

## SUMMARY & CONCLUSIONS

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The Slippery Rock Creek Watershed, exclusive of North Branch and Muddy Creek areas has a recorded mining history dating from 1885 to present. During that time, 75 million tons of coal have been removed from the study area consisting of 25 million tons of deep mined coal and 50 million tons of strip mined coal. As a result of this mining activity, there is a total of 13,700 acres of strip mine affected area and 52 major deep mines plus numerous small deep mines having a combined total of 263 known openings.

In the total strip mine area there are 2,700 acres of affected area which have acid discharges. Of the total 263 deep mine openings, there are 156 that require hydraulic sealing. In addition to the deep and strip areas, there are numerous refuse piles, mine appurtenances, and abandoned oil and gas wells that are contributing pollution to the watershed.

The magnitude of the mine drainage problem for the Study Area as computed from monthly source sampling data and chemical analyses is shown in tabular form below:

### Monthly Mine Drainage Discharge Characteristics

<u>1969</u>	<u>Flow</u> <u>mgd.</u>	<u>Acid Load</u> <u>lbs./day</u>	<u>Sulfates</u> <u>lbs./day</u>	<u>Iron</u> <u>lbs./day</u>
Jan.	14.76	14,214	50,310	943
Feb.	15.25	13,522	44,087	692
Mar.	12.86	7,177	24,859	484
April	17.32	11,823	39,648	770
May	16.05	9,639	40,211	620
June	6.40	5,981	20,986	492
July	6.57	7,249	24,702	403
Aug.	4.85	4,936	17,255	319
Sept.	4.16	4,350	17,450	275
Oct.	3.93	4,169	17,290	257
Nov.	5.63	4,421	18,119	328
Dec.	14.16	10,210	39,362	751

The range of total acid load was found to vary widely from about 2 tons (Oct. 1969) to 7 tons (Jan. 1969) per day. The average acid

contribution is approximately 4 tons per day for the Slippery Rock Creek Watershed area included in the study. Of this pollution load, 53% or about 4,200 pounds of acid per day is caused by discharges from abandoned underground mines, and 47% of 3,800 pounds is attributable to drainage from strip mine affected areas.

The following is a summary of the major points to be emphasized concerning the mine drainage problem, with regard to acid load, and the types of mining inventoried for the Slippery Rock Creek Watershed.

Type of Mining Inventory and Average Load

	<u>Strip Mines</u>	<u>Deep Mines</u>
Total .....	13,700 acres	263 openings
Mine Drainage Source .....	2,700 acres	156 openings
Average Acid Load .....	3,800 lbs./day	4,200 lbs./day
Average Acid Load, Strip and Deep .....		
	8,000 lbs./day	

A direct relationship exists between the mined areas and the intensity of the pollution problem. In the heavily mined eastern portion of the watershed, the acid load from the Slippery Rock Creek Headwaters – Seaton Creek Area makes up nearly 60% of the total acid discharge in the Study Area. The East Branch of Wolf Creek receives the second highest acid loading of about 14%. Next, is Big Run with approximately 11%, followed by South Branch with 6%. Below is a summary listing of mine drainage contributions by sub-watershed areas.

Range of Mine Discharge Characteristics  
in Sub-Watershed Areas

Sub-Watershed Area	Flow, m.g.d.			Acid Load, lbs./day		
	Min.	Max.	Avg.	Min.	Max.	Avg.
SRC, headwaters	1.00	4.16	2.29	1,108	4,135	2,477
Seaton Creek	0.83	4.22	2.72	813	4,709	2,235
Wolf Cr., East Br.	0.11	0.79	0.42	310	1,988	1,116
Big Run	0.10	1.49	0.51	143	3,012	888
South Branch	0.49	4.22	1.39	283	870	475
Glade Run	0.26	1.07	0.54	61	769	312
Blacks Creek	0.17	2.65	1.04	14	698	278
Src, Bovard to Boyers	0.08	1.32	0.34	14	298	61
McMurray Run	0.10	0.76	0.29	0	467	59
SRC, Slippery Rock Area	0.01	0.09	0.04	7	97	51
Coaltown Run	0.03	1.02	0.33	4	145	42
Hogue Run	0.01	1.38	0.20	1	121	36
Wolf Creek, Redmond- Armstrong Area	0.15	0.86	0.43	4	80	34
Totals	3.34	24.03	10.55	2,762	17,389	8,063

Stream studies were conducted to determine the collective effect of mine drainage on water quality in the watershed.

Degradation of water quality was found to exist in the upper reaches of Slippery Rock Creek from Argentine to Bovard. This is due specifically to acid mine waters originating in the headwaters - Seaton Creek Area. The level of pollution is such that the affected stream is essentially a sterile environment. Neutralization and recovery of minimal alkalinity takes place between Bovard and the Cooper Block Plant. Lesser quantities of acid are introduced from the Big Run and Glade Run Watersheds in this zone. With the addition of Wolf Creek, a fairly stable alkaline quality of water is established.