POLLUTION SOURCES

There are two major sources of pollution in the study area. These sources are coal mine drainage and raw sewage. Two additional sources of pollution, silt content in streams and leachates from silt and culm banks, become important locally. Silting operations at the active mines and breakers as well as silt piles located on or near the banks of the streams contribute large amounts of silt during heavy rainfalls which overload the streams. The locations of many of these refuse piles are shown in Plates A and B. The silt, particularly in the Shenandoah Creek, changes the streams from their usual color to a muddy black color and forms large deposits of silt banks along the streambeds.

Water percolating through the numerous refuse piles picks up acid and other oxidation products, if enough pyrite is available, before emerging as seepage discharges at the bottom of the piles. Examples of this type of discharge are the refuse piles near the Hammond Bore Hole (Site 25, Plate B) and along the stream banks at several points along the Shenandoah Creek. While the amounts of acid produced may be important locally, acid production is usually insignificant in comparison to the volume of the mine discharges.

One of the major sources of pollution to the streams is raw sewage. As of this writing the only sewage treatment plants in the watershed is a small plant located in Trevorton, and a plant located in Ashland. All of the other towns in the area discharge their wastes into the streams. The high pH and alkalinity of sewage aid in the neutralization of acid mine discharges in the streams. This affect is probably a much stronger influence on the acidity in the stream under most conditions than the acid produced by the oxidation of ferrous iron in the streams.

Coal mine drainage, the result of thirty-one mine discharges in the watershed, is the most important source of water pollution in the region. The distribution of these discharges is dependent on the locations of the many mine openings found in the watershed. As the level of the mine pools fluctuate in response to climatic conditions, mine discharges may disappear only to reappear after heavy rainfalls. Many of the discharge flows are affected by rainfall. This can be seen in the Appendix where monthly variations of the discharges are given. The location of all discharge points and their relation to the mining features of the watershed are shown in Plates A and B. The discharge parameters, such as which mine pool the discharge drains and the type of overflow, are given in Table 8 along with the land ownerships where these discharges are located. Descriptions of all discharges are discussed in groups where possible, the details being included in the Appendix.

The total mine drainage flow in the Mahanoy Creek watershed is 84.32 MGD. Of the thirty-one discharges in the watershed, only twelve discharges account for almost 91 percent of the total flow. Most of the discharges and hence a large portion of the total mine drainage flow (71%) is concentrated from Ashland east to Delano (the eastern half of the watershed.)

TABLE 8

DISCHARGE PARAMETERS

SAMPLE NO.	DESCRIPTION	SURFACE AND MINERAL RIGHTS OWNER
1	Headwaters Mahanoy Creek Discharge (Elevation 1370 Feet) Drains: Portion of Park Nos. 1 & 2 Mine Pool. Outfall: Morris Colliery Tunnel Overflow.	Natural Coal Co.
4	Mahanoy City Bore Hole Discharge (Elevation 1245 Feet) Drains: Vulcan-Buck Mountain Mine Pools. Outfall: Mahanoy City Bore Holes Overflow.	Leigh Service and Supply Corp.
7	Gilberton Shaft Discharge Drains: West Bear Ridge, Lawrence, East Bear Ridge, and Gilberton Mine Pools. Outfall: Gilberton Shaft (Pumping Station).	Gilberton Lawrence Fuel Inc.
10	Girardville No. 1 Discharge (Elevation 1005 Feet) Drains: Portion of Girard Mine Pool. Outfall: Overflow of Old Girard Workings.	Girard Estate
11	Girardville No. 2 Discharge (Elevation 1005 Feet) Drains: Portion of Girard Mine Pool. Outfall: Overflow of Old Girard Workings.	Girard Estate
12	Girardville No. 3 Discharge (Elevation 980 Feet) Drains: Portion of Girard Mine Pool. Outfall: Overflow of McTurks Bore Hole.	Girard Estate

TABLE 8 (Continued)

SAMPLE NO.	DESCRIPTION	SURFACE AND MINERAL RIGHTS OWNER
13	Girardville No. 4 Discharge (Elevation 1000 Feet) Drains: Portion of Girard Mine Pool. Outfall: Overflow of Girard Colliery Tunnel.	Kalinowski, Edward
15	Packer No. 5A Discharge (Elevation 966 Feet) Drains: Portions of Packer No. 5, Weston, William Penn, Kohinoor, West Shenandoah, Kehley Run, Indian Ridge, Maple Hill, Shenandoah City, Knickerbocker, North Mahanoy, Mahanoy City, Primrose, and Park Nos. 1 and 2 Mine Pools. Outfall: Packer No. 5 East Overflow.	Girard Estate
16	Packer No. 5B Discharge (Elevation 952 Feet) Drains: Same Mine Pools as Packer No. 5A Discharge. Outfall: Packer No. 5 West Overflow.	Girard Estate
21	Lost Creek Discharge (Elevation 1205 Feet) Drains: Portion of Weston Mine Pool. Outfall: Overflow of Buck Mountain Bed, West Slope.	Girard Estate
23	Lost Creek Ball Field Discharge (Elevation 1030 Feet) Drains: Portions of Weston and William Penn Mine Pools. Outfall: Packer No. 2 Overflow.	Girard Estate
25	Hammond Bore Hole Discharge (Elevation 1000 Feet) Drains: Hammond Mine Pool. Outfall: Hammond Bore Hole Overflow.	Girard Estate
26	Hammond Discharge (Elevation 1020 Feet) Drains: Portion of Hammond Mine Pool. Outfall: Hammond Mine Pool Overflow.	Girard Estate

TABLE 8 (Continued)

SAMPLE NO.	DESCRIPTION	SURFACE AND MINERAL RIGHTS OWNER
28	Connerton No. 1 Discharge (Elevation 980 Feet Average) Drains: Portion of Packer No. 5 Mine Pool. Outfall: Connerton Tunnel Overflow.	Girard Estate
29	Connerton No. 2 Discharge (Elevation 960 Feet) Drains: Portion of Packer No. 5 Mine Pool. Outfall: Connerton Overflow.	Girard Estate
31	North Girardville Discharge (Elevation 1020 Feet) Drains: Portion of Bast Mine Pool. Outfall: Preston No. 2 Overflow.	Girard Estate
32	South Preston Discharge (Elevation 960 Feet) Drains: Preston No. 3 Mine Pool. Outfall: Preston No. 3 Tunnel Overflow.	McDonald, Joseph
34	North Preston Discharge (Elevation 930 Feet) Drains: Portion of Bast Mine Pool. Outfall: Preston No. 1 Tunnel Overflow.	Reading Anthracite
36	Centralia Tunnel Discharge (Elevation 984 Feet) Drains: Centralia and Continental Mine Pools. Outfall: Centralia Tunnel.	Reading Anthracite
38	Bast Discharge (Elevation 874 Feet) Drains: Germantown and Bast Mine Pools. Outfall: Bast Tunnel (Overflow from Diamond Vein).	Philadelphia & Reading Corp.
40	Ashland No. 1 Discharge (Elevation 875 Feet) Drains: Portion of the Tunnel Mine Pool. Outfall: Tunnel Colliery, East Overflow.	Schuylkill Carbon Fuels Inc.
41	Ashland No. 2 Discharge (Elevation 875 Feet) Drains: Portion of the Tunnel Mine Pool. Outfall: Tunnel Colliery, West Overflow.	Schuylkill Carbon Fuels Inc.

TABLE 8 (Continued)

SAMPLE NO.	DESCRIPTION	SURFACE AND MINERAL RIGHTS OWNER
42	Ashland No. 3 Discharge (Elevation 876 Feet) Drains: Portion of the Tunnel Mine Pool. Outfall: Orchard Drift Overflow.	Borough of Ashland
48	Big Run No. 1 Discharge (Elevation 979 Feet) Drains: Potts Mine Pool. Outfall: Diamond Breach Overflow.	Reading Anthracite
49	Big Run No. 2 Discharge (Elevation 980 Feet) Drains: Potts Mine Pool. Outfall: Holmes Drift Overflow.	Reading Anthracite
53	Mowry Discharge (Elevation 1080 Feet) Drains: Locust Gap Mine Pool. Outfall: Laural Hill Slope Overflow.	Mourer, Clayton and Cora
54	Helfenstein Tunnel Discharge (Elevation 710 Feet) Drains: Locust Gap Mine Pool. Outfall: Helfenstein Tunnel.	Border: Zimmerman, K & Miller, Merl and Myrna
56	Doutyville Tunnel Discharge (Elevation 700 Feet) Drains: Locust Gap Mine Pool. Outfall: Doutyville Tunnel.	Shinskie, Kenneth J. and Vrona, John
62	North Franklin Overflow Discharge (Elevation 875 Feet) Drains: North Franklin Mine Pool. Outfall: Abandoned Pump House (Includes Rennie Tunnel).	Reserve Carbon Corp.
63	South Trevorton Discharge (Elevation 840 Feet) Drains: North Franklin Mine Pool. Outfall: North Franklin Overflow (Old North Franklin Mine Workings).	Reserve Carbon Corp.
65	Sunshine Mine Discharge (Elevation 855 Feet) Drains: North Franklin Mine Pool. Overfall: Sunshine Mine Overflow.	Stinehart Coal Co.

MAHANOY CITY GROUP DISCHARGES

The Headwaters Mahanoy Creek Discharge (1), which seeps from an abandoned slope located 1-1/2 miles east of Mahanoy City, is considered the headwaters of Mahanoy Creek (see Plates A and B). The slope drains a small portion of the Park No's 1 and 2 Mine Pool via the Morris Colliery Tunnel, and discharges AMD at an elevation of 1370 feet ±. The flow from the discharge fluctuates greatly and during extremely dry periods ceases to flow. Over the length of the study period the average flow was 0.24 MGD, with a pH of 3.4 and an acid concentration of 167 ppm. The iron and sulfate contents are 1.67 and 200 ppm respectively. The discharge contributes 315 lbs/day acid, 3 lbs/day iron, and 363 lbs/day sulfate into the Mahanoy Creek.

The Mahanoy City Bore Hole Discharge (4) flows from a series of bore holes located just off the south side of Route 54 at the eastern edge of Mahanoy City. During periods of heavy precipitation another bore hole located approximately 600 feet due east of the previously mentioned bore holes, also overflows. The average flow from the discharge is 7.31 MGD, with a pH of 4.6 and an acid concentration of 140 ppm. The average iron and sulfate contents are 11.21 and 229 ppm respectively. During the study period, an average of 6878 lbs/day acid, 724 lbs/day iron, and 14,658 lbs/day sulfate entered Mahanoy Creek from this discharge.

The bore holes which overflow at an elevation of 1245 feet, drain the Vulcan-Buck Mountain Mine Pool. The area contributing to the mine pool, and hence, the discharge, encompasses roughly 2.2 square miles east and northeast of Mahanoy City. The entire area is scattered with strip pits and waste piles, with the strip pits being relatively small and overgrown with vegetation. The Mahanoy City Bore Hole Discharge flows into Mahanoy Creek, but at the confluence the discharge is actually a much larger flow than the creek itself. This is one of the more significant pollution sources accounting for 8.7 percent of all mine drainage entering Mahanoy Creek.

GILBERTON SHAFT DISCHARGE

The Gilberton Shaft Discharge (7) consists of a pumping station located at the eastern end of Gilberton, that intermittently pumps water from the mine pools below. The purpose of the pumping station is to maintain the elevation of the mine pool at a sufficient level so no flooding of basements occurs in the area. During periods of heavy precipitation the pump is in operation almost constantly, and conversely during dry periods the pump is seldom in use. The pump which delivers water to Mahanoy Creek at the rate of 14.41 MGD, is considered to be in operation 40 percent of the time. The discharge has a pH of 6.3 and has a net acidity of 55.2 ppm. The iron and sulfate concentrations are 59.28 and 862 ppm. The Gilberton Shaft Discharge accounts for 3534 lbs/day acid, 3793 lbs/day iron, and 55,185 lbs/day sulfate which enter Mahanoy Creek.

The mine pools drained by the Gilberton Shaft Discharge include the West Bear Ridge, Lawrence, East Bear Ridge, and the Gilberton Mine Pools, also included may be the St. Nicholas, Boston Run and the Tunnel Ridge Mine Pools. 3.2 square miles of land contributes water to the discharge with most of it strip mined. The area is scattered with waste and silt piles, and numerous strip pits, with little if any vegetative cover.

GIRARDVILLE DISCHARGES

The Girardville Discharges are a series of four discharges located along the south bank of Mahanoy Creek just east of Girardville. In addition a series of seepages occurs along the creek from sample site 9 to 14. The surface area contributing to the discharges is located south and southeast of Girardville, and includes 0.93 square miles, of which 0.46 have been stripped. The strip pits run along the base of Ashland Mountain trapping all surface runoff and directing it into the Girard Mine Pool. Although all discharges drain the same mine pool, their water quality differs significantly. Girardville No's 1, 2 and 3 consist of two adjacent discharges which are sampled as one, resulting in three rather than six discharges.

The Girardville No. 1 (10) and the Girardville No. 2 (11) Discharges are both overflows of the old Girard Workings at elevation 1005 feet ±. The Girardville No. 1 Discharge has a flow rate of 1.99 MGD with a pH of 5.9 and a net acidity of 24 ppm. The discharge contributes 450 lbs/day acid, 422 lbs/day iron, and 7823 lbs/day sulfate into Mahanoy Creek. The iron and sulfate concentrations are 25.34 and 466 ppm respectively. The Girardville No. 2 Discharge has a flow rate of 0.63 MGD and chemical characteristics similar to those just mentioned. The pH is 6.4 with a net alkalinity of 4 ppm, while the iron and sulfate contents are 18.68 and 429 ppm respectively. The Girardville No. 2 Discharge accounts for 37 lbs/day alkalinity, 98 lbs/day iron and 2283 lbs/day of sulfate which enter Mahanoy Creek.

The Girardville No. 3 Discharge (12) is an overflow of McTurks Bore Hole at elevation 980 feet ±. The pH is 5.9, with a net acidity of 38 ppm. The iron and sulfate contents are 15.55 and 324 ppm respectively. The flow rate is 0.28 MGD. An average of 86 lbs/day net acidity, 36 lbs/day iron, and 750 lbs/day sulfate enter Mahanoy Creek from this discharge.

The Girardville No. 4 Discharge (13) overflows the Girard Colliery Tunnel at 1000 feet ±. The flow is quite small averaging only 0.06 MGD with pH 3.7 and acid concentration of 99 ppm. The iron and sulfate contents are 10.71 and 352 ppm. The Girardville No. 4 Discharge contributes 45 pounds of acidity, 5 pounds iron, and 170 pounds of sulfates daily to Mahanoy Creek.

PACKER GROUP DISCHARGES

The Packer No. 5A Discharge (15) surfaces at the eastern end of Girardville through the Packer No. 5 East Overflow. The discharge flows westward through a series of ditches and culverts before entering Mahanoy Creek. The elevation of the outfall is 966 feet ±, and the flow which fluctuated significantly during the study period averaged 12.25 MGD. The discharge pH is 6.3 and has a net alkaline concentration of 115 ppm, while the iron and sulfate contents are 30.28 and 1037 ppm respectively. The pollution loads entering Mahanoy Creek from the discharge are 12,136 lbs/day net alkalinity, 3118 lbs/day iron and 101,404 lbs/day sulfates.

The Packer No. 5B Discharge (16) surfaces from a series of openings west of the 5A Discharge and flows directly into it.. The discharge's outfall is the Packer No. 5 West Overflow and emerges at an elevation of 952 feet ±. This discharge drains the same area as that drained by the Packer No. 5A Discharge. The average flow from the 5B Discharge is 14.54 MGD with a pH of 6.3 and a net alkaline concentration of 107.2 ppm. The iron and sulfate contents are 31.62 and 1235 ppm respectively. The Packer No. 5B Discharge contributes 13,071 lbs/day net alkalinity, 3875 lbs/day iron and 152,866 lbs/day sulfates to Mahanoy Creek. The combined flows of the Packer Discharges account for 31.7 percent of the total mine drainage entering Mahanoy Creek.

Through a series of barrier pillar breaches, the Packer Discharges drain all or portions of 14 different mine pools, these include the Packer No. 5, Weston, William Penn, Kohinoor, West Shenandoah, Kehley Run, Indian Ridge, Maple Hill, Shenandoah City, Knickerbocker, North Mahanoy, Mahanoy City, Primrose, and the Park No's 1 and 2 Mine Pools. Approximately 30 square miles of surface area, stretching from Girardville eastward to Mahanoy City and northward to the watershed boundary, contributes water to the mine pools. Included in the area are some 11.9 square miles containing strip mines and waste piles. The most disturbed areas are those along Bear Ridge southeast of Lost Creek, and northwest of Mahanoy City. The stripped areas are characterized by large deep pits with near vertical slopes and huge piles of waste rock, little if any vegetation is present. A number of silt piles can be found in this area, most notably those along Mahanoy Creek from below Mahanoy City to Gilberton and again along North Mahanoy Creek.

The upper slopes of Locust Mountain north of Shenandoah through Mahanoy City has no coal, and therefore has not been disturbed by mining. Lost Creek, Kehley Run, Waste House Run and North Mahanoy Creek, all of which are unpolluted, drain this area. In the case of Lost Creek, Waste House Run and Kehley Run, the water flows down the mountain, only to be intercepted by crop falls or stripping pits where the water is directed to the mine pools and later becomes a portion of the AMD that flows from the Packer

Discharges. These unpolluted streams draining Locust Mountain contribute approximately 3.52 MGD to the Packer Discharges.

Within the area being drained by the Packer Discharges, are four additional discharges. These discharges drain portions of mine pools also being drained by the Packer Discharges.

The Lost Creek Discharge (21) is a very minor discharge located 2000 feet northeast of the village of Lost Creek. The discharge has an average flow of 0.15 MGD. The pH is 4.0 and the acid content is 23 ppm. The iron and sulfate concentrations are 0.47 and 160 ppm respectively. The discharge which generates 35 lbs/day acidity, 1 lb/day iron, and 197 lbs/day sulfates, is an overflow of the West Slope to the Buck Mountain Bed at elevation 1205 feet. The discharge which drains a portion of the Weston Mine Pool, is presently entering a mine slope at the bottom of an abandoned strip mine.

The Lost Creek Ball Field Discharge (23) is located in the village of Lost Creek. The discharge whose outfall is the Packer No. 2 Overflow at elevation 1030 feet ±, drains portions of the Weston and William Penn Mine Pools. The discharge, which enters Shenandoah Creek, flowed intermittently during the study period in response to mine pool level changes due to precipitation, with an average flow of 0.61 MGD. The pH value was 6.4, with a net alkaline, concentration of 49 ppm. The iron and sulfate concentrations were 21.5 and 929 ppm. An average of 434 pounds net akalinity, 183 pounds iron and 8314 pounds sulfates enter Shenandoah Creek from this discharge.

The Connerton No. 1 Discharge (28) (1.3 percent of the total mine drainage flow) which overflows the old Connerton Tunnel at elevation 980 ±, drains a portion of the Packer No. 5, and possibly the Hammond Mine Pools. The discharge emerges at a series of locations near the northeastern edge of Girardville before flowing through a swamp and then entering Shenandoah Creek. The average flow from the discharge is 1.10 MGD with a pH of 6.7 and a net alkalinity of 234 ppm. The iron and sulfate contents are 2.80 and 865 ppm respectively. The Connerton No. 1 Discharge contributes 2200 lbs/day net alkalinity, 26 lbs/day iron and 7571 lbs/day sulfates to Shenandoah Creek.

The Connerton No. 2 Discharge (29) located at the. eastern edge of Girardville also enters Shenandoah Creek. The discharge drains a portion of the Packer No. 5 Mine Pool through the Connerton Overflow at elevation 960 feet ±. Although the flow is not significant it is quite constant, averaging 0.13 MGD during the study period. The pH of the discharge is 6.4, with an alkaline concentration of 100 ppm. Both the iron and sulfate contents are very high being 34.93 and 1097 ppm respectively. The discharge accounts for 88 lbs/day of net alkalinity, 36 lbs/day of iron, and 1134 lbs/day of sulfates which enter Shenandoah Creek.

HAMMOND DISCHARGES

Located 6000 feet northeast of Girardville, the Hammond Bore Hole Discharge (25) (3 percent of the total mine drainage) drains the Hammond Mine Pool. The discharge which is an overflow of the Hammond Bore Hole at elevation 1000 feet ±, drains to Shenandoah Creek. The 1.34 square miles of land that contributes water to the mine pool, has been almost entirely disturbed by mining. Although the area has a relatively small number of strip pits, a vast number of waste piles dominate the entire region.

The average flow from the discharge is 2.53 MGD and is quite consistent. The pH is 6.2 with an alkalinity of 80 ppm. The iron and sulfate concentration are extremely high being 45.86 and 1002 ppm respectively. An average of 1542 lbs/day net alkalinity, 978 lbs/day iron and 20,546 lbs/day sulfates are introduced into Shenandoah Creek by the Hammond Bore Hole Discharge.

Also draining a small portion of the Hammond Mine Pool is the Hammond Discharge (26). The discharge located 300 feet northeast of the Hammond Bore Hole Discharge flows only during wet periods. The average flow during the study period was 0.01 MGD, with a pH of 4.1 and an acid concentration of 211 ppm. The iron and sulfate contents are 15.31 and 1171 ppm. The discharge is an overflow of an exposed portion of the Hammond Mine Pool at elevation 1020 feet ±, and contributes 35 lbs/day acidity, 3 lbs/day iron and 183 lbs/day of sulfates to Shenandoah Creek.

SOUTH PRESTON DISCHARGE

The South Preston Discharge (32) (1.2 percent of the total mine drainage) is located in the southwest section of Girardville and overflows the old Preston No. 3 Tunnel at an elevation of 960 feet ±. The discharge which enters Mahanoy Creek has a relatively consistent flow which averages 1.04 MGD. The pH of the discharge is 6.5 with a net alkaline concentration of 29 ppm. The average iron content is 14.26 ppm while the sulfate content is 240 ppm. The South Preston Discharge contributes 291 lbs/day net alkalinity, 114 lbs/day iron, and 1864 lbs/day of sulfates to Mahanoy Creek.

The discharge drains the Preston No. 3 Mine Pool which is located southwest of Girardville. Approximately 0.60 square miles of strip mine overlie the mine pool and an additional 0.31 square miles of undisturbed land on the upper slope of Ashland Mountain contributes to the discharge. The stripping are characterized by long narrow pits which follow the contour of the land very closely. The vegatative growth on the stripped areas varies from next to nothing to a dense thicket.

CENTRALIA TUNNEL DISCHARGE

The Centralia Tunnel Discharge (36) is located approximately 5000 feet northeast of the eastern edge of Ashland. The discharge overflows the old Centralia Drainage Tunnel at an elevation of 984 feet ±, and flows south 0.50 miles through a rocky, steep, ravine before entering Mahanoy Creek. The discharge is quite acidic with a pH of 3.4, and an acid concentration of 219 ppm. The iron and sulfate contents are 10.57 and 607 ppm respectively. The average flow is 9.83 MGD which accounts for 11.7 percent of the total mine drainage. The Centralia Tunnel Discharge contributes a very large amount of acid to Mahanoy Creek, 17,453 lbs/day, along with 858 lbs/day iron and 46,453 lbs/day sulfates. The discharge has a long response time to precipitation but will fluctuate monthly if significant differences in monthly precipitation occur.

The Centralia Tunnel Discharge drains both the Centralia and the Continental Mine Pools. The Continental Mine Pool lies entirely within the boundaries of the Mahanoy Creek Watershed but a portion of the Centralia Mine Pool extends westward into the Shamokin Creek Watershed. An estimated 1.1 square miles of land from the Shamokin Watershed drain into Mahanoy Creek via this drainage tunnel.

Within the Mahanoy Creek Watershed some 2.1 square miles of land contributes water to the mine pools, of this total approximately 1.4 square miles have been strip mined. The stripped areas are some of the most severely disrupted in the region, characterized by huge, deep pits and vast piles of waste rock. The present drainage pattern traps much of the surface runoff in the area.

BAST GROUP DISCHARGES

The Bast Discharge (38) (3.4 percent of the total mine drainage flow) emerges from the Bast Tunnel located on the north bank of Mahanoy Creek at the very eastern edge of Ashland. The elevation of the outfall is 874 feet ± and it drains both the Germantown and the Bast Mine Pools. The flow from the discharge is quite constant, averaging 2.86 MGD with a pH of 6.3 and an alkaline, concentration of 40 ppm. The iron and sulfate contents are quite high being 30.38 and 648 ppm respectively. The discharge contributes 958 lbs/day net alkalinity, 725 lbs/day iron and 15,017 lbs/day of sulfates to Mahanoy Creek.

The Bast Discharge drains 5.6 square miles of land stretching from 2.5 miles west of Ashland to Girardville and northward to the county line. Of the total area approximately 3.8 square miles have been strip mined. The stripped areas are scattered with pits of variyng dimensions, many are overgrown with a dense thicket while others are nearly void of vegetation.

Within the area drained by the Bast Discharge, are two other minor discharges, the North Preston and the North Girardville Discharges. Both of these drain portions of the Bast Mine Pool. The North Preston Discharge (34) located 2000 feet west of Girardville, is an overflow of a wet mine seal on the old Preston No. 1 Tunnel at elevation 930 feet ±. Water which discharges at a rate of 0.45 MGD has a pH of 3.2 and an acid concentration of 349 ppm. The iron and sulfate contents are 32.13 and 977 ppm respectively. The discharge fluctuates with the amount of precipitation. At average flow, the North Preston Discharge contributes 1033 lbs/day acidity, 117 lbs/day iron, and 3742 lbs/day of sulfates to Mahanoy Creek.

The North Girardville Discharge (31) located on the northern edge of Girardville has a very minor flow of 0.07 MGD. The discharge has a pH of 6.3 and a net alkalinity of 1 ppm. The iron and sulfate contents are 40.91 and 981 ppm. Each day the discharge contributes 7 pounds net alkalinity, 26 pounds iron and 580 pounds of sulfates to Mahanoy Creek. The outfall is the Preston No. 2 Overflow at elevation 1020 feet ±. This discharge is particularly affected by precipitation with the discharge immediately increasing with rainfall.

ASHLAND DISCHARGES

The Ashland Discharges are a series of three discharges located at the southeast edge of Ashland. They all drain the Tunnel Mine Pool and flow into Mahanoy Creek.

The outfall for the Ashland No. 1 Discharge (40) is the Tunnel Colliery East Overflow at elevation 875 ±. The flow is rather consistent and averaged 0.11 MGD with a pH of 6.1 and a net acidity of 57 ppm. The iron and sulfate contents were 39.84 and 569 ppm respectively. The discharge contributes 56 pounds of net acidity, 37 pounds of iron, and 513 pounds of sulfates daily to Mahanoy Creek.

The outfall for the Ashland No. 2 Discharge (41) is the Tunnel Colliery West Overflow at elevation 875 feet ±. The average flow is 0.12 MGD with a pH of 7.1 and net alkalinity of 345 ppm. The iron and sulfate concentrations are 11.19 and 667 ppm. The discharge contributes 355 lbs/day net alkalinity, 12 lbs/day iron and 661 lbs/day of sulfates to Mahanoy Creek. Both of these discharges drain an area of approximately 1.31 square miles southeast of Ashland. Except for a large waste pile and a few shallow overgrown strip pits the area is relatively undisturbed. Disturbed aquifers may be a significant source of water for the Ashland Nos. 1 and 2 Discharges.

The Ashland No. 3 Discharge (42) whose outfall is the Orchard Drift Overflow at elevation 876 feet ±, drains 0.49 square miles of land south of Ashland. The area is dominated by a strip pit that runs the length of the mountain south of Ashland, trapping

surface water that later appears at the discharge. The average flow from the Ashland No. 3 Discharge is 0.19 MGD, with a pH of 6.3 and a net alkaline concentration of 6.6 ppm. The iron and sulfate contents are 1.16 and 191 ppm respectively. The discharge contributes 2 lbs/day net alkalinity, 2 lbs/day iron, and 279 lbs/day of sulfates to Mahanoy Creek. The Ashland No. 3 Discharge also fluctuates with precipitation.

BIG RUN DISCHARGES

Both discharges are located some 5000 feet west southwest of Ashland and drain the Potts Mine Pool; approximately 2.24 square miles of land west and northwest of Ashland contribute water to the discharges. The area has been almost completely disrupted by mining, small stripping pits and waste piles abound throughout the area. The discharges drain into Big Run.

The outfall for the Big Run No. 1 Discharge (48) is the Diamond Breach Overflow at elevation 979 feet ±. The average flow is 0.19 MGD with a pH of 6.5 and net alkalinity of 438 ppm. The iron and sulfate contents are 32.07 and 1322 ppm. The discharge does not fluctuate significantly in response to precipitation, and discharges 725 lbs/day net alkalinity, 52 lbs/day iron, and 2139 lbs/day of sulfates into Mahanoy Creek.

The Big Run No. 2 Discharge (49) (3.3 percent of the total mine drainage) overflows the Holmes Drift at an elevation of 980 feet ±. During very dry periods this discharge will cease flowing. The flow from the discharge during the study periods was 2.81 MGD, with a pH of 6.5 and net alkalinity concentration of 306 ppm. The iron and sulfate contents are 27.62 and 864 ppm. The discharge contributes 8338 lbs/day net alkalinity, 670 lbs/day iron and 20,622 lbs/day of sulfates to Mahanoy Creek.

MOWRY DISCHARGE

The Mowry Discharge (53) is located 4500 feet west of Lavelle and drains an extension of the Locust Gap Mine Pool. The discharge overflows the old Laurel Hill Slope at elevation 1080 feet ±, and flows several thousand feet down Mahanoy Mountain before entering Mahanoy Creek. Approximately 0.14 square miles of land on top of Mahanoy Mountain, including 31 acres of strip mines feed the mine pool. Most of the infiltration to the mine pool occurs through the stripped area on the north slope of the mountain. This area is characterized by long, narrow, parallel and overgrown strip pits.

The Mowry Discharge which has an average flow of 0.14 MGD, does not fluctuate significantly. The water is quite acidic with a pH of 3.7 and an acid concentration of 57 ppm. The iron and sulfate contents are 4.91 and 189 ppm respectively. The discharge contributes 62 pounds of acidity, 6 pounds iron, and 202 pounds of sulfates daily to Mahanoy Creek.

HELFENSTEIN TUNNEL DISCHARGE

The Helfenstein Tunnel Discharge (54) is located on the north bank of Mahanoy Creek, some 3500 feet east of the village of Helfenstein. The discharge emerges from the Helfenstein Drainage Tunnel at elevation 710 feet ±. The tunnel extends northward through Mahanoy Mountain and into the Shamokin Creek Watershed where it drains portions of the Locust Gap Mine Pool.

The average flow from the discharge is 1.80 MGD (2.1 percent of the total mine drainage flow), and it has a pH of 6.7 with a net alkalinity of 55 ppm. The iron and sulfate contents are 13.26 and 548 ppm respectively. The discharge accounts for 718 pounds net alkalinity, 189 pounds iron and 7342 pounds of sulfates, which enter Mahanoy Creek daily.

DOUTYVILLE TUNNEL DISCHARGE

The Doutyville Tunnel Discharge (56) is located approximately 8000 feet west southwest of the village of Helfenstein. The discharge which emerges from the Doutyville Drainage Tunnel at elevation 700 feet ±, flows southward some 300 feet through a very steep, erodable ravine, before entering Mahanoy Creek. The drainage tunnel extends northward through Mahanoy Mountain, into the Shamokin Creek Watershed where it too drains a portion of the Locust Gap Mine Pool.

The average flow from the discharge is 8.74 MGD, and accounts for 10.4 percent of all mine drainage entering Mahanoy Creek. The discharge is very acidic with a pH of 3.7 and an acid content of 161 ppm. The iron and sulfate concentrations are 22.85 and 805 ppm respectively. The discharge, which significantly affects water quality of Mahanoy Creek, contributes 11,337 lbs/day acidity, 1627 lbs/day iron and 53,947 lbs/day of sulfates to the stream.

NORTH FRANKLIN GROUP DISCHARGES

The North Franklin Overflow Discharge (62) is located 3700 feet south along the main road from Trevorton and emerges at the site of an abandoned pump house. The average flow from the discharge is 7.85 MGD and is quite acidic with a pH of 3.8 and acid concentration of 167 ppm. The iron and sulfate contents are 38.16 and 535 ppm respectively. The North Franklin Overflow Discharge which enters Zerbe Run at the western end of Trevorton, accounts for almost all (94%) of the coal mine drainage entering the stream. This discharge fluctuates over a period of time in response to the dry season but has a consistant flow over the short term. The discharge contributes 10,197 lbs/day acidity, 2420 lbs/day iron and 34,735 lbs/day of sulfates to Zerbe Run.

The outfall, which is an overflow of a bore hole which is connected to the Rennie Tunnel at elevation 875 feet ±, drains the North Franklin Mine Pool. Approximately 5.3 square miles of land located south of Trevorton between Big and Mahanoy Mountains contributes its surface runoff and/or its ground water infiltration to the mine pool. Of the total area 3.11 square miles have been strip mined. This stripped area is one of the most severely disturbed portions of the watershed, and is characterized by many huge deep pits, a number of which are waterfilled. The vegetation is very sparse. The North Franklin Overflow Discharge accounts for 9.3 percent of the total mine drainage entering Mahanoy Creek. The flow is considerably higher than Zerbe Run, completely overwhelming the stream which contains fish above its confluence with the discharge.

Also draining the North Franklin Mine Pool are two minor discharges, the South Trevorton and the Sunshine Mine Discharges.

The South Trevorton Discharge (63) is located 2700 feet south along the main raod from Trevorton. The discharge which has a very small flow of 0.17 MGD, is an overflow of the old North Franklin Mine Working at elevation 840 feet ±. The pH is 3.6 and the acid content is 80 ppm. The iron and sulfate contents are 4.06 and 185 ppm. This discharge joins the flow from the North Franklin Overflow Discharge. The South Trevorton Discharge contributes 120 pounds of acidity, 5 pounds of iron and 266 pounds of sulfates to Zerbe Run daily.

The Sunshine Mine Discharge (65) located at the base of Big Mountain, approximately 6000 feet northeast of the confluence of Zerbe Run and Mahanoy Creek, drains the western most portion of the North Franklin Mine Pool. The discharge which emerges from the Sunshine Mine Overflow at elevation 855 feet ±, has an average flow of 0.36 MGD with a pH of 3.7 and an acid concentration of 56 ppm. The iron and sulfate contents are 1.74 and 193 ppm respectively. A portion of the discharge is presently being used by the Sunshine Coal Company to wash coal. The water is retained in a holding pond until it seeps through the impoundment where along with the remainder of the discharge, it enters Zerbe Run. This discharge fluctuates considerably in response to precipitation. During average flow periods, the discharge contributes 148 lbs/day acidity, 5 lbs/day iron and 520 lbs/day of sulfates to Zerbe Run.