 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, permit numbers, acres and seam mined, mine opening designation, openings with flows, and estimated elevation of the openings.

Table 46 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: GC6R1, GC6R2, and GC6R3, all un-named. 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 45
 ABANDONED DEEP MINES
 Sub-Watershed
 6R

Mine Number	Name of Mine or Operator	Strip Mine Connection	Mine Map Obtained	Area Mined (Acres)	Seam Mined	Opening No.	Elev. of Opening	Flow	Permit Number
M6R1	Unknown	S6R103	-	-	PGH *	MP6R1A	1100'	Yes	-
M6R2	Unknown	S6R103	-	-	PGH *	M6R2A	1100'	Yes	-

TABLE 46
 ABANDONED DEEP MINE AVERAGE WATER QUALITY DATA
 Sub-Watershed
 6R

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.
M6R1	3.1	300	28.85	0	0	300	28.85	2.24	.22	13.91	1.34	300	28.85	8	11,520
%	-	-	-	-	-	-	21.41%	-	550%	-	29.65%	-	6.09%	-	3.70%
M6R2	3.3	106	12.74	0	0	106	12.74	4.48	.54	14.57	1.77	250	30.05	10	14,400
%	-	-	-	-	-	-	9.66%	-	1350%	-	39.07%	-	6.34%	-	4.63%

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*Assumed

Deep Mine M6R1

General Description:

This deep mine is located in Smithfield north of the cemetery and south of T 429. The only opening, a mine pipe, is located on Strip Mine S6RI03 near a patch of pine trees and is flowing. It is assumed that the Pittsburgh coal seam was mined. The opening can be seen on the map of Sub-watershed 6R.

Recommendations:

This mine pipe is assumed to be draining a portal which has been air-sealed and covered. The air seal was probably not designed to withstand a head caused by hydrostatic pressure. Therefore, it must be replaced by a hydraulic seal which would eliminate the flow from this portal. This should be done before any reclamation of the strip mine is commenced.

Costs:

Known	1 seal	\$25,000
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Deep Mine M6R2

General Description:

This deep mine is located in Smithfield northeast of the cemetery and northwest of the intersection of Route 119 and T 429. The only opening found is located on the southeastern edge of Strip Mine S6R103 in an area vegetated by brush and locust saplings. It is partially caved in and flowing. It is assumed that this deep mine exploited the Pittsburgh coal seam. The opening is shown on the map of Sub-watershed 6R.

Recommendations:

A hydraulic seal should be placed in the opening to eliminate the flow. This should be accomplished prior to any reclamation of Surface Mine S6R103.

Costs:

Known	1 seal	\$25,000
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strip Mines

The Commonwealth records indicate there are 3 strip mines in this sub-watershed. Our field investigations located 2 surface mines with 1 having a flow. Table 47 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 6R is 67.02 acres or 20.68% of the total sub-watershed land area.

Table 48 gives the averages of the abandoned surface mine flow. Directly under the averages are the percentages of flows and pollution loads that it contributes to the pollution load of the sub-watershed as measured at the following sampling stations; GC6R1, GC6R2, and GC6R3.

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

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

Following Table 48 are the descriptions of the flowing strip mines along with abatement recommendations.

TABLE 47
 ABANDONED SURFACE MINES
 Sub-Watershed
 6R

Mine Number	Name of Mine or Operator	Permit No.	Area Mined (Acres)	Seam Mined	Flowing	Connection w/Deep Mine
S6R101	Holly Coal Co.	461M51	46.82	PGH	Yes	--
S6R103	Unknown	--	20.2	PGH *	No	M6R2A MP6R1A

TABLE 48
 ABANDONED SURFACE MINE AVERAGE WATER QUALITY DATA
 Sub-Watershed
 6R

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.
S6R101	3.0	2100	451.9	0	0	2100	451.9	0	0	20.44	4.29	3000	643.1	60	86,400
%	-	-	-	-	-	-	342.5%	-	0%	-	94.91%	-	135.68%	-	27,28%

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* Assumed

Strip Mine S6RIO1

General Description:

This strip mine is located about 3,500 feet northwest of Smithfield. It is also 500 feet north of the T 373 and U.S. Route 119 intersection. It is bisected by the 6R- 9R Sub-watershed boundary line. An air strip lies on the northern portion. The strip is completely reclaimed through grading and revegetation. The vegetative cover is thick and consists of grasses and trees. No highwall, gob piles, or depressions were evidence at this site. No sign of any deep mining could be found here. Four leaches flow from the strip mine, which is shown on the map of Sub-watershed 6R.

Recommendations:

The source of water for the leaches is assumed to be excessive surface water which is impeded by the vegetative cover and not sufficiently reduced by the evapo-transpiration process. This excess moisture eventually percolates into the spoil and emerges at the leaches. Therefore, a ditch system at strategic places will remove the drainage quickly and prevent much of the percolation.

Costs:

Ditches	4,500 feet@ \$1/foot	\$4,500
Grubbing (minimal)		<u>500</u>
		\$5,000

Recommendations

Table 49 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 50 lists the sources abated, the amount of beneficiation, and the costs associated with each plan.

The distance from Sampling Station GC6R1 to the next polluting tributary downstream, GC7R2, is 1.37 miles. This is the minimum distance on Georges Creek that would benefit from the recommended work.

TABLE 49
RECOMMENDED ABATEMENT PROCEDURES - COST BENEFCATION
SUB-WATERSHED
6R

Rank	Mine No.	TOTAL COSTS		COST \$/POUND ACID REMOVAL		Total Acid Abated PPD	Total Iron Abated PPD	% of Total Sub-Watershed	
		Known Sources	Potential Sources	Known Sources	Potential Sources			Acid	Iron
1	S6R101	\$ 5,000	\$ 5,000	\$ 14.75	\$ 14.75	338.93	3.22	257%	64%
2	M6R1	25,000	25,000	1,155.27	1,155.27	21.64	1	16%	20%
3	M6R2	25,000	25,000	2,615.06	2,615.06	9.56	1.33	7%	27%

TABLE 50
BENEFCATION - RECOMMENDED PLANS
SUB-WATERSHED
6R

PLAN	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	3	370.13	280%	5.55	111%	526.51	111%	\$ 55,000	\$ 55,000
B	1	338.93	257%	3.22	64%	482.33	102%	5,000	5,000

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