

Blacks Creek Restoration Plan



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SLIPPERY ROCK WATERSHED COALITION

Prepared by

BioMost, Inc. and STREAM RESTORATION INCORPORATED (non-profit)



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INTRODUCTION

Coal mining has been conducted in western Pennsylvania, as well as much of the Appalachian Coal Basin, for more than 150 years. With Pennsylvania's coal reserves playing a major role in the Industrial Revolution, the United States became a modern developed nation and major world power. This historical utilization of coal to heat our homes and to fuel our industries, however, resulted in a legacy of severe environmental impacts and public safety issues. The majority of these impacts are associated with mines operational prior to the federal Surface Mining Control and Reclamation Act of 1977 and Pennsylvania's legislative efforts including the Surface Mining Conservation and Reclamation Act of 1945.

Small towns and villages of western Pennsylvania and Appalachia, which were once bustling coal communities supporting the steel industry and electricity generation for such cities as Pittsburgh (PA), Wheeling (WV), and Johnstown (PA), are now often non-existent ghost towns left with only scarred landscapes characterized by dangerous highwalls, barren coal refuse piles, and, polluted mine drainage. According to the Pennsylvania Integrated Water Quality Monitoring and Assessment Report (PA DEP, 2006), these pollutive discharges, commonly referred to as abandoned mine drainage (AMD), are the largest source of stream degradation in the Commonwealth, with over 4,600 miles of streams impacted. Furthermore, 45 of Pennsylvania's 67 counties are impacted with over 250,000 acres of unreclaimed mine lands, 2.6 billion cubic yards of abandoned coal refuse, and about 7,800 abandoned underground mines. In many cases, entire watersheds have been completely decimated by AMD.

Since 1994, the Slippery Rock Watershed Coalition (SRWC) has been actively working to restore the severely degraded headwaters of Slippery Rock Creek. This effort has resulted in the installation of about 18 passive systems for approximately 30 abandoned mine discharges. These passive systems are currently treating over 750 million gallons of mine drainage per year eliminating about 200 tons of iron, 8 tons of aluminum, and 335 tons of acidity annually from Slippery Rock Creek and its tributaries. This reduction in pollution loading has significantly improved over 11 miles of streams with fish being observed in at least 6 miles of streams for the first time in over a century.

Much of the work completed by the SRWC to date has been based upon background data collected by the Pennsylvania Department of Environmental Protection (PA DEP) Knox District Mining Office (Knox DMO) as published in the 1998 Slippery Rock Creek Watershed Comprehensive Mining Reclamation Strategy (CMRS) Reclamation/Remediation Plan (for a 27-square mile area of the headwaters. While Blacks Creek, a major tributary in the headwaters of Slippery Rock Creek, was not included in the CMRS, a Total Maximum Daily Load (TMDL) was prepared by the Knox DMO (PA DEP, 10/20/04) and approved by the US Environmental Protection Agency (US EPA) on 01/19/05. In 2005, Stream Restoration Incorporated was awarded a US EPA 319 grant to address the BC16 abandoned mine discharge located along an unnamed tributary to Blacks Creek. Prior to utilizing these funds for construction, a watershed restoration plan was needed to provide an overview of Blacks Creek and tributaries thereto in relation to the applicable water quality criteria cited in the TMDL as well as to identify sources of degraded mine drainage. The sources were also characterized and prioritized based on pollutant loading and impact to the overall watershed. Best Management Practices (BMP), such as land reclamation and passive treatment systems, with rough cost estimates, were also described.

BLACKS CREEK WATERSHED DESCRIPTION & CHARACTERISTICS

Blacks Creek (DEP Stream Code 34731, Basin 20-C) is a major headwaters tributary and subwatershed of Slippery Rock Creek in the Ohio River Basin in western Pennsylvania. (The attached Stream Map identifies the Reach Codes from the National Hydrography Dataset developed by the USGS and EPA.) The Blacks Creek Watershed is primarily located in Marion and Venango Townships in northern Butler County with a small portion located in Irwin and Clinton Townships in southern Venango County. (See Topographic Map.) The watershed encompasses approximately 9-square miles (5,600 acres) with approximately 110,000 feet (20.8 miles) of 1st, 2nd, 3rd, and 4th order streams that flow in a generally southern direction. The Blacks Creek headwaters are characterized by spring/wetland- and abandoned mine discharge-fed tributaries. Blacks Creek enters Slippery Rock Creek about a mile west of Boyers, PA.

Surface elevations range from about 1200 to 1600 feet and contain, relatively flat, rural and forested lands with gently rolling hills of low relief. A stream gradient analysis was completed on the major tributaries of Blacks Creek by utilizing streams digitized from aerial photography (1' resolution) and a digital terrain model generated from USGS contours (20' intervals). The analysis is presented in Table I as well as on the attached Stream Gradient Map. As shown, over 70% of Blacks Creek and the major tributary (Trib 6 on the Blacks Creek Watershed Map) are considered low or very low gradient.

Table I. Stream Gradient Analysis

Gradient (% slope)	Classification	Length		Percent
		Feet	Miles	
0-0.99	very low	25275.4	4.79	38.5
1-1.99	low	20997.5	3.98	32.0
2-3.99	moderate	11483.0	2.17	17.5
4-7.99	high	6561.9	1.24	10.0
8-20	very high	1312.3	0.25	2.0
	Total	65630.1	12.43	100.0

The Blacks Creek Watershed has been extensively mined through both surface and underground methods primarily on the Middle Kittanning, Lower Kittanning, and Brookville coalbeds. Numerous abandoned mine features such as spoil piles, coal refuse piles, water-filled surface mine pits, dangerous highwalls, subsidence, and abandoned mine drainage can be seen throughout the watershed as well as successfully-reclaimed surface mines. While there are currently two active quarries on the Vanport limestone that may be removing incidental coal encountered, there are no coal mines currently in operation within the watershed. In addition to mining, the northern part of the watershed is part of the Bullion-Clintonville Oil Field, with average pay zones at a depth of about 1050 feet in the Venango Second and Third Sandstones. Petroleum exploration was reported to have begun around 1876. Numerous historic, as well as more recent, oil wells, pumping facilities, storage tanks, and piping systems are commonly observed in this portion of the watershed.

Major land uses in the Blacks Creek Watershed were documented in the Slippery Rock Creek Watershed Assessment and Restoration Plan (Beran et al, 2006) utilizing digital, orthophoto, quarter-quadrangle, aerial photographs (1993-1995) developed and published by the USGS. (See Table II.)

Table II. Land Uses in the Blacks Creek Watershed

Land Use	Watershed	
	(acres)	(%)
Woodland	3,179	57
Scrub-shrub Land	520	9
Agricultural Land	663	12
Unmanaged Land	1,097	20
Developed Land	58	1
Communities	-	0
Commercial	-	0
Water Bodies	23	0
Unvegetated Land	71	1
Total	5,611	100

WATER QUALITY

Sources of Data

Several sources of data were used to develop the restoration plan. A large portion of the data was obtained from the PA DEP Knox DMO. Other sources of data included Non-Coal Surface Mining Permits 10960301 and 10960302 for limestone quarries operated by Quality Aggregates Inc. and Allegheny Mineral Corporation, respectively, and previous restoration activities including Operation Scarlift (Gwin, 1970) and the Slippery Rock Creek Watershed Assessment and Restoration Plan (Beran et al, 2006). In addition, BioMost, Inc. collected samples both as part of developing this restoration plan as well as part of other remediation efforts.

The use of numerous sources created a significant data management challenge with many sampling locations having multiple sample names and nomenclature systems. For example, BC8, BC2, and 906-32 of the PA DEP, Beran Environmental, and BioMost, Inc., respectively, were for the same sampling location. In addition, this point was approximately the same as Allegheny Mineral sampling point 40K. After all known available data were obtained and entered into the water quality database, there were nearly 150 named sampling points. For purposes of simplifying data management, sample point locations that were similar, but with different names, were combined and renamed when necessary to provide only one designation for any given sample point location. Table III provides a key to sample point locations with multiple names. Sample points with only one name were not included in the table. Sample point locations are identified on the Blacks Creek Watershed Map.

Table III. Key to Water Sampling Points with Multiple Names

Sample Point Used	BMI	PA DEP	Beran Environmental	Quality Aggregates	Allegheny Mineral	Operation Scarlift
BC6.1	906-1	BC6.1				
906-2	906-2		DSCH BC7.2			
906-6	906-6		STRM BC7.5			
906-10	906-10	BC6A	~STRM BC7.6			
906-12	906-12	BC7				
906-15	906-15	BC6	BC7			
BC12	906-18	BC12	BC3			
QAS4	906-30	QAS4	BC1	QAS4		T4
906-31	906-31				~40L	
BC8	906-32	BC8	BC2		~ 40K	
BC11	906-33	BC11			~ 40H	
BC9	906-34	BC9			64G	
BC10	906-35	BC10			64I	
BC3	906-37	BC3	BC8			
BC1	906-38	BC1	~ BC4		65B	
BC1A	906-39	BC1A				
BC3B	906-40	BC3B				
BC4	906-41	BC4				
BC4.1	906-43	BC4.1				
BC2	905 UP	BC2	BC6			
905 WL	905 WL	BC19D				
BC2B	905 DN	BC2B	BC5			

See Selected References.

Water Quality Criteria

In this area, PA Title 25, Chapter 93 (electronically retrieved 01/31/07), designates Slippery Rock Creek and the tributaries thereto as a Cold Water Fishery with the following water quality criteria:

- Alkalinity - Min. 20 mg/L as CaCO₃, except where natural conditions are less...
- Dissolved Oxygen - For flowing waters, min. daily average 6.0mg/l...
- Iron - 30-day avg. 1.5 mg/L as total recoverable
- Osmotic Pressure - Max. 50 milliosmoles/kg
- pH - From 6.0 to 9.0 inclusive
- Total Dissolved Solids - 500 mg/L as a monthly avg. value; max. 750 mg/L

The TMDL documented that Blacks Creek was impaired with respect to metals from abandoned mine drainage, in agreement with the 2002 PA Section 303(d) list and the 2006 PA Integrated Water Quality Monitoring and Assessment Report.

Table IIIa. Blacks Creek TMDL Stream Identification

Year	Miles	Seg. ID	DEP Stream Code	Stream Name	Designated Use	Data Source	Source	EPA 305(b) Cause Code
2002	4.6	4570	34731	Blacks Creek	CWF	SWMP	AMD	Metals

Portion of Table 1. 303(d) Sub-List; State Water Plan (SWP) Subbasin: 20-C Slippery Rock Creek Watershed in Final Blacks Creek Watershed TMDL Butler County (10/20/04), EPA approved 01/19/05; Cold Water Fishes (CWF); Surface Water Monitoring Program (SWMP)

Note that the applicable water quality criteria listed in the TMDL (See Table IV.) does not correspond with that listed in Chapter 93. For instance, Subchapter 93.7 reserves the total manganese and dissolved iron criterion values for streams designated with the critical use as a Public Water Supply. For the purpose of this report, stream quality was not compared to Chapter 93 criteria. The applicable water quality criteria listed in the TMDL are to be met 99% of the time. (See Table IV.)

Table IV. TMDL Applicable Water Quality Criteria

Parameter	Criterion Value
Aluminum - Total	0.75 mg/L
Iron - Total	1.50 mg/L
Iron - Dissolved	0.3 mg/L
Manganese - Total	1.00 mg/L
pH	6.0 – 9.0 standard units

Since the primary cause of impairment to Blacks Creek is metals associated with mine drainage, decreasing the iron, aluminum, and manganese concentrations within the streams to meet the applicable water quality criteria identified in the TMDL report are the ultimate goal of this restoration plan. The average values at sample point locations were used for comparison to TMDL criteria. In instances where only one sample was collected for a given point, the single set of analyses was assumed to represent the average water quality at that location. (Please note that continued monitoring may reflect a significantly different average water quality.)

Discussion of Stream Water Quality

Table V characterizes the unnamed tributaries to Blacks Creek. (The attached Stream Map provides a key to both the Reach Codes and the “trib #”.) “Trib #” is used within the narrative and shown on the Blacks Creek Watershed Map with sample point locations.

Data were compiled or collected for every unnamed tributary, except tributaries #3 and #4. Tributary #3 was not sampled due to accessibility, but is assumed to be of good quality based upon water quality characteristics of similar tributaries in the watershed which have little or no mining in the contributory drainage area. Tributary #4 was also not sampled; however, a pH of 6.5 was measured on 10-03-06. As there was minimal flow at this location and mining was not indicated on the 7½' USGS topographic map in the contributory drainage area, a sample was not collected for laboratory analysis.

Except for a few segments, most of Blacks Creek and its tributaries have an acceptable pH and are net alkaline. This is assumed to be largely due to the influence of the persistent Vanport limestone (typically, 90% calcium carbonate content) which is <50 feet stratigraphically below the Lower Kittanning coalbed and crops out in the area. Of the 19 unnamed tributaries to Blacks Creek, 13 met all of the water quality criteria identified in Table IV.

Tributaries Not Meeting Applicable Water Quality Criteria (TMDL)

Tributary #6 meets the criteria for most of its length, except for the iron content at 906-24, which is the effluent from an in-stream, settling pond on a reclaimed surface mine within the headwaters. The pond discharge meets the surface mining permit effluent limit for total iron, which is 7 mg/L. Downstream the water becomes oxygenated, mixes with other sources, and the Table IV criteria are met at point 906-27.

Tributary #8 meets the criteria except for very slightly exceeding the dissolved iron content at point 906-25. With only one sample analysis, additional monitoring would be necessary to determine if the dissolved iron content is of concern. Further downstream at point 906-28, tributary #8 meets all criteria.

Tributary #7 is formed by the confluence of two small abandoned mine discharges (906-22 and 906-23), which as noted in Table V, are only slightly impacted. These discharges meet the typical surface mine permit effluent limits. Tributary #7 receives additional base flow and mixes with other water sources and, at downstream point 906-19, all criteria are met except for slightly exceeding the dissolved iron criterion of 0.3 mg/L. This may be due to a small abandoned mine discharge (906-21) that enters the tributary about 50 feet upstream of point 906-19.

Tributary #15, also referred to as the “McIntire trib”, is the most degraded tributary and is responsible for the majority of the metal loading to Blacks Creek. As shown in Table V, there is not a single sampling point along the tributary that meets the water quality criteria identified in Table IV. This tributary is primarily impacted by two sources of mine drainage. The first source is a bond forfeiture site known as the “McIntire” minesite, which is located at the headwaters of the tributary. Mine discharges MC1, MC2, and MC3 enter an existing chemical treatment pond (TB1), which is no longer in operation. The effluent of TB1 essentially forms tributary #15. As this water travels downstream, a combination of natural processes and dilution from base flow and other sources of water improve the quality of the stream, but as noted at downstream point BC4.1, the stream remains heavily impacted. A second discharge, BC16, an upwelling of mine drainage from an abandoned oil well, enters tributary #15 between BC4.1 and the final downstream point BC4, located at the mouth of tributary #15 prior to the confluence with Blacks Creek. As noted in Table V, tributary #15 at BC4 is still heavily impacted. The impact of the “McIntire trib” to Blacks Creek is severe as observed by the change in water quality (Table VI) upstream (906-42) and downstream (BC2) of the confluence with tributary #15.

Tributary #16 is essentially formed by the effluent of a sediment pond (906-16) at an old reclaimed surface mine. The sediment pond receives both good quality surface runoff collected by diversion ditches, as well as poor quality mine drainage (906-17 & 906-17b) that flows onto and across the reclaimed surface mine. Mine discharge point 906-16 exceeds the total manganese and aluminum criteria as well as the dissolved iron and pH criteria. The drainage mixes with good quality water downstream, significantly improves, and, based upon data collected by PA DEP, tributary #16 meets the water quality criteria at the mouth (BC5) prior to the confluence with Blacks Creek.

Tributary #18, formed by two abandoned mine discharges (906-4 & 906-5), was sampled at point B-BC7.2B. Downstream from this point, the flow mixes with other sources of water of varying quality within a large wetland complex.

Tributary #19 is also formed by abandoned mine discharges (906-7, -8, -9) and sources of good quality water. These discharges mix within a wetland created by a beaver dam. Below the beaver dam, at point 906-6, the applicable water quality criteria are met, except for manganese.

Table V. Unnamed Tributaries Water Quality Data (Average Values)

Trib #	Sample Point	pH field	Alkalinity		Acidity	Iron		Manganese		Aluminum		SO ₄
			field	lab		total	diss.	total	diss.	total	diss.	
1	QAS3	7.5	-	72	0	0.2	-	0.0	-	0.3	-	43
2	QAS2	7.2	-	101	-65	0.6	-	0.3	-	0.3	-	106
3		-	NO SAMPLE TAKEN									
4		6.5	NO SAMPLE TAKEN									
5	906-44	7.5	55	56	-49	0.5	0.1	0.0	0.0	0.2	0.0	60
6	906-24	7.5	130	128	-96	2.1	1.1	0.3	0.3	0.3	0.1	181
6	906-27	7.9	93	85	-76	0.4	0.2	0.1	0.1	0.2	0.2	114
6	906-29	7.9	95	92	-70	0.4	0.2	0.1	0.1	0.1	0.1	104
6	BC12A	7.3	-	96	0	0.2	-	0.0	-	0.3	-	-
6	906-20	7.7	84	72	-60	0.3	0.1	0.0	0.0	0.2	0.1	86
6	BC12	7.1	76	57	-33	0.5	0.2	0.8	0.2	0.2	0.1	157
7	906-22	7.0	28	14	-5	3.4	1.0	0.7	0.5	0.5	0.2	93
7	906-23	5.9	10	4	5	0.9	0.5	2.3	2.3	0.3	0.2	233
7	906-19	7.6	79	74	-60	0.8	0.5	0.5	0.5	0.1	0.1	313
8	906-25	7.7	74	70	-56	0.6	0.5	0.1	0.1	0.2	0.1	40
8	906-28	8.0	98	94	-72	0.5	0.1	0.1	0.1	0.1	0.1	89
9	906-26	7.7	128	129	-117	0.6	0.2	0.2	0.1	0.2	0.1	162
10	906-31	7.8	66	47	-16	0.7	0.1	0.1	0.2	0.3	0.1	122
11	BC11	7.4	198	126	-46	0.2	0.1	0.1	0.1	0.1	0.1	434
12	BC10	7.4	46	45	-6	0.4	0.2	0.3	0.1	0.1	0.1	82
13	BC9	7.1	52	48	-20	0.3	0.2	0.1	0.1	0.2	0.1	45
14	BC3	7.8	257	229	-160	0.3	0.2	0.4	0.3	0.1	0.1	306
14	BC3B	8.2	109	201	-83	0.1	0.1	0.1	0.1	0.2	0.1	234
15	TB1	3.0	-	0	853	262.7	236.5	73.5	66.6	35.0	35.4	2028
15	TRX	2.8	-	0	630	109.3	111.4	54.8	52.8	46.5	48.3	1504
15	RS1	2.9	-	0	499	80.5	77.4	54.3	51.3	15.8	14.7	1357
15	RS2	2.8	-	0	462	79.3	70.4	36.2	37.7	15.8	19.4	1333
15	SB1	3.0	-	0	374	33.0	31.9	47.6	42.5	22.5	20.0	1099
15	BC4.1	3.5	0	0	127	5.5	3.4	17.6	13.7	11.2	6.6	408
15	BC4	5.9	48	32	59	20.4	16.0	18.1	14.7	5.9	2.2	568
16	906-16	4.5	0	0	40	0.7	0.7	3.4	3.3	5.8	5.3	176
16	BC5	6.7	-	103	0	0.3	-	0.3	-	0.3	-	265
17	906-12	7.3	68	64	-26	0.3	0.2	0.3	0.4	0.2	0.1	103
18	B-BC7.2B	3.3	0	0	67	0.7	0.6	5.5	5.3	9.3	9.0	264
19	906-6	5.9	4	3	4	0.3	0.1	1.5	1.5	0.6	0.5	108

Trib # corresponds to the tributary number provided on the Stream Map; pH in standard units; Alkalinity, acidity, total and dissolved metals, and sulfates in mg/L; Metals and pH rounded to nearest tenth; Alkalinity, acidity, and sulfates rounded to nearest whole number; Highlighted entries indicate the unnamed tributary, sampling point, and parameter which do not meet the applicable water quality criteria (TMDL) listed in Table IV. Dissolved manganese and aluminum are also highlighted if the total concentrations exceed the applicable water quality criteria (TMDL). (See attached monitoring data.)

Blacks Creek

While the majority of the unnamed tributaries to Blacks Creek met the water quality criteria listed in Table IV, most of the length of Blacks Creek, as identified in Table VI, does not.

Tributaries #18 and #19 appear to confluence within a large wetland complex. The effluent of this wetland forms Blacks Creek and is represented by sample point 906-10 which does not meet the water quality criteria for pH, manganese, and aluminum. At sampling point 906-11,

even though the Blacks Creek water quality has significantly improved due to the influence of good quality springs and seeps, water quality criteria are not met. Below the confluence of tributary #17, Blacks Creek is sampled at 906-15. At 906-15, the manganese and aluminum criteria are exceeded while pH is just slightly below the criterion of 6-9. While good quality water enters and improves Blacks Creek as evidenced by point BC14.1, the stream still exceeds the criteria for manganese and total aluminum. Note, however, that the dissolved aluminum content has decreased below 0.75 mg/L with total aluminum representing mostly particulates which are probably either suspended clay particles or precipitated aluminum solids. The water quality of Blacks Creek would probably continue to improve except for the impacts associated with two upwellings (BC14 & BC15) from abandoned oil wells conveying mine drainage. These discharges severely impact Blacks Creek as noted at point 906-42. While aluminum content has decreased below the applicable water quality criterion, the iron and manganese content has increased. About 75 feet downstream of 906-42, the severely impacted tributary #15 ("McIntire trib") enters Blacks Creek. The impact of this tributary can be seen 50-100 feet downstream at point BC2 where iron, manganese, and aluminum concentrations have increased. Just downstream of BC2, the effluent of the BC19 & 19B passive treatment system (905-WL) enters Blacks Creek. Prior to installation of the passive system, these two discharges, which emanate from oil wells, directly entered Blacks Creek. Downstream of the passive treatment system at BC2B, there is generally an improvement to the stream, but the criteria are still exceeded for iron, manganese, and aluminum. Further downstream at BC1A, the water quality has improved as the concentration of aluminum no longer exceeds the water quality criterion. At BC1, the stream has improved so that only total iron and manganese criteria are exceeded. Even with the confluence of good quality tributaries #13, #12, and #11, Blacks Creek, on average, still exceeds the iron and manganese criteria at point BC8. While Blacks Creek cannot be shown to meet all of the applicable water quality criteria until sampling point QAS1, more than likely the stream is significantly improved by tributary #6. The furthest downstream sampling point on Blacks Creek is QAS4 near the mouth, just above the confluence with Slippery Rock Creek.

Table VI. Blacks Creek Water Quality Data (Average Values)

← Downstream	Sample Point	pH field	Alkalinity		Acidity	Iron		Manganese		Aluminum		SO ₄
			field	lab		total	diss.	total	diss.	total	diss.	
	906-10	4.8	2	3	21	0.4	0.3	2.3	1.9	2.2	1.1	118
	906-11	5.9	10	6	4	0.4	0.4	1.9	1.8	1.0	0.5	124
	906-15	5.7	25	16	8	1.1	0.3	2.5	1.5	1.0	1.0	155
	BC14.1	6.7	-	68	0	0.2	0.1	1.3	1.2	1.0	0.1	204
	906-42	7.2	67	68	-12	4.3	2.0	1.8	1.7	0.3	0.1	240
	BC2	6.7	74	69	-26	7.2	6.5	4.6	5.1	1.0	0.1	287
	BC2B	6.9	78	68	-29	6.6	4.0	5.2	3.5	1.1	0.2	316
	BC1A	7.7	87	85	-31	2.9	0.6	2.7	2.1	0.7	0.0	234
	BC1	7.2	94	81	-35	2.4	0.2	3.4	2.0	0.5	0.1	287
	BC8	7.1	83	69	-27	1.4	0.4	2.1	1.3	0.3	0.1	211
QAS1	7.2	-	59	-34	0.5	-	0.4	-	0.2	-	179	
QAS4	7.1	84	60	-26	0.6	0.2	0.7	0.2	0.1	0.1	158	

pH in standard units; Alkalinity, acidity, total & dissolved metals, and sulfates in mg/L; Highlighted or shaded entries indicate the Blacks Creek sampling point and the parameters which do not meet the applicable water quality criteria listed in Table IV. Dissolved Mn and Al are also highlighted if the total concentrations exceed the applicable water quality criteria (TMDL). The parameters analyzed and the sample sets for the individual points vary. (See attached monitoring data.)

Where flow rates were measured, loadings were calculated. Table VII provides a summary of average loading values for each sampling point on Blacks Creek where flow rates were available. The number of flow measurements for each sampling location varied. This inconsistency along with inherent inaccuracy associated with various flow measurement methods, may explain why either BC8 has significantly higher values or BC1 has significantly lower values than expected, compared to other sampling point loadings. As the majority of the significant AMD discharges enter prior to BC2 and as the constituents of interest are not conservative, good quality water from tributaries and/or base flow to Blacks Creek are expected not only to dilute concentrations (no impact to loadings) but also to encourage precipitation of metal solids resulting in decreased loadings. The increase in iron and manganese loadings between BC1 and BC8 for one or both of the sampling point loadings, therefore, is probably inaccurate. Of particular interest is the large increase in metal loading between sampling point 905-15 and BC2. This section of stream is where discharges BC14, BC15 and tributary #15 (conveying mine drainage from the MC1, MC2, MC3, and BC16 discharges) enter Blacks Creek. As will be further discussed in later sections, addressing the discharges in this area of the watershed will be imperative to the restoration of Blacks Creek.

Table VII. Blacks Creek Average Loadings at Selected Sampling Points

Sample Point	Alkalinity	Acidity	Total Fe	Total Mn	Total Al	Total Fe, Mn, Al
906-15	32.2	16.7	0.3	3.4	4.2	7.9
BC2	612.0	-241.6	53.0	31.3	7.8	92.1
BC2B	599.5	-243.6	42.8	29.2	5.2	77.2
BC1	841.9	-151.3	25.1	32.3	1.8	59.2
BC8	1394.8	-215.8	41.7	47.1	1.0	89.8
QAS1	364.6	-178.3	2.6	2.9	1.1	6.6
QAS4	537.3	-226.1	4.4	5.4	1.3	11.1

All loadings in lbs/day based on available laboratory measurements to date. The number of sample sets (n) varies. (See attached monitoring data.)

Table VIII provides a summary of the existing loadings and the reduction needed to meet the allowable loadings according to the TMDL to achieve the stated water quality criterion values. A comparison between Table VII and VIII indicates that while there are minor discrepancies in calculated loadings, which are probably due to incorporation of additional monitoring data in Table VII, in general, the calculated loads are comparable and the trends are similar. Both tables indicate that while there are sources of pollutant loading above 906-15 (BC6), the majority of the loading enters the stream between this point and BC2. Both also illustrate that the water quality improves downstream and that no major additional sources enter the stream. According to the information in the TMDL, approximately 59 lbs/day of iron, 29 lbs/day of manganese and 3 lbs/day of aluminum need to be eliminated from Blacks Creek in order to meet applicable water quality criteria. The BMPs, proposed in this restoration plan, seek to meet the needed load reductions in order to restore the entire main stem of Blacks Creek. As will be further discussed, successful treatment of the "McIntire" discharges (TB1) and the BC14, BC15, and BC16 discharges would significantly reduce the loadings at BC2. Even though prediction is tenuous, the treatment of the discharges coupled with the noted existing attenuation, may lead to the level of reduction indicated in the TMDL.

Table VIII. TMDL: Existing, Allowable, and Reduction Needed

Sample Point	Existing			Allowable			Reduction Needed			% Reduction		
	Fe	Mn	Al	Fe	Mn	Al	Fe	Mn	Al	Fe	Mn	Al
BC6 [906-15]	0.6	3.5	2.8	0.6	0.7	0.2	0.0	2.8	2.6	0	79	92
BC2	60.2	26.6	1.8	1.2	1.1	1.0	59.0	22.8	0.4	98	96	29
BC2B	33.6	25.8	5.2	4.7	2.6	2.3	0.0	0.0	0.0	0	0	0
BC1	20.1	35.9	6.2	5.6	7.2	6.2	0.0	3.2	0.0	0	31	0
BC8	10.2	25.1	0.0	10.2	8.0	0.0	0.0	0.0	0.0	0	0	0

Loadings in lbs/day; all loading data reorganized from 2004 TMDL Table 3; based on data available during the period of study for the TMDL; BC6 in the TMDL is approximately the same sample point as 906-15 in the restoration plan.

Sedimentation

The poor water quality, accumulation of sediment from upgradient erosion, and precipitation and settling of metal solids appear to greatly impact the aquatic ecosystem in Blacks Creek. In addition, as the majority of Blacks Creek has a low or very low gradient (less than 2%), even as the water quality improves, the pre-existing metal precipitates in the substrate may not be flushed as readily as a stream with a higher gradient. According to the Slippery Rock Creek Watershed Assessment and Restoration Plan (Beran et al, 2006):

“Marginal habitat conditions are reflected in the relatively low median scores (range of 8 – 10.5) for sediment deposition in all the assessed streams. This indicates that sediment is degrading habitat with major deposition of fines (sand, silt, clay) in pools and glides reducing pool depth. Coarse sand and gravel deposition on bars, transverse riffles, and formation of sand deposits occur at obstructions frequently limiting habitat quality.”

Investigation of the sedimentation problem was not the focus of this report and requires further study for evaluation. Nonetheless, implementation of passive systems to collect metal sludge is expected to significantly assist in ameliorating the sediment problem in the stream.

Discussion of Mine Discharge Water Quality

The primary source of impairment to the watershed identified in the Blacks Creek TMDL was metals from abandoned mine drainage. Other sources may be on-lot septic systems; sedimentation from the erosion of stream banks, poorly-vegetated lands, and dirt/gravel roads; as well as nutrients and pesticides from agriculture. Investigation of these potential sources was beyond the scope of this report. Over 20 abandoned mine discharges exhibiting significant degradation and flow have been identified in the Blacks Creek Watershed. Numerous other small seeps exist. In addition, ephemeral, intermittent or other discharges of significance may exist within the watershed but remain unidentified.

Several abandoned mine discharges have been monitored for over 10 years while others have only recently been identified and monitored. Table IX provides a general characterization of these abandoned mine discharges. The water quality varies from alkaline water with relatively low metal concentrations to very acidic water with high metal concentrations. Unreclaimed surface mines on the Brookville coalbed, which characteristically encountered potentially alkalinity-generating material in the overburden, appear to have minimal impact to the water quality, other than possibly sedimentation. The only exception may be discharges 906-4 and 906-5 which emanate at the toe of an unreclaimed surface mine; however, it is unclear as to whether the source of the degradation is from a surface or an underground mine or both. Surface mining of coalbeds which included disposal of coal refuse and which did not encounter

substantial alkalinity-generating material in the overburden prior to implementation of modern, environmentally-based mining methods appears to have been the major contributor to stream degradation. These discharges shall be further discussed in the Restoration Plan section.

Table IX. Mine Drainage Water Quality Characteristics

Sample Point		Flow	pH field	Alkalinity		Acidity	Iron		Manganese		Aluminum		SO ₄
				field	lab		total	diss.	total	diss.	total	diss.	
906-2		-	6.2	48	36	-27	0.3	0.0	1.4	1.3	0.9	0.0	264
906-4		20	3.1	0	0	317	2.1	1.8	8.0	7.7	37.8	35.8	421
906-5		20	3.6	0	0	77	0.3	0.3	5.4	5.3	6.4	6.4	167
906-7		15	4.2	0	0	48	0.2	0.1	3.4	3.5	5.3	5.1	141
906-8		10	3.2	0	0	640	104.8	95.7	16.8	16.7	59.4	55.2	950
906-9		5	3.4	0	0	160	0.9	0.9	11.7	11.7	15.3	14.5	328
906-14		7	5.7	34	9	11	20.1	11.1	6.0	4.8	0.2	0.1	148
906-17		16	3.7	0	0	408	0.5	0.5	19.2	18.2	48.4	46.4	906
906-21		10	6.6	80	48	-16	30.1	27.9	1.0	1.0	0.2	0.2	95
906-22		12	7.0	28	14	-5	3.4	1.0	0.7	0.5	0.5	0.2	93
906-23		4	5.9	10	4	5	0.9	0.5	2.3	2.3	0.3	0.2	223
906-36		25	6.5	133	107	-70	13.5	12.9	1.5	1.5	0.1	0.1	157
BC14		21	6.3	-	89	26	20.9	35.9	17.8	10.6	0.1	0	422
BC15		80	6.2	-	115	4	35.9	33.8	10.7	9.7	0.2	0.0	418
BC16		74	6.0	167	171	13	53.0	45.0	15.7	11.9	0.3	0.2	610
BC19		30	6.3	180	194	-13	25.7	31.7	7.4	6.7	0.2	0.0	496
BC19B		31	6.2	251	234	-112	28.0	23.2	7.0	6.4	0.1	0.0	505
TB1	MC1	17	4.1	-	0	979	293.6	338.8	85.8	80.9	42.4	28.8	2053
	MC2	19	3.1	-	0	856	314.4	240.8	88.2	80.7	40.5	33.8	2143
	MC3	29	4.1	-	11	1239	348.8	-	90.3	-	37.0	-	2159

Flow in gallons/minute (gpm); pH in standard units; Alkalinity, acidity, total metals, dissolved metals, and sulfates in mg/L; Metals and pH rounded to nearest tenth; Alkalinity, acidity, and sulfates rounded to nearest whole number

Loadings were also calculated for each of the discharges and are presented in Table X. Since metals are the primary source of impairment to the watershed, the discharges were ranked based on total metal loadings. This ranking system was also used to help prioritize the restoration effort. Note that the top 3 discharges account for 64% of the metal loadings in the watershed while the top 5 account for 77% of the metal loadings. In contrast, the bottom 10 discharges account for only 7.5% of the metal loadings to the watershed.

Table X. Individual Mine Discharges Ranked by Total Metals Loadings

Rank	Point	Alkalinity	Acidity	Total Fe	Total Mn	Total Al	Total Fe, Mn, Al	% of Total Contribution
1	TB1	0.0	225.5	64.0	16.7	8.1	88.9	28.8
2	BC16	157.6	7.2	49.2	14.7	0.2	64.1	20.8
3	BC15	115.8	4.1	34.6	9.8	0.2	44.6	14.5
4	906-8	0.0	76.9	12.6	2.0	7.1	21.8	7.1
5	906-16	0.0	72.8	1.2	6.1	10.4	17.7	5.8
6	BC19B	85.9	-41.2	10.3	2.5	0.1	12.9	4.2
7	906-17	0.0	73.6	0.1	3.4	8.7	12.3	4.0
8	906-4	0.0	76.2	0.5	1.9	9.1	11.5	3.7
9	BC19	72.4	0	8.5	2.7	0.1	11.3	3.6
10	BC14	13.7	7.8	0.2	5.3	0.0	5.6	1.8
11	906-36	32.2	-20.9	4.0	0.5	0.0	4.5	1.5
12	906-21	5.8	-1.9	3.6	0.1	0.0	3.8	1.2
13	906-5	0.0	18.6	0.1	1.3	1.5	2.9	0.9
14	906-14	0.7	0.8	1.6	0.5	0.0	2.1	0.7
15	906-9	0.0	9.6	0.1	0.7	0.9	1.7	0.5
16	906-7	0.0	8.7	0.0	0.6	1.0	1.6	0.5
17	906-22	2.0	-0.8	0.5	0.1	0.1	0.7	0.2
18	906-24	15.4	-11.5	0.2	0.0	0.0	0.3	0.1
19	906-23	0.2	0.2	0.0	0.1	0.0	0.2	0.1
	Totals			191.4	69.2	47.6	308.2	100.0

Loadings in lbs/day calculated using available lab analyses; BC19/BC19B currently treated by passive system; thus, values do not represent current loadings; TB1 (combined MC1, MC2, and MC3 loadings) as some individual discharges appear spurious

RESTORATION PLAN

In order to meet the TMDL criteria provided for Blacks Creek as well as achieve the ultimate goal of returning the stream to a viable fishery, a restoration plan has been developed. This plan proposes to passively treat the abandoned mine discharges that cause substantial degradation to Blacks Creek. The discharges have been grouped based on location and similar water quality. **The final effluent from the passive systems, as proposed, is expected to be characterized as net alkaline with low dissolved metals.**

Passive systems have been proposed to treat the significant sources of AMD degradation to Blacks Creek. In addition to describing the conceptual BMP, an estimate of the cost and pollutant loading reduction have been provided. Costing generally follows guidelines used in the *AMDTreat* software program (US OSM et al, 2006). Component selection and sizing are generally based on information provided in the US Department of Energy, National Energy Technology Laboratory report, "The Passive Treatment of Coal Mine Drainage" (Watzlaf et al, 2004). Development of the conceptual design as well as the estimated costs and pollutant loading reductions are also based on the experience of the BioMost, Inc. and Stream Restoration Inc. team that have designed and built over 200 passive components for over 35 systems, which successfully treat ~1 billion gallons of mine drainage annually.

While sophisticated modeling programs could be developed to predict pollutant loading reductions, experience has shown that pre- and post- construction water monitoring data often illustrate that undetected mine drainage such as shallow subsurface flow is commonly

encountered and treated by the system, typically resulting in higher pollutant loading removal than indicated by pre-construction monitoring. Nonetheless, a preliminary pollutant load reduction estimate is provided for each proposed passive system based only on existing pollutant loading of the discharge. Although passive systems have been online in the Slippery Rock Creek Watershed that have operated for more than a decade and have met or exceeded the design effluent criteria, typically passive systems are not expected to remove 100% of all pollutant loadings 100% of the time. Table XI briefly describes the functions of the components included in the passive treatment systems proposed for the Blacks Creek Watershed:

Table XI. Passive Treatment System Components: General Function and Description

Component	Function & Description
Step Aerator (SA)	Oxygenate AMD, convert Fe^{+2} to Fe^{+3} , degas CO_2 ; constructed of stainless-steel or other corrosive-resistant material
Oxidation & Precipitation Channel (OPC)	Promote removal and recovery of iron minerals at low pH; substrate limestone aggregate with geotextile
Vertical Flow Pond - oxic [VFP(oxic)]	Generate alkalinity; limestone aggregate; metal solids flushed automatically or manually
Vertical Flow Pond - anaerobic [VFP(anaerobic)]	Generate alkalinity; organic material with or without limestone aggregate; metal sulfides formed/retained; iron reduced (Fe^{+3} to Fe^{+2})
Settling Pond (SP)	Oxidize, precipitate, settle, retain metal solids
Aerobic Wetland (WL)	Oxidize, precipitate, settle, retain metal solids; provide wildlife habitat
Horizontal Flow Limestone Bed (HFLB)	Generate alkalinity; promote removal and recovery of manganese

Note: The descriptions and functions are applicable for this report only.

Unnamed “McIntire” Tributary #15 [includes discussion of TB1(MC1, MC2, MC3) and BC16]

The single largest impact to Blacks Creek is the “McIntire” trib #15, impacted by two discharges (TB1 & BC16) with the highest metal loadings (~50%) in the Blacks Creek Watershed. As noted previously, TB1 is the effluent of an existing old chemical treatment pond which receives, three discharges (MC1, MC2, MC3) from the H&D “McIntire” minesite in the headwaters of trib #15. The TB1 primary spillway has become plugged with iron minerals precipitating at low pH to the point that the water now discharges over the emergency spillway, forming trib #15. (See photos.) Trib #15 is conveyed in a reconstructed stream channel to an in-stream settling pond (SB1). The SB1 effluent (trib. 15) confluences with BC16 just prior to entering Blacks Creek.

Table XII illustrates the water quality of trib #15 from the TB1 effluent to the confluence with Blacks Creek. (Samples are arranged from upstream to downstream.) Table XII also includes sample points on Blacks Creek upstream (906-42) and downstream (BC2) of the confluence with the “McIntire trib”. TRX, RS1, and RS2 are intermediate stream points between TB1 and SB1. These points illustrate the natural improvement in water quality both from dilution and from precipitation of iron minerals at a low pH. BC4.1 is the furthest downstream sample point below TB1 prior to BC16 entering the tributary. BC4 is on trib #15 directly downstream of the BC16 discharge and just upstream of the confluence with Blacks Creek. The impact of BC16 to trib #15 is quite remarkable. Based on the sample analyses, the iron content in trib #15 significantly increases while the aluminum content actually decreases. The alkaline BC16 discharge with an average flow rate of 74 gpm decreases the aluminum content in trib #15 both by dilution and by increasing the pH. (As aluminum solubility is controlled primarily by pH, once the pH reaches ~4.0 aluminum solids begin to form and by pH of ~5 only ~1 mg/L dissolved aluminum is typically in solution.) The impact of the “McIntire trib” to Blacks Creek is devastating as illustrated by comparing upstream (906-42) and downstream (BC2) points on Blacks Creek, with iron, manganese, and aluminum content doubling and in some cases tripling.

Table XII. Unnamed Tributary #15 Water Quality Data (Average Values)

Location	Sample Point	pH field	Alkalinity		Acidity	Iron		Manganese		Aluminum		SO ₄
			field	lab		total	diss.	total	diss.	Total	diss.	
← Downstream Tributary #15	TB1	3.0	-	0	853	262.7	236.5	73.5	66.6	35.0	35.4	2028
	TRX	2.8	-	0	630	109.3	111.4	54.8	52.8	46.5	48.3	1504
	RS1	2.9	-	0	499	80.5	77.4	54.3	51.3	15.8	14.7	1357
	RS2	2.8	-	0	462	79.3	70.4	36.2	37.7	15.8	19.4	1333
	SB1	3.0	-	0	374	33.0	31.9	47.6	42.5	22.5	20.0	1099
	BC4.1	3.5	0	0	127	5.5	3.4	17.6	13.7	11.2	6.6	408
	BC16 AMD to trib15	6.0	167	171	13	53.0	45.0	15.7	11.9	0.3	0.2	610
	BC4	5.9	48	32	59	20.4	16.0	18.1	14.7	5.9	2.2	568
Blacks Creek	906-42 above trib15	7.2	67	68	-12	4.3	2.0	1.8	1.7	0.3	0.1	240
	BC2 below trib15	6.7	74	69	-26	7.2	6.5	4.6	5.1	1.0	0.1	287

Alkalinity, acidity, total & dissolved metals, and sulfates in mg/L; Metals and pH rounded to nearest tenth; Alkalinity acidity, and sulfates rounded to nearest whole number; Number of sample sets (n) varies. (See attached monitoring data.)

“McIntire” Site TB1 (MC1, MC2, and MC3): The “McIntire” bond forfeiture surface mine and coal refuse disposal site has the single largest impact to the Blacks Creek Watershed. A terrain conductivity study was completed by the PA DEP to identify “hot spots” at the minesite. This information was used to determine placement of alkaline material at the site. In 2006, local limestone quarry operator and active Slippery Rock Watershed Coalition participant, Quality Aggregates Inc., placed approximately 10,000 tons of waste lime to create a low- permeability barrier and to provide alkalinity to the subsurface flow. Long-term improvement will be demonstrated by monitoring site drainage. Based on experience with similar efforts, loadings are expected to decrease but degradation is expected to remain. A passive system, therefore, that has the capability of handling differing site drainage characteristics is proposed.

Proposed Passive Treatment System Components

“McIntire” Mine Site (TB1)

SA → OPC → VFP(oxic) → OPC → SP(existing) → VFP(anaerobic) → SP/WL(0.5 ac) → HFLB

Treatment Media: VFP(oxic)-1500 tons limestone; VFP(anaerobic)-3100 tons limestone, 1200 CY compost, 1200 CY wood chips; HFLB-1500 tons limestone

Projected Decrease in Pollutant Loadings:
(~82,000 lbs/yr acidity; ~32,000 lbs/yr metals)

Parameter	Acidity	Iron	Manganese	Aluminum
Lbs/day	~226	~64	~17	~8

Preliminary Cost Estimate: ~\$600,000

BC16: The BC16 discharge, which emanates from an old oil well, has the second highest metal loading in the watershed. While the final design has not yet been completed, Stream Restoration Incorporated has received a \$151,740 PADEP/EPA 319 grant to construct a 2/3- to 1-acre aerobic wetland for the oxidation, precipitation, and settling of iron and a 1,500-ton, Horizontal Flow Limestone Bed for manganese removal and alkalinity generation. Successful completion of the BC16 passive treatment system is expected to neutralize 7 lbs/day of acidity and remove 49 lbs/day of iron and 15 lbs/day of manganese. This equates to a load reduction from the discharge of 2,600 lbs/year of acidity and 41,000 lbs/year of metals.

Based on available data, completion of the “McIntire” and BC16 passive treatment systems are expected to eliminate roughly 50% of the total metal loadings, including 60% of the iron and 45% of the manganese to Blacks Creek. The elimination of this pollution source is expected to significantly improve the water quality of Blacks Creek.

BC14 & BC15

BC14 and BC15 are ranked 10th and 3rd, respectively, in terms of total metal loadings to Blacks Creek. Because of the proximity to one another, the discharges would most likely be treated in one passive system. Like BC16, the discharges appear to emanate as upwellings from old abandoned oil wells. BC14 & BC15 can be characterized as alkaline, net-acidic, iron- and manganese-bearing discharges with low aluminum content. Both discharges flow directly into Blacks Creek.

The data available for BC14 is quite variable. Interestingly, the sample dates with flow measurements all have extremely low iron concentrations while samples with no flow measurements have rather high iron concentrations. Likewise two of the dates with flow measurements have much lower manganese concentrations. This discrepancy makes developing a design and predicting results difficult. Also, this may cause BC14 to be ranked lower on the priority list. While a conceptual design has been developed, additional monitoring will be necessary prior to completing a final design.

Proposed Passive Treatment System Components

BC14 & BC15

SA → WL(1.5 ac) → HFLB

Treatment Media: HFLB-2,000 tons limestone

Projected Decrease in Pollutant Loadings:
(~1,800 lbs/yr acidity; ~16,000 lbs/yr metals)

Parameter	Acidity	Iron	Manganese	Aluminum
Lbs/day	~5	~35	~10	Na

Estimates tenuous due to variable water quality reported.

Preliminary Cost Estimate: ~\$300,000

BC19 & BC19B

The BC19 & BC19B discharges are ranked 9th and 6th, respectively, in terms of metal loadings. These discharges which formerly flowed directly into Blacks Creek are currently being treated by a ~½-acre aerobic wetland that was constructed in 2004 with grant funding of about \$110,000. Additional monitoring is needed to evaluate seasonal changes in water quality related to vegetation and ice cover. On average, ~12 lbs/day (~4,300 lbs/yr) of iron is being removed. (Additional monitoring is needed to confirm the apparent removal of 1 lb/day of manganese.)

906-7, -8, and -9

Abandoned mine discharges 906-7, -8, and -9 are ranked 16th, 4th, and 15th, respectively, in terms of metal loadings to Blacks Creek. Due to numerous subsidence features in the general vicinity of the 906-8 and -9 discharges, the source of the drainage is believed to be from an abandoned underground mine. Discharge 906-7 is an upwelling from an old oil well. Because of the proximity to one another, the discharges have been grouped into one passive treatment system design. These discharges do not appear to have been previously sampled at their source. The combined discharges may be reflected in PA DEP sampling point BC17. As only one sampling event was conducted, prior to finalizing the design, additional sampling and site investigations are recommended. Depending upon the final design and actual construction conditions, including the 906-7 discharge may not be feasible. The following conceptual design and estimated cost are based on one sample set. Due to the limited data, the system was designed using the water quality data for the most degraded discharge (906-8) coupled with the combined total flow of all three discharges. This conservative approach helps to ensure that the size and cost of the passive system are not underestimated. Again, further investigations should be completed prior to finalizing the design.

Proposed Passive Treatment System Components

906-7, 906-8, 906-9

**SA → OPC(length 500') → VFP(oxic) → OPC (length 500') → SP/WL(0.5 ac) →
VFP(anaerobic) → SP/WL(0.5 ac) → HFLB**

Treatment Media: VFP(oxic)-1000 tons limestone; VFP(anaerobic)-2000 tons limestone, 800 CY compost, 800 CY wood chips; HFLB-1000 tons limestone

Projected Decrease in Pollutant Loadings:
(~34,000 lbs/yr acidity; ~9,000 lbs/yr metals)

Parameter	Acidity	Iron	Manganese	Aluminum
Lbs/day	~95	~13	~3	~9

Preliminary Cost Estimate: ~\$500,000

906-17 (includes discussion of 906-16 and 906-17B)

Mine discharge 906-17, ranked 7th, flows across a reclaimed surface mine site where the discharges mix with relatively good quality surface runoff prior to entering an old sediment pond. The effluent of the sediment pond (906-16) is the headwaters of tributary #16. A smaller discharge, 906-17B, is located ~20 feet from 906-17 and was not sampled, although pH, ORP, and flow were measured. Because of the proximity to 906-17, 906-17B has been assumed to be of similar quality. (Additional sampling is necessary to confirm this assumption.) As can be seen from Table X, the loadings for the sediment pond effluent (906-16) and for the abandoned mine drainage (906-17) are rather similar, even though 906-16 has slightly higher metal loadings while 906-17 has higher acidity loadings. While an extensive search was not completed, there appears to be no available historic data for these sampling points. Even though the final location of the passive treatment system has not been determined, for the purpose of this restoration plan, the proposed location is upgradient of the settling pond so as to only intercept and treat the mine drainage. This has significantly reduced the size and cost of the passive system as many of the components are designed based upon flow rate, retention time, and water quality. (A higher flow rate with approximately the same loading may require a larger system because of the retention time needed.) The proposed system was based on only one sample event. Further water monitoring will be needed prior to finalizing system design.

Proposed Passive Treatment System Components

906-17 & 906-17B (hydrologically related to 906-16)

VFP(anaerobic) → SP/WL(0.5 ac) → HFLB

Treatment Media: VFP(anaerobic)-1800 tons limestone, 700 CY compost, 700 CY wood chips; HFLB-1000 tons limestone

Projected Decrease in Pollutant Loadings:
(~27,000 lbs/yr acidity; ~4,000 lbs/yr metals)

Parameter	Acidity	Iron	Manganese	Aluminum
Lbs/day	~74	<1	~3	~9

Preliminary Cost Estimate: ~\$300,000

906-4 & 906-5

The 906-4 and 906-5 abandoned mine discharges are ranked 8th and 13th, respectively, in terms of metal loadings. These discharges mix with mine discharges 906-7, -8, -9 and other smaller seeps as well as some sources of good quality water and essentially form the headwaters of Blacks Creek. These discharges are the primary source of impairment within the watershed until the stream reaches the oil well upwellings of BC14 and BC15 and the “McIntire” tributary. Addressing discharges 906-4 and 906-5 will be necessary for the entire Blacks Creek to meet water quality criteria. The origin is uncertain as to whether the source of these discharges is an abandoned underground mine or an unreclaimed surface mine or both. Further investigation is necessary to determine if land reclamation either alone or in combination with a passive treatment system is necessary to improve the drainage. These discharges do not appear to

have been previously sampled. While a conceptual design has been provided, as only one sample set is available, additional monitoring is necessary prior to completing a final design.

Proposed Passive Treatment System Components

906-4 & 906-5

OPC(2 channels) → VFP(anaerobic) → SP/WL(0.5 ac) → HFLB

Treatment Media: VFP(anaerobic)-2000 tons limestone, 800 CY compost, 800 CY wood chips; HFLB-600 tons limestone

Projected Decrease in Pollutant Loadings:
(~34,000 lbs/yr acidity; ~5,000 lbs/yr metals)

Parameter	Acidity	Iron	Manganese	Aluminum
Lbs/day	~95	<1	~3	~10

Preliminary Cost Estimate: ~\$300,000

906-36

The 906-36 discharge, ranked 11th in terms of metal loadings, is assumed to be an upwelling from an old oil well. Historical data for this discharge does not appear to exist. Based on the one available sample analysis, the impact to Blacks Creek is minimal as the discharge is net alkaline and only contributes ~4 lbs/day of iron. The restoration effort for this discharge, therefore, is low on the priority list. Nonetheless, a conceptual design and cost estimate have been developed which consists of ~1/4-acre aerobic wetland. Additional water monitoring will be necessary prior to finalizing the design. The project has been estimated to cost ~ \$100,000.

906-21

The 906-21 discharge is ranked 12th in terms of metal loadings. The exact source of the discharge is not known, but it emanates along tributary #7 just prior to the confluence with tributary #6. The discharge has limited impact to the stream and is, therefore, low on the priority list. Additional water monitoring will be necessary prior to finalizing the design. A ~1/4-acre aerobic wetland is proposed which would remove ~4 lbs/day of iron. The project has been estimated to cost ~\$100,000.

906-14

The 906-14 discharge is ranked 14th in terms of metal loadings. It emanates along County Line Road and is conveyed in a ditch through a road culvert and into a natural wetland prior to entering tributary #17. The discharge has limited, if any, impact to the stream as most of the iron precipitates within the road ditch and natural wetland. The discharge has a loading of ~1.5 lbs/day of iron and 0.5 lbs/day of manganese. A 0.1-acre wetland would probably be sufficient to remove the remaining iron. To remove the manganese, 100 tons of limestone would be needed. The cost has been estimated at ~\$50,000. As there is little or no impact from discharge 906-14, implementation of treatment is not proposed.

906-22 & 906-23

Abandoned mine discharges 906-22 and 906-23 are ranked 17th and 19th in terms of metal loadings, contributing ~1 lb/day. As these two discharges form tributary #7, installation of a small passive system consisting of a ~0.1-acre wetland would improve at least a short segment of the tributary; however, because of other sources of good quality water, tributary #7 improves rapidly. These discharges, therefore, would be placed low on the priority list. The estimated cost is ~\$50,000.

906-24

Sampling point 906-24 is the effluent of a settling pond on a reclaimed surface mine receiving primarily surface run-off. The discharge of this settling pond forms tributary #6. There does not appear to be any historic data available for this site. At this sampling point, while the effluent does meet surface mining water quality standards, 906-24 does not meet the applicable water quality criteria. As better quality waters are encountered, 906-24 improves substantially as evidenced by sampling point 906-27. Like many of these smaller discharges, a small 0.1-acre wetland could be installed; however, due to the lack of known impact, a passive system is not currently recommended.

PRIORITIZATION, SCHEDULING, EVALUATION, and COST ESTIMATE SUMMARY

As obtaining landowner support (except for the “McIntire” site for which Stream Restoration Inc. has a written support letter) and as determining construction site suitability are beyond the scope of this report, pollutant loadings and estimated impacts to the streams were used to develop the priority list in Table XIII with cost estimates for proposed passive treatment systems. Implementation of all proposed passive systems is estimated to cost about \$2.6 million dollars. Potential sources of available funding to implement these projects are provided in Table XVI.

Table XIII. Summary of Priority List and Cost Estimates

Priority Ranking	Sample Point	Cost Estimate
(completed)	BC19 & BC19B	\$110,000
1	TB1 (“McIntire” Site)	\$600,000
2	BC16	\$150,000
3	BC14 & BC15	\$300,000
4	906-7, -8, -9	\$500,000
5	906-4, -5	\$300,000
6	906-17 (& 17B)	\$300,000
7	906-36	\$100,000
8	906-22, -23	\$50,000
9	906-21	\$100,000
10	906-14	\$50,000
11	906-24	NA
Total		\$2,560,000

Cost estimate provided for the BC19 & BC19B passive system does not include in-kind/matching contributions.

Tables XIV and XV provide estimated TMDL reductions for Blacks Creek at sample points BC6 and BC2 for seven out of the proposed eleven passive systems. In order to generally estimate

the impact of the seven proposed systems, certain assumptions were made. The first assumption is that the entire pollutant load of the mine discharge will be treated by the passive system. Second, while the decrease of loading due to apparent natural attenuation is provided in the tables, apparent natural attenuation was not considered in estimating the pollutant loading contributions of each discharge. (In this case, apparent natural attenuation is attributed to unaccounted surface and subsurface flow and to the chemical, physical, and biological processes that occur within the streams resulting in the precipitation and settling of metals from the water column.) A third assumption is that the available data is accurate and representative of typical water quality and flow conditions.

The remaining four proposed passive systems (addressing discharges 906-21, -22, -23, -24, and -36) were not included in Tables XIV and XV as implementation is downstream of BC6 and BC2 and would, therefore, have no impact to the segments of Blacks Creek identified for TMDL pollutant loading reductions. Note that TMDL reductions are improvements needed to the main branch of Blacks Creek at specific sampling point locations and not improvements to the individual tributaries for restoration of the entire watershed.

Table XIV. Blacks Creek Point BC6 TMDL:
Discharge Contribution and Corresponding Passive System Reduction (prelim. est.)

Sample Point	Pollutant Loading by Source (lbs/day)				Percentage of Total Source Load by Discharge				Estimated Load Contribution (Reduction) to point BC6			
	Fe	Mn	Al	Acidity	Fe	Mn	Al	Acidity	Fe	Mn	Al	Acidity
906-7,8,9	12.7	3.3	9.0	95.2	95%	51%	46%	50%	0.6	1.8	1.3	7.3
906-4,5	0.6	3.2	10.6	94.8	5%	49%	54%	50%	0.0	1.7	1.5	7.3
Apparent Natural Attenuation	-12.7	-3.0	-16.8	-175.4								
BC6	0.6	3.5	2.8	14.6	100%	100%	100%	100%	0.6	3.5	2.8	14.6

Pollutant discharge loadings (n varies) from existing data provided in appendix; BC6 loading from Final Blacks Creek TMDL Table 3 - Summary...; assumes 100% discharge load reduction with installation of passive system; apparent natural attenuation attempts to quantify pollutant loading reduction from chemical, physical, and biological processes; BC6 loading attributed to discharges (percentage and quantity) does not consider natural attenuation in Blacks Creek; Estimated Load Contribution (Reduction) to point BC6 is calculated by multiplying BC6 loading (bottom row first column set) by the Percentage of Total Source Load by Discharge for each pollutant.

Table XV. Blacks Creek Point BC2 TMDL:
Discharge Contribution and Corresponding Passive System Reduction (prelim. est.)

Sample Point	Pollutant Loading by Source (lbs/day)				Percentage of Total Source Load by Discharge				Estimated Load Contribution (Reduction) to point BC2			
	Fe	Mn	Al	Acidity	Fe	Mn	Al	Acidity	Fe	Mn	Al	Acidity
BC6	0.6	3.5	2.8	14.6	0%	6%	14%	4%	0.2	1.7	0.6	0.0
906-14	1.6	0.5	0.0	0.8	1%	1%	0%	0%	0.6	0.2	0.0	0.0
906-17/17B	0.1	3.4	8.7	73.6	0%	6%	44%	22%	0.0	1.7	1.7	0.0
BC14/BC15	34.8	15.1	0.2	11.9	23%	28%	1%	4%	13.9	7.5	0.0	0.0
TB1	64.0	16.7	8.1	225.5	43%	31%	41%	68%	25.6	8.2	1.6	0.0
BC16	49.2	14.7	0.2	7.2	33%	27%	1%	2%	19.7	7.3	0.0	0.0
Apparent Natural Attenuation	-90.1	-27.3	-16.0	-333.6								
BC2	60.2	26.6	4.0	0.0	100%	100%	100%	100%	60.2	26.6	4.0	0.0

(See notes for Table XIV.) BC6 and BC2 loadings from Final Blacks Creek TMDL Table 3 - Summary...; BC2 loadings attributed to discharges (percentage and quantity) does not consider apparent natural attenuation in Blacks Creek; implementation of proposed passive systems at 906-7,8,9 and 906-4,5 upstream of BC6 expected to result in loading reductions at BC2 of 0.2 lbs/day, 1.7 lbs/day, 0.6 lbs/day, 0.0 lbs/day of Fe, Mn, Al, acidity, respectively; Estimated Load Contribution (Reduction) to point BC2 is calculated by multiplying BC2 loading (bottom row first column set) by the Percentage of Total Source Load by Discharge for each pollutant.

Table XVI. Potential Funding Sources for Implementing Blacks Creek Restoration Plan

Funding Source	Contact Information	Eligible Uses	Amount
PA DEP Growing Greener Program	PA DEP Grants Center RCSOB, 15th Floor 400 Market Street P.O. Box 8776 Harrisburg, PA 17105 717-705-5400 www.depweb.state.pa.us	Watershed restoration implementation (construction) projects, O&M, education/outreach projects, watershed organization, and watershed assessment	No known maximum or minimum
US EPA Section 319 Nonpoint Source Program	PA DEP Grants Center RCSOB, 15th Floor 400 Market Street P.O. Box 8776 Harrisburg, PA 17105 717-705-5400 www.depweb.state.pa.us	Projects addressing nonpoint sources including AMD restoration (construction projects); watersheds with approved TMDLs and restoration plans considered a priority	No known maximum or minimum
US OSM Appalachian Clean Streams Initiative	US OSM Harrisburg Field Office 415 Market Street, Suite 3 Harrisburg, PA 17101 717-782-2285	AMD restoration (construction projects) in the Appalachian Region	Up to around \$100,000 with no defined maximum
Western Pennsylvania Watershed Program	John Dawes RR#1, Box 152 Alexandria, PA 16611 814-669-4847 www.wpawp.org	Watershed restoration and preservation projects including AMD	No known min/max; funding typically ≤\$20,000/ project
Dominion Foundation	Pennsylvania Community Investment Board Attn: Ms. Anita M. Wilson Dominion Peoples 625 Liberty Avenue Pittsburgh, PA 15222 http://www.dom.com/about/community/foundation	Projects that preserve, protect, and improve the quality of the environment in communities Dominion companies operate	\$1,000 to \$15,000
Common Grant Application	Grant Makers of Western Pennsylvania 650 Smithfield St., Suite 210 Pittsburgh, PA 15222 412-471-6488	Variety of uses; application may be used for many different foundations, although each foundation should be contacted individually	Varies
The Heinz Endowment	The Heinz Endowments 30 Dominion Tower 625 Liberty Avenue Pittsburgh PA 15222-3115 http://www.heinz.org	Restore and protect watersheds, ecosystems and landscapes; decrease human impact (point and non-point) sources; encourage public awareness, empower grassroots organizations, and build partnerships to address environmental preservation and remediation	No known minimum or maximum
Richard King Mellon Foundation	Richard King Mellon Foundation One Mellon Bank Center 500 Grant Street, Suite 4106 Pittsburgh, PA 15219-2502 http://fdncenter.org/grantmaker/rkmellon/index.html	Protection and preservation of natural resources	No known minimum or maximum

Table XVII provides a proposed time table for implementing the restoration plan. Design and construction of the BC16 passive treatment system are expected to be completed in 2007. Seeking funding for the “McIntire” site will begin in 2007 as well. Following completion of these two passive systems, an evaluation of the impact to Blacks Creek will be conducted. Priorities may be rearranged following this evaluation. After completion of each additional major project, another evaluation is recommended to be completed in order to restore Blacks Creek in the most efficient and economical manner possible. Load reductions and the water quality criteria are to be used, primarily, for evaluating the progress of the restoration plan. This priority list and proposed time table are to serve as a guide to developing implementation projects within the Blacks Creek Watershed. The priority list and proposed time table are to be revised as needed.

Table XVII. Proposed Time Table for Implementing Restoration Plan

Passive System	Obtain Funding		Design & Construct	
	Start	End	Start	End
BC19 & BC19B	Completed		Completed	
BC16	Completed		1/2007	12/2007
“McIntire”	1/2007	3/2008	3/2008	12/2008
BC14 & BC15	1/2008	3/2009	3/2009	12/2009
906-7, -8, -9	1/2009	3/2010	3/2010	12/2010
906-4, -5	1/2010	3/2011	3/2011	12/2011
906-17 (& 17B)	1/2011	3/2012	3/2012	12/2012

WATER QUALITY MILESTONES AND PROGRESS EVALUATION

Water quality milestones will be used to evaluate the progress and degree of success in the implementation of the restoration plan, as the primary purpose of this plan is to improve the water quality of Blacks Creek and its tributaries with the ultimate goal of returning the stream to a viable fishery. Water monitoring shall be conducted by SRWC partners, which includes, but is not limited to PA DEP, Stream Restoration Inc., volunteers, etc. When funding is available water samples will be collected and analyzed by a laboratory for standard mining parameters including pH, alkalinity, acidity, iron, manganese, aluminum, sulfates, and suspended solids. When funding is not available for laboratory analyses field kits may be used to measure pH, alkalinity, and iron. Ideally, flow rate is also to be measured. At a minimum, water monitoring should be conducted twice a year although quarterly is preferred at sampling points 906-15, BC2, BC2B, BC1, and BC8. Monitoring locations are proposed at the influent and effluent for each passive treatment system as well as on the receiving stream above and below the confluence with the final system effluent. [monitoring to follow EPA-approved QAPP (BioMost et al, 2006)]

Once per year, the SRWC will review available water quality data related to Blacks Creek and discuss the progress of the implementation plan. This will most likely be conducted during one of the monthly public meetings during the 1st quarter of the year. With each new passive treatment system installed, the degree of improvement to the impacted tributary and/or main branch of Blacks Creek will be reported. In general, these improvements are expected to be reflected by increases in pH and alkalinity values and decreases in acidity, iron, manganese, and aluminum values. Implementation of the restoration plan, as feasible, shall continue until applicable water quality criteria have been met.

PUBLIC PARTICIPATION

Public participation in the restoration plans and project implementation has always been encouraged by the SRWC and Stream Restoration Inc. Progress relating to plan development has been discussed at the SRWC monthly meetings (open to the public) as well as outreach events. As this plan outlines the restoration of an entire watershed, the major stakeholders includes everyone who lives within the watershed, especially the landowners who have property directly impacted by abandoned mine lands, people who use the watershed recreationally, those who work in the watershed, the SRWC, and the PADEP. The SRWC, Stream Restoration Inc., and PA DEP will be leading the effort to implement the plan. In order to inform the public about the progress of implementing the plan, various education/outreach activities will be utilized including the internet, our monthly newsletter *The Catalyst*, newspaper articles, monthly SRWC meetings and public outreach events such as the annual July 4th Harrisville Community Day. The plan may be uploaded to either the SRWC (www.srwc.org) or Stream Restoration Inc. (www.streamrestorationinc.org) websites. Water monitoring data will be uploaded to the on-line GIS and database management website Datashed www.datashed.org.

CONCLUSIONS

The watershed of Blacks Creek, a major headwaters tributary to Slippery Rock Creek, has been extensively mined through both surface and underground methods. In addition, the northern portion of the watershed was developed for oil production. These extensive resource extraction activities have severely degraded portions of the watershed. In addition to the TMDL developed by the PADEP Knox District Mining Office in 2002, a restoration plan has now been developed by BioMost, Inc., Stream Restoration Inc., and the SRWC based upon available data compiled from a variety of sources as well as newly acquired water quality data obtained while conducting stream walks of the watershed. This restoration plan has described all observed major sources of mine drainage that impact the Blacks Creek Watershed. Conceptual passive treatment Best Management Practices (BMPs) have been developed and cost estimates provided for these major sources of mine drainage. The restoration projects were then prioritized and a proposed time table for implementation was developed. In some cases, due to limited available data, additional water monitoring of mine discharges and more thorough site investigations will be required prior to finalizing the proposed passive treatment system designs. Occasional re-evaluations of the watershed to determine the progress of the restoration effort and possible reprioritization of the mine drainage abatement projects will be necessary to ensure a wise use of available funding and resources in order to restore the watershed in the most efficient, economical, and environmentally-friendly manner as feasible.

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- Beran Environmental Services, Inc. et al, 2006, Slippery Rock Creek Watershed Assessment and Restoration Plan, PADEP Environmental Stewardship & Watershed Protection Grant (Growing Greener NW20254, ME3521001) to Stream Restoration Inc., 73pp with Appx.
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- Harper, John, 2006, Personal Comm., PA DCNR Bureau of Topographic & Geologic Survey.
- PA Code, Title 25. Environmental Protection, Chap. 93. Water quality Standards; Chap. 96. Water Quality Standards Implementation, [portions electronically retrieved 1/31/2007].
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- PA Dept. of Environmental Protection, Bureau of District Mining Ops., Knox Office, 10/20/04, Final Blacks Creek Watershed TMDL, Butler County, 55pp. (EPA approved 01/19/05).
- Quality Aggregates Inc. (last entry dated 06/23/05) NCSMP 10960301, Module 8.1(A), Monitoring Points S-1, S-2, S-3, S-4, S-5, Boyers Quarry, Marion Twp., Butler Co.
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- Taylor, W., M. Dunn, S. Busler, 2001, Accepting the Challenge: A Primer about the History, Cause, and Solutions to Abandoned Mine Drainage, A Slippery Rock Watershed Coalition Publication, 79pp.
- US OSMRE, WVDEP, PADEP, 12/06, *AMDTreat Version 4.1*, [cost modeling software for mine drainage treatment]
- Watzlaf, George R. et al, 2004, The Passive Treatment of Coal Mine Drainage, US Dept. of Energy, National Energy Technology Laboratory, DOE/NETL-2004/1202, 72pp.



AMD discharges 906-4 (Left) and 906-5 (Center) as well as other seeps (Right) and good quality sources of water form unnamed tributary #18, which feeds into the large AMD impacted wetland complex.



Illegal dumps (Left), highwalls (Left), and water-filled pits (Center and Right) are located throughout the watershed.



AMD discharges 906-8 (Left) and 906-9 (Right) emanate from an abandoned underground mine evidenced by numerous subsidence features (Center) present in the vicinity. These discharges are collected by a beaver dam.



AMD discharges 906-7,-8,-9 mix with good quality water in a beaver dam wetland (Left) before entering the larger AMD impacted wetland complex (Center) with the outlet forming Blacks Creek (Right).



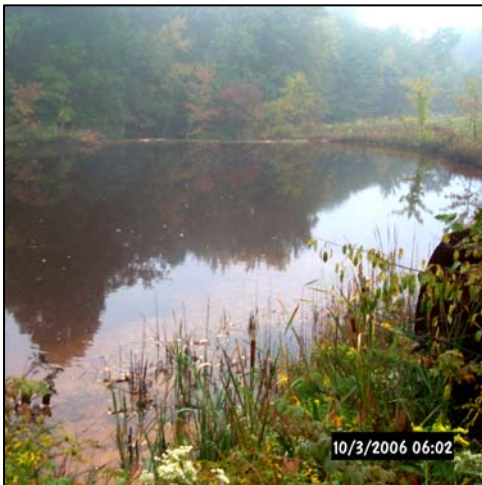
Wetlands/springs like 906-1(Left) are sources of good quality water to the watershed. 906-1 mixes with unnamed tributary #19 (Center), which raises the pH to precipitate aluminum (Center and Right) within the stream.



AMD discharge 906-14 (Left), along County Line Road, has minimal impact to good quality tributary #17 which confluent with Blacks Creek at 906-15 (Center)...Sediment Pond 906-16 (Right), at the headwaters of tributary #16 receives surface runoff from a reclaimed strip mine and AMD discharges 906-17, -17B.



Historic oil wells (Left), piping systems, and storage tanks (Center) can be seen throughout the northern portion of the watershed. These old oil wells can provide a conduit for mine drainage to reach the surface. Discharges BC14 and BC15 severely impact Blacks Creek as can be seen downstream at sampling point 906-42 (Right).



Existing treatment pond TB1 (Left) receives mine discharges MC1, MC2, and MC3 which emanate from the "McIntire" site. The effluent of TB1 (Right) forms tributary #15. The natural formation of iron minerals at low pH, plugging old piping (Center), is to be utilized and enhanced as part of the proposed passive system.



The BC16 discharge upwelling (Left) from an old oil well is the 2nd largest source of metal loadings in the watershed and flows into tributary #15 (Center & Right). A passive system is to be constructed in 2007.



Discharges BC19 & 19B (Left) are upwellings from old oil wells, which use to flow directly into Blacks Creek, but are now captured and treated in a passive treatment wetland (Right). Blacks Creek sampling point BC2B (Center) is downstream of all known major AMD discharges. Note the historic oil pipeline crossing Blacks Creek.



Several working farms, such as this one (Left) located downstream of BC2B, use the water resources within the watershed. Even though good quality streams such as tributary #14 (Center) improve Blacks Creek significantly it remains impacted at sampling point BC1 (Right) by sedimentation and metal loadings.



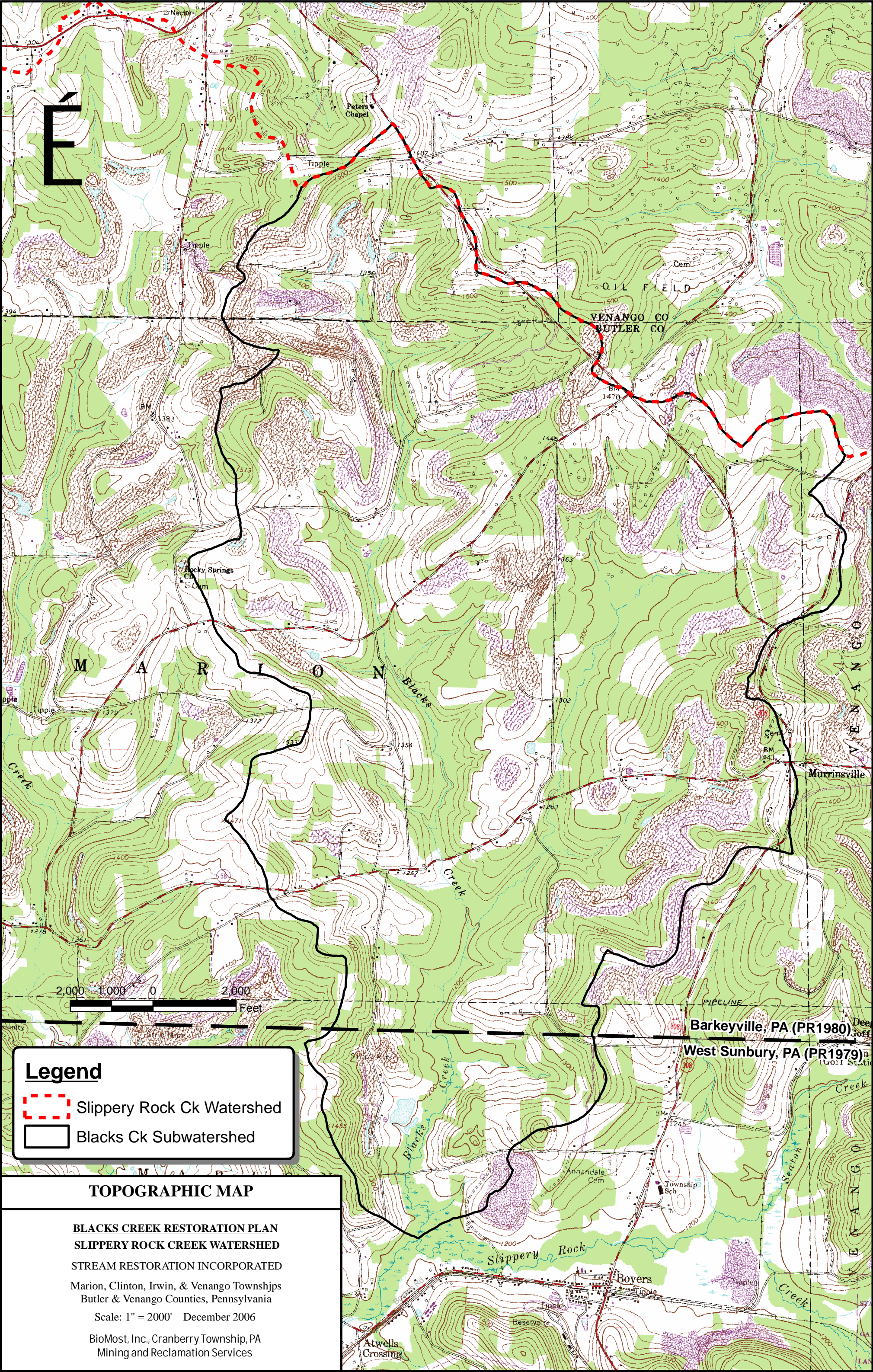
The oil well upwelling 906-36 (Left) has a minimal impact to Blacks Creek. An Allegheny Mineral limestone quarry (Center) has “eliminated” pre-existing AMD discharges. Blacks Creek remains slightly impacted at BC8 (Right).





Unnamed tributary #7 is formed by two small AMD discharges 906-22 and 906-23; however, the tributary quickly assimilates the drainage and becomes a stream with excellent water quality and habitat (Center). Another small AMD discharge 906-21 enters the stream just before the confluence with tributary #6. Other small seeps with little impact exist in the watershed like this on unnamed tributary #8 (Right).



Tributary #6 is essentially formed by the effluent of several old settling ponds (Left) that receive runoff from a large successfully reclaimed surface mine. The water quality meets mining effluent limits, but is slightly higher than the stream water quality criteria identified in the TMDL. The tributary quickly assimilates the drainage and is of excellent quality at sampling point BC12 (Center). Tributary #6 then confluent with and improves the water quality of Blacks Creek. The final downstream sampling point QAS4 (Right) on Blacks Creek is located below a Quality Aggregates limestone quarry.

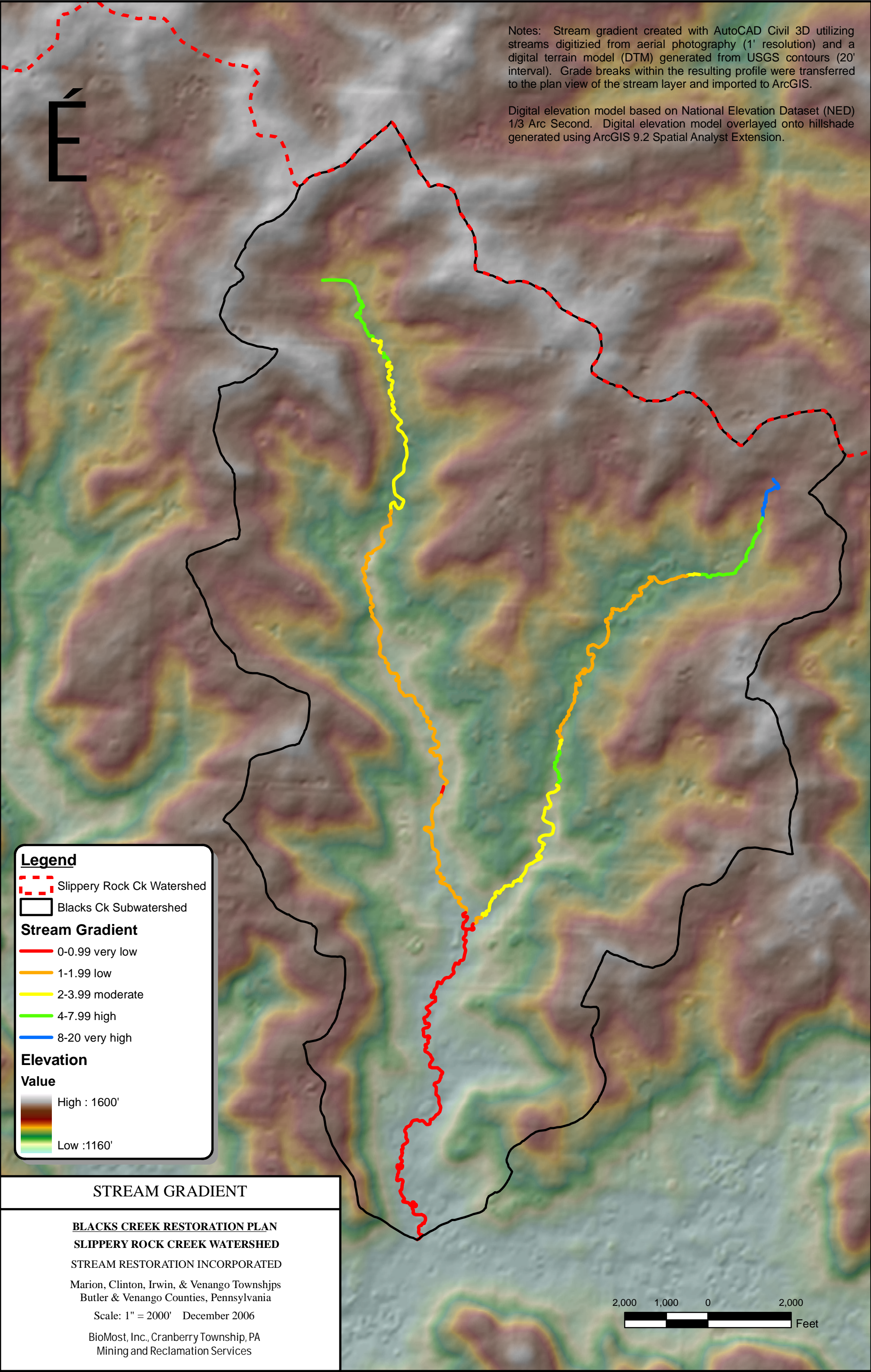


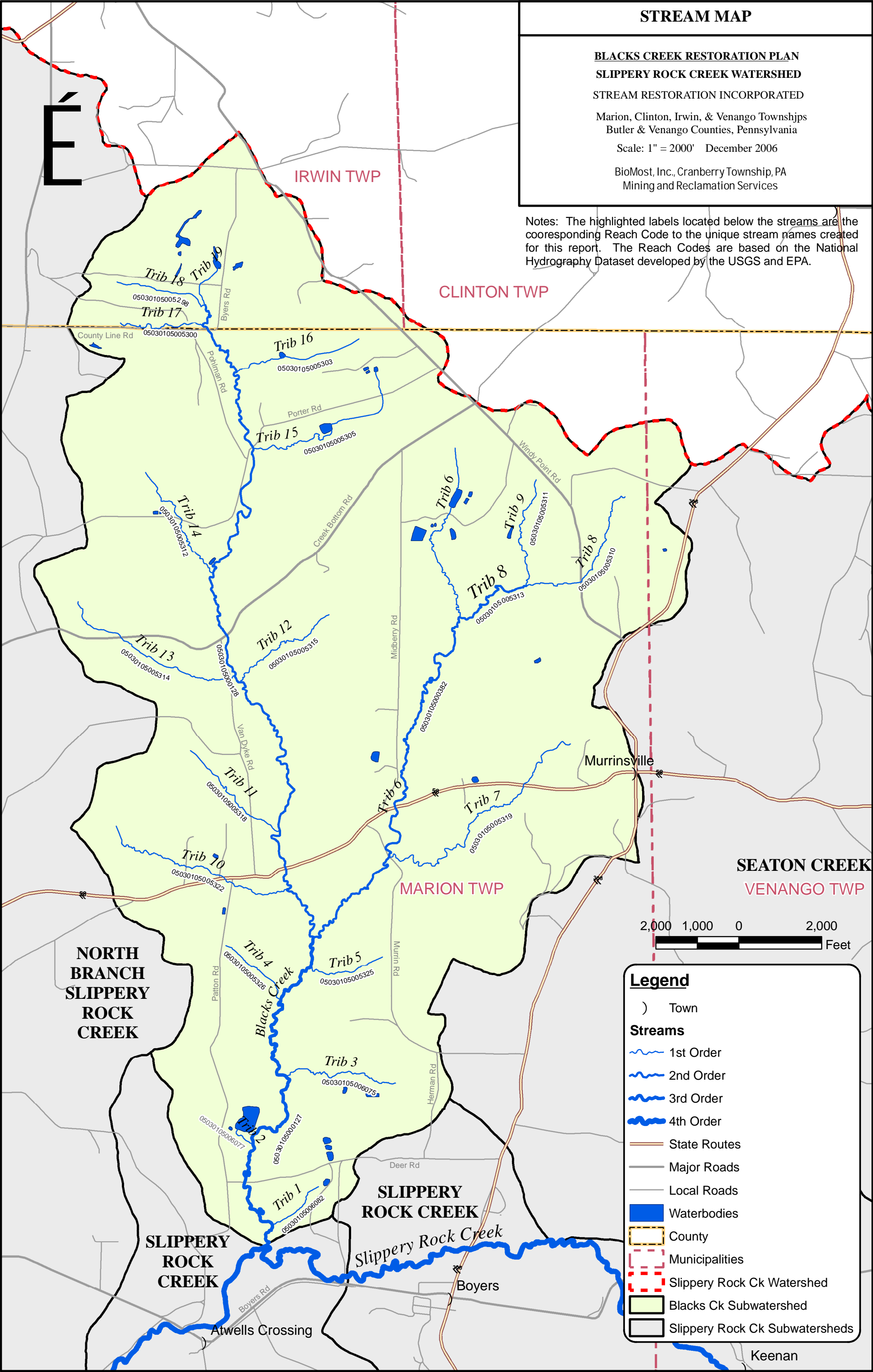
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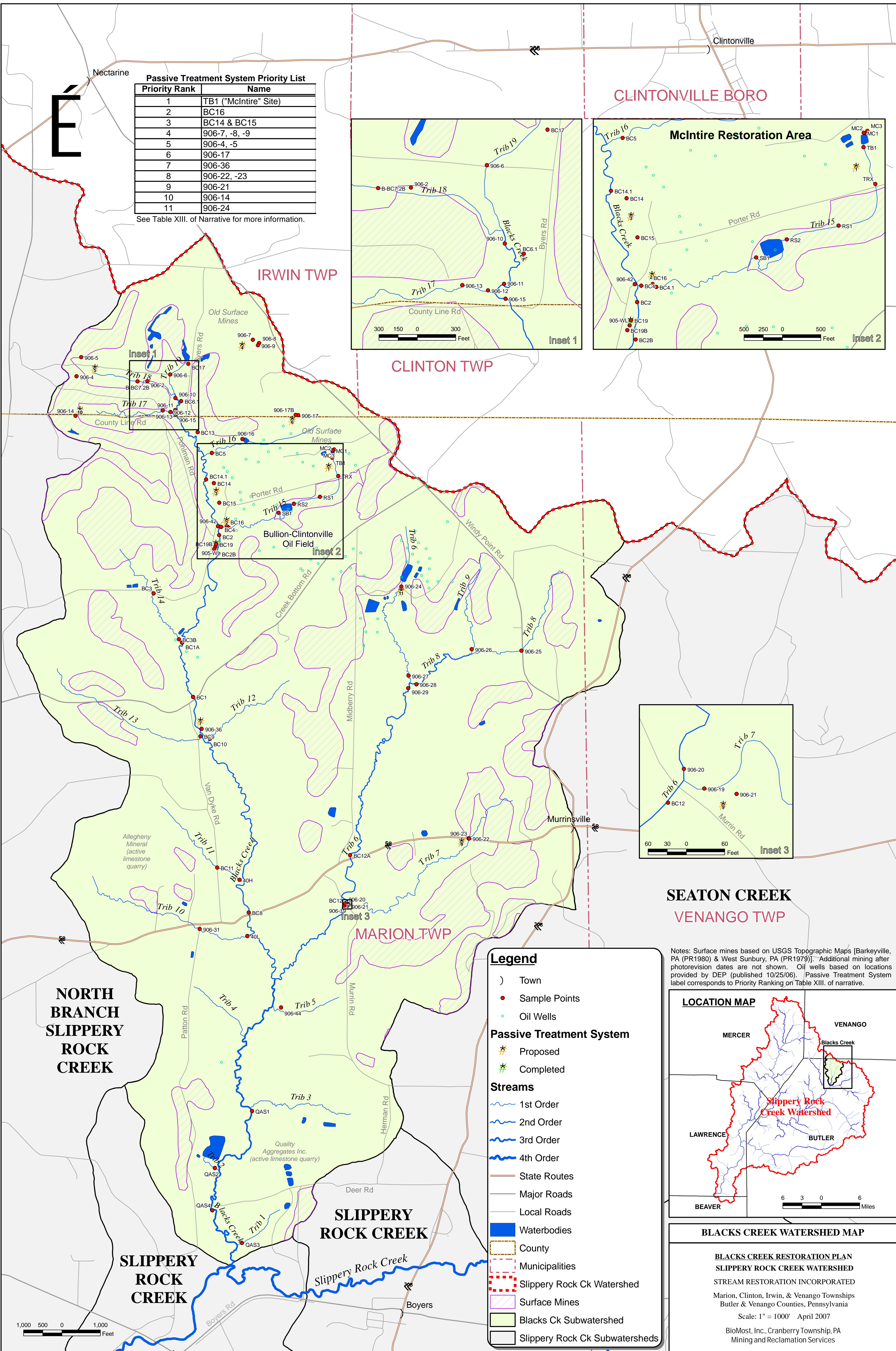
-  Slippery Rock Ck Watershed
-  Blacks Ck Subwatershed

TOPOGRAPHIC MAP

BLACKS CREEK RESTORATION PLAN
SLIPPERY ROCK CREEK WATERSHED
STREAM RESTORATION INCORPORATED
Marion, Clinton, Irwin, & Venango Townships
Butler & Venango Counties, Pennsylvania
Scale: 1" = 2000' December 2006
BioMost, Inc., Cranberry Township, PA
Mining and Reclamation Services







Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
905 WL	10/18/2004			7.2					174	-108			13.0		7.6		0.3		443	18
905 WL	10/21/2004	66	6.9	7.2		1214	12	160	160	-114			8.3	6.0	5.8	5.8	0.2	0.0	476	8
905 WL	1/12/2005	56	7.2	6.9		1060	9	143	140	-111			12.6	9.9	5.5	5.5	0.2	0.0	473	4
905 WL	2/1/2005	48		7.2					173	-114			15.1		7.0		0.3		364	36
905 WL	4/6/2005	65	7.3	7.6		12	20		164	-148			4.0	1.3	6.5	6.4	0.0	0.0	751	4
905 WL	5/9/2005	66		7.4					173	-131			1.4		4.4		0.0		423	12
905 WL	8/2/2005	68		7.2					163	-82			5.7		6.6		0.3		371	14
905 WL	11/9/2005	75		6.9					133	-36			26.7		6.2		0.3		439	68
905 WL	2/8/2006	68		7.0					140	-42			4.8		7.0		0.3		418	12
905 WL	5/9/2006			7.0					156	-86			2.7		5.4		0.3		418	12
905 WL	8/3/2006	53		6.8					161	-137			3.6		6.1		0.3		404	4
905 WL	10/3/2006	66	6.9	6.9	87.0	1240	15	157	148	-121			3.5	2.9	3.9	3.8	0.1	0.1	403	2
	Min	48	6.9	6.8	87.0	12	9	143	133	-148			1.4	1.3	3.9	3.8	0.0	0.0	364	2
	Max	75	7.3	7.6	87.0	1240	20	160	174	-36			26.7	9.9	7.6	6.4	0.3	0.1	751	68
	Avg	63	7.1	7.1	87.0	882	14	153	157	-102			8.5	5.0	6.0	5.4	0.2	0.0	449	16
	Range	27	0.4	0.8	0.8	1228	11	17	41	111			25.3	8.6	3.7	2.6	0.3	0.1	388	66

Description: Effluent of BC19 &19B passive treatment wetland; BMI sampling point; Same as PA DEP sampling point BC19D

Latitude: 41.162743780 **Longitude:** 79.918648257

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-2	3/30/2005		5.9	6.2		387		38	36	-27			0.1	0.0	1.4	1.3	0.9	0.0	264	1
906-2	5/10/2006		6.5		167.0		14	58					0.5							
Min			5.9	6.2	167.0	387	14	38	36	-27			0.1	0.0	1.4	1.3	0.9	0.0	264	1
Max			6.5	6.2	167.0	387	14	58	36	-27			0.5	0.0	1.4	1.3	0.9	0.0	264	1
Avg			6.2	6.2	167.0	387	14	48	36	-27			0.3	0.0	1.4	1.3	0.9	0.0	264	1
Range			0.6	0.0	0.0	0	0	20	0	0			0.4	0.0	0.0	0.0	0.0	0.0	0	0

Description: Seep zone in wetland below previous mining activities; BMI sampling point; Includes Beran Environmental sampling point DSCH BC7.2 which is assumed to be similar

Latitude: 41.174452629 **Longitude:** 79.925471184

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-4	5/10/2006	20	3.1	3.1	415.0	1158	20		0	317			2.1	1.8	8.0	7.7	37.8	35.8	421	4
	Min	20	3.1	3.1	415.0	1158	20		0	317			2.1	1.8	8.0	7.7	37.8	35.8	421	4
	Max	20	3.1	3.1	415.0	1158	20		0	317			2.1	1.8	8.0	7.7	37.8	35.8	421	4
	Avg	20	3.1	3.1	415.0	1158	20		0	317			2.1	1.8	8.0	7.7	37.8	35.8	421	4
	Range	0	0.0	0.0	0.0	0	0		0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Abandoned Mine Discharge; Emenates in an abandoned surface mine pit; Confluences with Abandoned Mine Discharge 906-5 to form unnamed headwaters tributary #18 to Blacks Creek; Upstream of 906-2 which feeds into the AMD impacted wetland; BMI sampling point

Latitude: 41.174681202 **Longitude:** 79.932181990

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-5	5/10/2006	20	3.6	3.6	0.0	461	20		0	77			0.3	0.3	5.4	5.3	6.4	6.4	167	13
	Min	20	3.6	3.6	0.0	461	20		0	77			0.3	0.3	5.4	5.3	6.4	6.4	167	13
	Max	20	3.6	3.6	0.0	461	20		0	77			0.3	0.3	5.4	5.3	6.4	6.4	167	13
	Avg	20	3.6	3.6	0.0	461	20		0	77			0.3	0.3	5.4	5.3	6.4	6.4	167	13
	Range	0	0.0	0.0	0.0	0	0		0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Abandoned Mine Discharge; Emanates at toe of spoil at base of large rock; Confluences with Mine Discharge 906-5 to form unnamed headwaters tributary #18 to Blacks Creek; Upstream of 906-2 which feeds portion of the AMD impacted wetland; BMI sampling point

Latitude: 41.176048928 **Longitude:** 79.931784324

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-6	4/5/2005		5.5	6.0		456			4	3			0.4	0.1	1.2	1.1	0.7	0.7	92	2
906-6	5/10/2006		6.2	5.7	274.0	369	20	4	3	6			0.3	0.1	1.9	1.9	0.4	0.2	124	10
	Min		5.5	5.7	274.0	369	20	4	3	3			0.3	0.1	1.2	1.1	0.4	0.2	92	2
	Max		6.2	6.0	274.0	456	20	4	4	6			0.4	0.1	1.9	1.9	0.7	0.7	124	10
	Avg		5.9	5.9	274.0	413	20	4	3	4			0.3	0.1	1.5	1.5	0.6	0.5	108	6
	Range		0.7	0.3	0.3	87	0	0	2	2			0.1	0.0	0.8	0.8	0.3	0.5	33	8

Description: Unnamed headwaters tributary #19 to Blacks Creek; Sample taken in middle of large beaver dam; Upstream of confluence with unnamed tributary #18; BMI sampling point; Approximately the same as Beran Environmental sampling point STRM BC7.5

Latitude: 41.174975202 **Longitude:** 79.92332713

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-7	5/10/2006	15	4.2	4.1	373.0	567	8		0	48			0.2	0.1	3.4	3.5	5.3	5.1	141	5
	Min	15	4.2	4.1	373.0	567	8		0	48			0.2	0.1	3.4	3.5	5.3	5.1	141	5
	Max	15	4.2	4.1	373.0	567	8		0	48			0.2	0.1	3.4	3.5	5.3	5.1	141	5
	Avg	15	4.2	4.1	373.0	567	8		0	48			0.2	0.1	3.4	3.5	5.3	5.1	141	5
	Range	0	0.0	0.0	0.0	0	0		0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Abandoned Mine Discharge; Possibly emanating from old deep mine or oil well; Mixes with other seeps, discharges and other sources of water which is then sampled at 906-6; BMI sampling point

Latitude: 41.177594411 **Longitude:** 79.915585596

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-8	5/10/2006	10	3.2	3.0	512.0	1829	12		0	640			104.8	95.7	16.8	16.7	59.4	55.2	950	6
	Min	10	3.2	3.0	512.0	1829	12		0	640			104.8	95.7	16.8	16.7	59.4	55.2	950	6
	Max	10	3.2	3.0	512.0	1829	12		0	640			104.8	95.7	16.8	16.7	59.4	55.2	950	6
	Avg	10	3.2	3.0	512.0	1829	12		0	640			104.8	95.7	16.8	16.7	59.4	55.2	950	6
	Range	0	0.0	0.0	0.0	0	0		0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Abandoned Mine Discharge; Probably emanates from an abandoned deep mine; Numerous subsidence features in vicinity; PVC pipe flows into old bath tub; Mixes with other seeps, discharges and other sources of water which is then sampled at 906-6; BMI point

Latitude: 41.177367270 **Longitude:** 79.914988056

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-9	5/10/2006	5	3.4	3.3	538.0	998	12		0	160			0.9	0.9	11.7	11.7	15.3	14.5	328	6
	Min	5	3.4	3.3	538.0	998	12		0	160			0.9	0.9	11.7	11.7	15.3	14.5	328	6
	Max	5	3.4	3.3	538.0	998	12		0	160			0.9	0.9	11.7	11.7	15.3	14.5	328	6
	Avg	5	3.4	3.3	538.0	998	12		0	160			0.9	0.9	11.7	11.7	15.3	14.5	328	6
	Range	0	0.0	0.0	0.0	0	0		0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Abandoned Mine Discharge; Close proximity to 906-8; Emanates below small pond; May be hydrologically connected to deep mine; Mixes with other seeps, discharges and other sources of water which is then sampled at 906-6; BMI sampling point

Latitude: 41.177214534 **Longitude:** 79.915093599

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-10	3/30/2000	100		4.5					8	50			0.2		3.3		4.6		135	
906-10	4/5/2005		4.7	4.7		272	17		1	13			0.4	0.2	1.9	1.9	1.5	1.3	129	1
906-10	5/17/2006		4.5	4.8	317.0	311	12		1	13			0.3	0.3	1.8	1.8	1.6	1.4	121	5
906-10	10/4/2006		5.2	5.1	333.0	295	17	2	2	9			0.5	0.5	2.2	2.2	0.9	0.7	86	1
Min		100	4.5	4.5	317.0	272	12	2	1	9			0.2	0.2	1.8	1.8	0.9	0.7	86	1
Max		100	5.2	5.1	333.0	311	17	2	8	50			0.5	0.5	3.3	2.2	4.6	1.4	135	5
Avg		100	4.8	4.8	325.0	293	15	2	3	21			0.4	0.3	2.3	1.9	2.2	1.1	118	2
Range		0	0.7	0.6	0.6	39	5	0	7	41			0.4	0.3	1.5	0.4	3.8	0.7	49	4

Description: Blacks Creek; Downstream of large AMD impacted wetlands that forms the stream; Upstream of BC6.1 spring; BMI sampling point; Essentially the same as PA DEP sampling point BC6A; Assumed to be the same as Beran Environmental sampling point STRM BC7.6

Latitude: 41.173305404 **Longitude:** 79.922772137

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-11	5/17/2006		5.2	5.1	308.0	324	12	7	2	9			0.4	0.3	1.7	1.7	1.5	0.9	124	2
906-11	10/4/2006		6.6	6.1	255.0	337	13	13	10	0			0.5	0.4	2.1	2.0	0.5	0.0	123	2
	Min		5.2	5.1	255.0	324	12	7	2	0			0.4	0.3	1.7	1.7	0.5	0.0	123	2
	Max		6.6	6.1	308.0	337	13	13	10	9			0.5	0.4	2.1	2.0	1.5	0.9	124	2
	Avg		5.9	5.6	281.5	331	13	10	6	4			0.4	0.4	1.9	1.8	1.0	0.5	124	2
	Range		1.3	1.0	1.0	13	1	6	8	9			0.2	0.1	0.4	0.3	1.0	0.9	0	0

Description: Blacks Creek; Sample point located downstream of 906-10 and downstream of the confluence with BC6.1 spring and upstream of confluence with unnamed tributary #17 (906-12); BMI sampling point

Latitude: 41.172439208 **Longitude:** 79.9227663387

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-12	8/23/1996			6.6					48	0			0.5		0.1		0.3		26	8
906-12	3/30/2000	25		6.7					78	0			0.2		0.2		0.3		178	
906-12	5/17/2006		6.9	7.0	285.0	324	10	40	39	-27			0.5	0.2	0.4	0.4	0.2	0.1	90	5
906-12	10/4/2006	25	7.7	7.0	229.0	482	15	95	92	-76			0.2	0.1	0.4	0.4	0.0	0.0	119	2
	Min	25	6.9	6.6	229.0	324	10	40	39	-76			0.2	0.1	0.1	0.4	0.0	0.0	26	2
	Max	25	7.7	7.0	285.0	482	15	95	92	0			0.5	0.2	0.4	0.4	0.3	0.1	178	8
	Avg	25	7.3	6.8	257.0	403	13	68	64	-26			0.3	0.2	0.3	0.4	0.2	0.1	103	5
	Range	0	0.9	0.4	0.4	158	5	55	54	76			0.4	0.1	0.3	0.0	0.2	0.1	152	6

Description: Unnamed headwaters tributary #17 to Blacks Creek; Sampled near mouth before confluenting with unnamed tributary #19 (906-11) to form Blacks Creek; BMI sampling point; Assumed to be same as PA DEP sampling point BC7

Latitude: 41.172291208 **Longitude:** 79.923214025

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-13	5/17/2006	1	6.8		238.0		12							6.0						
	Min	1	6.8		238.0		12							6.0						
	Max	1	6.8		238.0		12							6.0						
	Avg	1	6.8		238.0		12							6.0						
	Range	0	0.0				0							0.0						

Description: Seep; Small alkaline iron seep near old strip mine located north of County Line road along side of unnamed tributary #17 to Blacks Creek; Seep appears to have minimal impact to unnamed tributary #17; BMI sampling point

Latitude: 41.172390209 **Longitude:** 79.923948887

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-14	5/17/2006	7	5.7	5.7	229.0	368	9	34	9	11			20.1	11.1	6.0	4.8	0.2	0.1	148	1
	Min	7	5.7	5.7	229.0	368	9	34	9	11			20.1	11.1	6.0	4.8	0.2	0.1	148	1
	Max	7	5.7	5.7	229.0	368	9	34	9	11			20.1	11.1	6.0	4.8	0.2	0.1	148	1
	Avg	7	5.7	5.7	229.0	368	9	34	9	11			20.1	11.1	6.0	4.8	0.2	0.1	148	1
	Range	0	0.0	0.0	0.0	0	0	0	0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Abandoned Mine Discharge; Emanates along County Line Road, flows along ditch, through wetlands and enters unnamed tributary #17 to Blacks Creek; Source may be strip mine, but uncertain; BMI sampling point

Latitude: 41.171850696 **Longitude:** 79.932173883

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-15	8/23/1996			6.2					20	0			0.6		2.8		0.3		164	18
906-15	3/30/2000	100		4.7					9	40			0.2		3.1		4.2		146	0
906-15	4/25/2000	334		5.0					10	13			0.2		2.3		3.6		159	10
906-15	6/28/2000			6.3					24	0			0.3		2.2		0.8		133	16
906-15	9/28/2001	60		6.8					64	0			0.2		1.2		0.3		187	4
906-15	11/7/2001	57		6.9					48	0			0.2		1.0		0.3		172	
906-15	5/15/2003		5.0	6.0		362	13		4				0.2		2.5		2.3		190	
906-15	6/17/2003		5.5	7.3		387	18	28	6				0.2		2.5		1.9		170	
906-15	7/16/2003		6.5	6.7		171	18	40	30	-10			0.5		0.1		0.7	0.2	175	
906-15	8/13/2003		5.5	7.0		147	20	28	19	3			0.3		3.7		0.0	0.2	185	
906-15	9/13/2003		5.0	6.1		127		24	7	30			3.0		3.6		0.2	0.9	180	
906-15	10/18/2003		5.0	6.5		348	8	20	9	9			2.1		2.9		0.2	1.1	140	
906-15	12/16/2003			5.4		363			2	27			2.3		2.9		0.1	1.7	145	
906-15	1/18/2004			5.2		390			2	21			2.9		3.9		0.2	1.8	165	
906-15	2/14/2004			6.7		246			12	2			2.2		3.0		0.2	1.0	135	
906-15	3/11/2004			6.1		224			5	14			1.9		2.8		0.1	1.6	145	
906-15	4/16/2004			5.9		291			4	14			2.0		2.7		1.8	1.6	125	
906-15	5/12/2004			6.6		239			10	4			2.1		3.2		0.1	1.7	140	
906-15	5/17/2006		6.2	6.2	223.0	312	12	12	7	1			0.5	0.2	1.5	1.3	1.3	0.2	120	1
906-15	10/4/2006	110	6.9	6.3	262.0	373	16	24	23	-13			0.5	0.4	1.7	1.7	0.9	0.1	129	1
Min		57	5.0	4.7	223.0	127	8	12	2	-13			0.2	0.2	0.1	1.3	0.0	0.1	120	0
Max		334	6.9	7.3	262.0	390	20	40	64	40			3.0	0.4	3.9	1.7	4.2	1.8	190	18
Avg		132	5.7	6.2	242.5	284	15	25	16	8			1.1	0.3	2.5	1.5	1.0	1.0	155	7
Range		277	1.9	2.6	2.6	263	12	28	62	53			2.8	0.2	3.9	0.4	4.2	1.8	70	18

Description: Blacks Creek; Sampled below confluence with tributary #17, upstream of County Line Road; Upstream of stream point BC14.1 and discharges BC14 and BC15; BMI sampling point; Same as Beran Environmental point BC7; Assumed same as PA DEP point BC6

Latitude: 41.172093441 **Longitude:** 79.922591506

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-16	5/17/2006	150	4.5	4.4	292.0	411	15		0	40			0.7	0.7	3.4	3.3	5.8	5.3	176	1
	Min	150	4.5	4.4	292.0	411	15		0	40			0.7	0.7	3.4	3.3	5.8	5.3	176	1
	Max	150	4.5	4.4	292.0	411	15		0	40			0.7	0.7	3.4	3.3	5.8	5.3	176	1
	Avg	150	4.5	4.4	292.0	411	15		0	40			0.7	0.7	3.4	3.3	5.8	5.3	176	1
	Range	0	0.0	0.0	0.0	0	0		0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Effluent of sediment pond on reclaimed surface mine; Forms unnamed tributary #16 to Blacks Creek; Source of water includes surface runoff as well as mine discharges 906-17 & 17b; Brief heavy rain while collecting 5-17-06 sample; BMI sampling point

Latitude: 41.170491657 **Longitude:** 79.916341307

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-17	5/17/2006	12	3.7	3.6	419.0	1399	10		0	408			0.5	0.5	19.2	18.2	48.4	46.4	906	2
	Min	12	3.7	3.6	419.0	1399	10		0	408			0.5	0.5	19.2	18.2	48.4	46.4	906	2
	Max	12	3.7	3.6	419.0	1399	10		0	408			0.5	0.5	19.2	18.2	48.4	46.4	906	2
	Avg	12	3.7	3.6	419.0	1399	10		0	408			0.5	0.5	19.2	18.2	48.4	46.4	906	2
	Range	0	0.0	0.0	0.0	0	0		0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Abandoned Mine Discharge; Possibly from a deep mine; Flows down into and across reclaimed strip mine and mixes with surface flow before entering sediment pond (906-16); BMI sampling point

Latitude: 41.172293075 **Longitude:** 79.911117487

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-17b	5/17/2006	4	3.8		357.0		10													
	Min	4	3.8		357.0		10													
	Max	4	3.8		357.0		10													
	Avg	4	3.8		357.0		10													
	Range	0	0.0				0													

Description: Abandoned Mine Discharge; Located in close proximity to (~20 feet away) and probably related to 906-17; Assumed to be of similar quality as 906-17; BMI sampling point

Latitude: 41.172787307 **Longitude:** 79.912820576

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-19	9/27/2006		7.6	7.0	207.0	750	13	79	74	-60			0.8	0.5	0.5	0.5	0.1	0.1	313	2
	Min		7.6	7.0	207.0	750	13	79	74	-60			0.8	0.5	0.5	0.5	0.1	0.1	313	2
	Max		7.6	7.0	207.0	750	13	79	74	-60			0.8	0.5	0.5	0.5	0.1	0.1	313	2
	Avg		7.6	7.0	207.0	750	13	79	74	-60			0.8	0.5	0.5	0.5	0.1	0.1	313	2
	Range		0.0	0.0	0.0	0	0	0	0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Unnamed tributary #7 to Blacks Creek; Sample point located upstream of BC12 and ~50 ft above confluence with unnamed tributary #6 (906-20) at Murrin Road and just downstream of alkaline AMD discharge 906-21; BMI sampling point

Latitude: 41.137423976 **Longitude:** 79.905430649

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-20	9/27/2006		7.7	7.0	185.0	375	15	84	72	-60			0.3	0.1	0.0	0.0	0.2	0.1	86	5
	Min		7.7	7.0	185.0	375	15	84	72	-60			0.3	0.1	0.0	0.0	0.2	0.1	86	5
	Max		7.7	7.0	185.0	375	15	84	72	-60			0.3	0.1	0.0	0.0	0.2	0.1	86	5
	Avg		7.7	7.0	185.0	375	15	84	72	-60			0.3	0.1	0.0	0.0	0.2	0.1	86	5
	Range		0.0	0.0	0.0	0	0	0	0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Unnamed tributary #6 to Blacks Creek; Sample point located upstream of BC12 and ~50 feet upstream of confluence with unnamed tributary #7 (906-19) at Murrin Road; BMI sampling point

Latitude: 41.137337485 **Longitude:** 79.905641785

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-21	9/27/2006	10	6.6	6.1	180.0	400	12	80	48	-16			30.1	27.9	1.0	1.0	0.2	0.2	95	11
	Min	10	6.6	6.1	180.0	400	12	80	48	-16			30.1	27.9	1.0	1.0	0.2	0.2	95	11
	Max	10	6.6	6.1	180.0	400	12	80	48	-16			30.1	27.9	1.0	1.0	0.2	0.2	95	11
	Avg	10	6.6	6.1	180.0	400	12	80	48	-16			30.1	27.9	1.0	1.0	0.2	0.2	95	11
	Range	0	0.0	0.0	0.0	0	0	0	0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Abandoned Mine Discharge; Located just upstream of 906-19 along unnamed tributary #7 to Blacks Creek; BMI sampling point

Latitude: 41.137386609 **Longitude:** 79.905246383

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-22	9/27/2006	12	7.0	6.3	179.0	256	14	28	14	-5			3.4	1.0	0.7	0.5	0.5	0.2	93	1
	Min	12	7.0	6.3	179.0	256	14	28	14	-5			3.4	1.0	0.7	0.5	0.5	0.2	93	1
	Max	12	7.0	6.3	179.0	256	14	28	14	-5			3.4	1.0	0.7	0.5	0.5	0.2	93	1
	Avg	12	7.0	6.3	179.0	256	14	28	14	-5			3.4	1.0	0.7	0.5	0.5	0.2	93	1
	Range	0	0.0	0.0	0.0	0	0	0	0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Abandoned Mine Discharge; Sampled near RT58; Confluences with Abandoned Mine Discharge 906-23 to form unnamed tributary #7 to Blacks Creek; BMI sampling point

Latitude: 41.142350215 **Longitude:** 79.893987323

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-23	9/27/2006	4	5.9	5.7	271.0	499	14	10	4	5			0.9	0.5	2.3	2.3	0.3	0.2	223	2
	Min	4	5.9	5.7	271.0	499	14	10	4	5			0.9	0.5	2.3	2.3	0.3	0.2	223	2
	Max	4	5.9	5.7	271.0	499	14	10	4	5			0.9	0.5	2.3	2.3	0.3	0.2	223	2
	Avg	4	5.9	5.7	271.0	499	14	10	4	5			0.9	0.5	2.3	2.3	0.3	0.2	223	2
	Range	0	0.0	0.0	0.0	0	0	0	0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Abandoned Mine Discharge; Sampled near Rt 58; Confluences with Abandoned Mine Discharge 906-22 to form unnamed tributary #7 to Blacks Creek; BMI sampling point

Latitude: 41.142352675 **Longitude:** 79.894023997

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-24	9/27/2006	10	7.5	7.1	184.0	652	18	130	128	-96			2.1	1.1	0.3	0.3	0.3	0.1	181	4
	Min	10	7.5	7.1	184.0	652	18	130	128	-96			2.1	1.1	0.3	0.3	0.3	0.1	181	4
	Max	10	7.5	7.1	184.0	652	18	130	128	-96			2.1	1.1	0.3	0.3	0.3	0.1	181	4
	Avg	10	7.5	7.1	184.0	652	18	130	128	-96			2.1	1.1	0.3	0.3	0.3	0.1	181	4
	Range	0	0.0	0.0	0.0	0	0	0	0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Settling Pond located on a reclaimed surface mine; Discharge of the pond forms headwaters of unnamed tributary #6 to Blacks Creek; BMI sampling point

Latitude: 41.160223093 **Longitude:** 79.900964701

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-25	9/27/2006	50	7.7	6.8	172.0	260	16	74	70	-56			0.6	0.5	0.1	0.1	0.2	0.1	40	5
	Min	50	7.7	6.8	172.0	260	16	74	70	-56			0.6	0.5	0.1	0.1	0.2	0.1	40	5
	Max	50	7.7	6.8	172.0	260	16	74	70	-56			0.6	0.5	0.1	0.1	0.2	0.1	40	5
	Avg	50	7.7	6.8	172.0	260	16	74	70	-56			0.6	0.5	0.1	0.1	0.2	0.1	40	5
	Range	0	0.0	0.0	0.0	0	0	0	0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Unnamed tributary #8 to Blacks Creek; Sampled at Windy Point Road culvert; BMI sampling point

Latitude: 41.155853794 **Longitude:** 79.889469068

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-26	9/27/2006		7.7	7.2	180.0	633	20	128	129	-117			0.6	0.2	0.2	0.1	0.2	0.1	162	2
	Min		7.7	7.2	180.0	633	20	128	129	-117			0.6	0.2	0.2	0.1	0.2	0.1	162	2
	Max		7.7	7.2	180.0	633	20	128	129	-117			0.6	0.2	0.2	0.1	0.2	0.1	162	2
	Avg		7.7	7.2	180.0	633	20	128	129	-117			0.6	0.2	0.2	0.1	0.2	0.1	162	2
	Range		0.0	0.0	0.0	0	0	0	0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Unnamed tributary #9 to Blacks Creek; Sampled near mouth; Confluences with unnamed tributary #8 downstream of 906-25; BMI sampling point

Latitude: 41.155879210 **Longitude:** 79.894180859

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-27	9/27/2006		7.9	7.1	195.0	484	15	93	85	-76			0.4	0.2	0.1	0.1	0.2	0.2	114	5
	Min		7.9	7.1	195.0	484	15	93	85	-76			0.4	0.2	0.1	0.1	0.2	0.2	114	5
	Max		7.9	7.1	195.0	484	15	93	85	-76			0.4	0.2	0.1	0.1	0.2	0.2	114	5
	Avg		7.9	7.1	195.0	484	15	93	85	-76			0.4	0.2	0.1	0.1	0.2	0.2	114	5
	Range		0.0	0.0	0.0	0	0	0	0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Unnamed tributary #6 to Blacks Creek; Sample point located downstream of 906-24 prior to confluencing with unnamed tributary #8 (906-28); BMI sampling point

Latitude: 41.153871133 **Longitude:** 79.900085267

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-28	9/27/2006		8.0	7.0	199.0	433	15	98	94	-72			0.5	0.1	0.1	0.1	0.1	0.1	89	8
	Min		8.0	7.0	199.0	433	15	98	94	-72			0.5	0.1	0.1	0.1	0.1	0.1	89	8
	Max		8.0	7.0	199.0	433	15	98	94	-72			0.5	0.1	0.1	0.1	0.1	0.1	89	8
	Avg		8.0	7.0	199.0	433	15	98	94	-72			0.5	0.1	0.1	0.1	0.1	0.1	89	8
	Range		0.0	0.0	0.0	0	0	0	0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Unnamed tributary #8 to Blacks Creek; Sample point located downstream of confluence with unnamed tributary #9 (906-26) prior to confluence with unnamed tributary #6 (906-27); BMI sampling point

Latitude: 41.153278170 **Longitude:** 79.899333142

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-29	9/27/2006		7.9	7.2	200.0	448	15	95	92	-70			0.4	0.2	0.1	0.1	0.1	0.1	104	1
	Min		7.9	7.2	200.0	448	15	95	92	-70			0.4	0.2	0.1	0.1	0.1	0.1	104	1
	Max		7.9	7.2	200.0	448	15	95	92	-70			0.4	0.2	0.1	0.1	0.1	0.1	104	1
	Avg		7.9	7.2	200.0	448	15	95	92	-70			0.4	0.2	0.1	0.1	0.1	0.1	104	1
	Range		0.0	0.0	0.0	0	0	0	0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Unnamed tributary #6 to Blacks Creek; Sampled below confluence with unnamed tributary #8 (906-28); Upstream of BC12A and 906-20 and downstream of 906-27; BMI sampling point

Latitude: 41.152974009 **Longitude:** 79.900091268

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-31	12/3/1997	157		7.4		305	6		43	0			0.2		0.1		0.1		34	7
906-31	11/9/1998																			
906-31	11/23/1999	13	7.2	7.6		548	10		77	0			0.1		0.1				150	8
906-31	10/16/2000	3	7.3	7.6		569	10		96	0			0.1		0.1				161	1
906-31	12/11/2001	54	7.2	7.5		452	4		47	0			0.1		0.1				167	2
906-31	10/31/2002	7	7.2	7.5		573	4		64	0			0.3		0.1				280	4
906-31	12/11/2003	224	7.5	6.8		213	4		27	0			0.6		0.1				67	4
906-31	3/29/2004	478	7.3	7.3		271	13		31	0			1.2		0.1				89	3
906-31	5/17/2004	94	7.3	7.1		405	13		46	0			0.3		0.1				137	3
906-31	8/4/2004	108	7.1	7.4		274	17		37	0			0.3		0.1				87	3
906-31	12/22/2004		7.2	6.7		331	0		41	-26			0.4		0.1				124	1
906-31	1/27/2005		7.2	7.0		410	1		37	-24			1.4		0.2				123	30
906-31	6/23/2005	22	7.1	7.2		275	14		26	-16			0.3		0.1				97	1
906-31	9/12/2005	14	7.0	7.1		568	17		47	-30			0.2		0.2				206	2
906-31	12/14/2005			7.1		420			41	-29			1.1		0.3				132	4
906-31	3/9/2006	538	6.8	7.0		563	4		40	-34			2.9		0.2				56	34
906-31	6/20/2006	54	7.0	7.2		301	16		32	-24			0.8		0.2				83	11
906-31	9/5/2006	404	7.3	7.6		490	13		67	-58			0.9		0.1				112	7
906-31	10/3/2006		7.8	7.2	192.0	388	14	66	53	-42			1.1	0.1	0.2	0.2	0.5	0.1	95	13
Min		3	6.8	6.7	192.0	213	0	66	26	-58			0.1	0.1	0.1	0.2	0.1	0.1	34	1
Max		538	7.8	7.6	192.0	573	17	66	96	0			2.9	0.1	0.3	0.2	0.5	0.1	280	34
Avg		155	7.2	7.2	192.0	409	9	66	47	-16			0.7	0.1	0.1	0.2	0.3	0.1	122	8
Range		535	1.0	0.9	0.9	360	17	0	70	58			2.8	0.0	0.2	0.0	0.4	0.0	245	33

Description: Unnamed tributary to Blacks Creek; Sampled below bridge on Patton Road below Allegheny Mineral limestone quarry; BMI sampling point; Also includes Allegheny Mineral (permit #10960302) sampling point 40L located approximately 1000' downstream near mouth

Latitude: 41.135410293 **Longitude:** 79.919238419

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-36	10/3/2006	25	6.5	6.4	69.0	891	11	133	107	-70			13.5	12.9	1.5	1.5	0.1	0.1	157	8
	Min	25	6.5	6.4	69.0	891	11	133	107	-70			13.5	12.9	1.5	1.5	0.1	0.1	157	8
	Max	25	6.5	6.4	69.0	891	11	133	107	-70			13.5	12.9	1.5	1.5	0.1	0.1	157	8
	Avg	25	6.5	6.4	69.0	891	11	133	107	-70			13.5	12.9	1.5	1.5	0.1	0.1	157	8
	Range	0	0.0	0.0	0.0	0	0	0	0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Abandoned Mine Discharge; Appears to be bubbling up from an old oil well; Flows into Blacks Creek; BMI sampling point

Latitude: 41.149717880 **Longitude:** 79.919526256

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-42	2/2/2000			7.3		707			81	0			3.6	1.9	2.4	2.3	0.7	0.1	316	9
906-42	1/15/2001		7.1	7.2		625	2		79	0			9.5	2.6	1.9	1.8	0.2	0.2	256	5
906-42	2/5/2001		7.1	6.9		533	2		49	0			2.9	2.8	1.8	1.7	0.2	0.1	218	8
906-42	10/3/2006		7.4	7.1	92.0	541	15	67	64	-49			1.3	0.6	1.3	1.3	0.1	0.0	171	7
	Min		7.1	6.9	92.0	533	2	67	49	-49			1.3	0.6	1.3	1.3	0.1	0.0	171	5
	Max		7.4	7.3	92.0	707	15	67	81	0			9.5	2.8	2.4	2.3	0.7	0.2	316	9
	Avg		7.2	7.1	92.0	602	6	67	68	-12			4.3	2.0	1.8	1.7	0.3	0.1	240	7
	Range		0.3	0.4	0.4	174	13	0	32	49			8.2	2.2	1.1	1.0	0.6	0.1	145	4

Description: Blacks Creek; Sampled at T-434 (Porter Rd.) crossing located upstream of confluence with unnamed "McIntire" tributary #15 and below BC14 and BC15 discharges ; BMI sampling point; Formerly BMI sampling point MID

Latitude: 41.164225850 **Longitude:** 79.918454603

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
906-44	10/4/2006		7.5	6.6	265.0	263	15	55	56	-49			0.5	0.1	0.0	0.0	0.2	0.0	60	3
	Min		7.5	6.6	265.0	263	15	55	56	-49			0.5	0.1	0.0	0.0	0.2	0.0	60	3
	Max		7.5	6.6	265.0	263	15	55	56	-49			0.5	0.1	0.0	0.0	0.2	0.0	60	3
	Avg		7.5	6.6	265.0	263	15	55	56	-49			0.5	0.1	0.0	0.0	0.2	0.0	60	3
	Range		0.0	0.0	0.0	0	0	0	0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Unnamed tributary #5 to Blacks Creek; Sampled near mouth; Stream forms below reclaimed surface mine near the "Lucas" site; BMI sampling point

Latitude: 41.129948972 **Longitude:** 79.911371485

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
B-BC7.2B	3/30/2005		3.3	3.6		456			0	67			0.7	0.6	5.5	5.3	9.3	9.0	264	1
	Min		3.3	3.6		456			0	67			0.7	0.6	5.5	5.3	9.3	9.0	264	1
	Max		3.3	3.6		456			0	67			0.7	0.6	5.5	5.3	9.3	9.0	264	1
	Avg		3.3	3.6		456			0	67			0.7	0.6	5.5	5.3	9.3	9.0	264	1
	Range		0.0	0.0	0.0	0			0	0			0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Unnamed tributary #18 to Blacks Creek; Upstream of AMD impacted wetland complex and downstream of AMD discharges 906-4 and 906-5; Beran Environmental sampling point

Latitude: 41.174423 **Longitude:** 79.926415

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC1	8/23/1996			7.0					88	0			0.8		4.1				220	
BC1	12/3/1997	4039		7.4		638	6		66	0			1.6		2.6		0.2		191	21
BC1	11/9/1998	553	7.4	7.7		979	8		104	0			0.2		3.1				361	1
BC1	11/23/1999	269	7.3	7.6		790	10		88	0			0.3		2.8				295	10
BC1	3/30/2000			6.8					92	0			2.8		3.1		0.6		264	
BC1	4/25/2000	1625		7.4					102	0			2.4		2.3		0.6		310	8
BC1	10/16/2000	269	7.2	7.6		878	9		95	0			0.3		3.0				391	9
BC1	4/19/2001			7.2					78	0			2.7		2.7		0.6		235	14
BC1	5/8/2001	915		7.3					108	0			1.7		3.8		0.3		306	4
BC1	9/28/2001	278		7.1					106	0			0.2		3.2		0.3		300	
BC1	12/11/2001	403	7.2	7.5		748	5		79	0			0.9		3.0				316	5
BC1	10/31/2002	430	7.2	7.5		794	2		83	0			0.6		3.2				232	1
BC1	5/15/2003		7.0	7.3		576	12		59				3.7		3.7		0.6		230	
BC1	6/17/2003		7.5	7.5		653	16	96	72				2.4		2.8		0.4		280	
BC1	7/16/2003		7.5	7.7		299	17	92	91	-72			1.3		9.6		0.0	0.0	345	
BC1	8/13/2003		7.0	7.7		267	18	98	89	-82			0.3		3.9		0.1		345	
BC1	9/13/2003		7.0	7.8		220	15	104	87	-70			3.1		3.8		0.6	0.0	280	
BC1	10/18/2003		7.0	7.8		220	9	90	69	-54			3.0		4.2		0.8	0.1	200	
BC1	12/11/2003	1795	7.7	7.1		339	3		12	0			2.3		2.4				174	5
BC1	12/16/2003			7.9		589			73	-57			2.0		2.6		0.8	0.0	210	
BC1	1/18/2004			7.8		671			89	-63			3.2		4.3		0.5	0.2	305	
BC1	2/14/2004			7.6		425			74	-61			3.5		4.7		1.2	0.4	400	
BC1	3/11/2004			7.7		356			79	-35			2.2		3.2		0.9	0.1	375	
BC1	3/29/2004	2639	7.2	7.5		595	10		64	0			2.9		2.2				247	6
BC1	4/16/2004			7.8		487			76	-52			2.4		3.3		0.5	0.2	210	
BC1	5/12/2004			7.8		400			72	-45			3.0		4.6		0.3	0.3	290	
BC1	5/17/2004	647	6.2	5.3		936	13		3	23			11.0		10.0				454	25
BC1	8/4/2004	754	7.3	7.7		730	18		86	0			1.6		2.5				295	2
BC1	12/22/2004	1005	7.3	7.0		680	0		80	-50			3.2		2.2				368	2
BC1	1/27/2005		7.2	7.4		733	2		97	-74			3.2		2.7				306	4

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC1	6/23/2005	359	7.3	7.8		783	13		103	-91			1.5		3.5				341	2
BC1	9/12/2005	336	7.2	7.6		867	16		107	-87			0.3		2.0				315	4
BC1	12/14/2005			7.4		739			105	-84			1.8		2.5				279	2
BC1	3/9/2006		7.0	7.1		620	5		74	-71			12.3		2.2				221	3
BC1	6/20/2006	539	7.3	7.8		820	16		107	-81			1.0		2.2				397	5
BC1	9/5/2006	1436	7.2	7.6		580	17		79	-61			1.6		1.8		0.3		174	3
BC1	10/3/2006	195	7.7	7.3	165.0	595	14	82	77	-61			1.8	0.2	2.1	2.0	0.4	0.1	170	2
	Min	195	6.2	5.3	165.0	220	0	82	3	-91			0.2	0.2	1.8	2.0	0.0	0.0	170	1
	Max	4039	7.7	7.9	165.0	979	18	104	108	23			12.3	0.2	10.0	2.0	1.2	0.4	454	25
	Avg	973	7.2	7.4	165.0	613	11	94	81	-35			2.4	0.2	3.4	2.0	0.5	0.1	287	6
	Range	3844	1.5	2.5	2.5	759	18	22	105	115			12.1	0.0	8.2	0.0	1.2	0.4	284	24

Description: Blacks Creek; Sampled upstream of bridge on Creek Bottom Road (SR 4013); PA DEP sampling point; Same as BMI point 906-38; Essentially same as Beran Environmental point BC4; Same as Allegheny Mineral (permit #10960302) point 65B

Latitude: 41.151981946 **Longitude:** 79.920411641

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC1A	3/30/2000			6.9					94	0			3.7		3.1		0.9		278	6
BC1A	10/3/2006		7.7	7.4	75.0	625	14	87	75	-61			2.2	0.6	2.3	2.1	0.5	0.0	189	2
	Min		7.7	6.9	75.0	625	14	87	75	-61			2.2	0.6	2.3	2.1	0.5	0.0	189	2
	Max		7.7	7.4	75.0	625	14	87	94	0			3.7	0.6	3.1	2.1	0.9	0.0	278	6
	Avg		7.7	7.1	75.0	625	14	87	85	-31			2.9	0.6	2.7	2.1	0.7	0.0	234	4
	Range		0.0	0.5	0.5	0	0	0	19	61			1.5	0.0	0.9	0.0	0.4	0.0	90	4

Description: Blacks Creek; Sampled below confluence with unnamed tributary #14; PA DEP sampling point; Same as BMI point 906-39

Latitude: 41.155841556 **Longitude:** 79.921576292

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC2	8/23/1996			6.8					86	0			4.0		2.9		0.3		230	12
BC2	11/7/1996			6.4					80	0			9.3		6.5		1.0		189	0
BC2	3/11/1997			6.7					70	0			5.5		4.1		1.8		211	14
BC2	2/2/2000		6.8	6.7		1015	4		58	0			17.3	13.0	12.7	10.5	2.5	0.0	457	30
BC2	3/30/2000			6.3					182	0			49.0		15.0		0.3		842	70
BC2	6/28/2000			6.4					68	0			10.1		5.8		1.4		281	8
BC2	1/15/2001		5.8	6.6		775	3		47	0			10.3	6.4	8.5	5.9	2.3	0.4	401	20
BC2	2/5/2001		6.6	6.5		799	4		37	0			10.9	10.6	7.3	6.8	2.3	0.2	406	18
BC2	5/15/2003		7.0	6.8		476	12		46				2.1		1.9		0.1		300	
BC2	6/17/2003		7.0	7.1		560	18	94	60				2.1		1.8		0.1		190	
BC2	7/16/2003		6.5	7.4		255	18	88	80	-40			4.8		4.1		0.0	0.0	290	
BC2	9/13/2003		6.5	7.4		202	17	104	83	-27			2.4		2.9		0.9		235	
BC2	10/18/2003		7.0	7.4		482	9	64	51				2.1		2.9		1.4	0.1	185	
BC2	12/16/2003			7.7		205			58	-36			1.7		2.2		0.8	0.1	205	
BC2	1/18/2004			7.4		606			68	-48			2.3		3.1		0.4	0.2	270	
BC2	2/14/2004			7.5		385			62	-48			2.3		3.0		0.8	0.4	300	
BC2	3/11/2004			7.4		331			65	-53			1.5		2.2		1.0	0.2	275	
BC2	4/16/2004			7.2		446			63	-23			1.5		2.1		0.1	0.0	225	
BC2	5/6/2004		7.0	6.9		778	15	69	55	-42			6.9	5.1	3.8	3.6	1.4	0.1	381	7
BC2	5/12/2004			7.8		357			67	-56			1.9		2.8		0.0	0.1	225	
BC2	10/18/2004			6.7					69	-19			11.6		7.7		2.5		294	24
BC2	10/18/2004			6.7					69	-19			11.6		7.7		2.5		294	24
BC2	10/21/2004		6.6	6.8		823	11	62	55	-35			9.7	7.4	5.5	5.3	1.5	0.2	397	14
BC2	1/12/2005		6.1	6.0		383	6	15	9	4			2.5	1.5	2.7	2.7	1.8	0.2	185	8
BC2	2/1/2005	927		7.0					76	-26			7.9		4.9		2.0		253	24
BC2	2/1/2005	927		7.0					76	-26			7.9		4.9		2.0		253	24
BC2	4/6/2005		7.1	7.0		558	13		50	-40			4.1	3.1	2.8	2.8	0.7	0.0	275	4
BC2	5/9/2005	931		6.9					75	-31			5.8		3.5		0.7		247	16
BC2	5/9/2005	931		6.9					75	-31			5.8		3.5		0.7		247	16
BC2	8/2/2005	197		7.0					103	-57			12.7		6.1		0.3		271	24

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC2	11/9/2005	240		6.8					71	-18										
BC2	2/8/2006	820		6.6					56	5			6.6		3.9		0.7		233	6
BC2	5/9/2006	465		6.9					83	-42			7.7		3.2		0.3		259	20
BC2	8/3/2006	692		6.8					80	-63			4.0		2.9		0.3		215	4
BC2	8/13/2006		7.0	7.6		231		106	83	-55			2.3		2.5		0.6	0.1	275	
BC2	10/3/2006		7.1	6.7	89.0	656	15	64	54	-38			5.6	4.6	3.4	3.3	0.9	0.1	237	1
	Min	197	5.8	6.0	89.0	202	3	15	9	-63			1.5	1.5	1.8	2.7	0.0	0.0	185	0
	Max	931	7.1	7.8	89.0	1015	18	106	182	5			49.0	13.0	15.0	10.5	2.5	0.4	842	70
	Avg	681	6.7	6.9	89.0	516	11	74	69	-26			7.2	6.5	4.6	5.1	1.0	0.1	287	17
	Range	734	1.3	1.8	1.8	813	15	91	173	68			47.5	11.5	13.2	7.8	2.5	0.4	657	70

Description: Blacks Creek; Downstream of 906-42 and the confluence with unnamed "McIntire" tributary #15; Upstream of BC19 &19B passive treatment system effluent discharge and BC2B; PA DEP sampling point; Same as BMI point 905 UP and Beran Environmental BC6;

Latitude: 41.163585908 **Longitude:** 79.918323647

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC2B	3/30/2000			6.6					74	0			7.7		4.6		1.1		296	10
BC2B	6/28/2000			6.5					74	0			9.5		6.1		1.3		315	10
BC2B	9/28/2001	157		6.7					98	0			7.4		6.7		1.1		300	16
BC2B	11/7/2001	157		6.9					78	0			8.0		7.6		1.5		394	16
BC2B	5/15/2003		7.5	6.4		641	13		39				10.6		6.3		1.6		280	
BC2B	6/17/2003		7.0	7.3		462	17	94	54				9.0		5.5		1.2		280	
BC2B	7/16/2003		6.5	7.0		327	16	105	76	-39			18.7		3.3		0.8	0.0	475	
BC2B	8/13/2003		7.0	6.8		298	17	108	73	-46			0.3		7.1		0.0		500	
BC2B	9/13/2003		6.5	7.0		239	16	94	94	-34			5.2		6.2		1.0	0.0	375	
BC2B	10/18/2003		7.0	6.9		614	9	70	47	-24			5.3		7.4		1.6	0.2	290	
BC2B	1/18/2004			7.2		689			65	-42			4.7		6.3		0.9		400	
BC2B	2/14/2004			7.0		461			52	-33			5.7		7.7		1.0	0.4	375	
BC2B	3/11/2004			7.0		384			62	-44			3.4		5.0		2.3	0.2	375	
BC2B	3/25/2004		7.0	6.7		674	16		48	-35			8.3	4.6	3.4	3.3	1.6	0.0	283	17
BC2B	4/16/2004			7.0		515			57	-35			4.2		5.7		1.0	0.6	275	
BC2B	5/6/2004		7.0	6.9		794	16	74	62	-47			7.6	5.1	3.9	3.7	1.3	0.0	414	8
BC2B	5/12/2004			7.2		422			60	-41			6.6		9.8		1.6	1.1	340	
BC2B	10/18/2004			6.9					78	-29			10.8		7.4		2.0		277	28
BC2B	10/18/2004			6.9					78	-29			10.8		7.4		2.0		277	28
BC2B	10/21/2004		6.9	6.9		844	11	79	62	-36			9.3	6.6	5.9	5.6	1.6	0.1	421	17
BC2B	12/16/2004			7.6		626			56	-31			3.5		4.4		1.7		325	
BC2B	1/12/2005		6.2	6.2		366	6	15	11	3			3.1	1.4	2.8	2.6	1.8	0.2	190	14
BC2B	2/1/2005	1026		7.1					83	-42			7.4		4.4		1.6		262	16
BC2B	4/6/2005		7.1	7.1		583	13		51	-41			3.9	2.6	2.8	2.7	0.6	0.0	309	5
BC2B	5/9/2005	1021		7.0					79	-34			5.4		3.7		0.6		250	18
BC2B	5/9/2005	1021		7.0					79	-34			5.4		3.7		0.6		250	18
BC2B	8/2/2005	271		7.2					115	-7			8.5		5.9		0.3		289	20
BC2B	11/9/2005	315		6.8					80	-35			0.2		0.3		0.3		276	2
BC2B	2/8/2006	891		6.6					59	6			6.5		4.1		0.6		246	8
BC2B	5/9/2006	546		6.8					91	-56			5.3		3.6		0.3		276	18

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC2B	8/3/2006	793		6.6					84	-65			4.5		3.3		0.3		245	4
BC2B	10/3/2006		7.4	6.8	80.0	697	15	66	55	-36			5.1	3.7	3.4	3.3	0.9	0.0	242	6
	Min	157	6.2	6.2	80.0	239	6	15	11	-65			0.2	1.4	0.3	2.6	0.0	0.0	190	2
	Max	1026	7.5	7.6	80.0	844	17	108	115	6			18.7	6.6	9.8	5.6	2.3	1.1	500	28
	Avg	620	6.9	6.9	80.0	535	14	78	68	-29			6.6	4.0	5.2	3.5	1.1	0.2	316	14
	Range	869	1.3	1.4	1.4	605	11	93	104	71			18.6	5.2	9.6	3.0	2.3	1.1	310	27

Description: Blacks Creek; Located downstream of BC19 & 19B passive system effluent discharge; PA DEP sampling point; Same as BMI sampling point 905 DN and Beran Environmental sampling point BC5

Latitude: 41.162245927 **Longitude:** 79.918347122

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC3	8/23/1996			6.8					198	0			0.4		0.1		0.3		221	16
BC3	2/7/2002			8.0					246	0			0.4		0.4		0.3		459	
BC3	5/15/2003			8.0		807			243				0.2		0.1		0.1		240	
BC3	6/17/2003		8.0	7.2		883	16	276	226				0.5		0.2		0.5		240	
BC3	7/16/2003		8.0	7.7		336	17	268	239	-221			0.2		1.2		0.0	0.0	375	
BC3	8/13/2003		7.5	7.9		293	18	280	232	-207			0.1		0.0		0.0	0.1	300	
BC3	9/13/2003		7.5	8.1		258	16	230	227	-104			0.1		0.1		0.2		325	
BC3	10/18/2003		7.5	8.2		765	10	252	230	-220			0.1		0.1		0.1	0.1	245	
BC3	12/16/2003			8.2		835			213	-205			0.5		0.6		0.0	0.0	300	
BC3	1/18/2004			8.1		905			262	-209			1.0		1.3		0.1	0.1	425	
BC3	2/14/2004			8.1		542			218	-202			0.4		0.6		0.2	0.4	315	
BC3	3/11/2004			8.0		498			233	-109			0.4		0.6		0.1		275	
BC3	4/16/2004			8.2		653			214	-207			0.3		0.4		0.0	0.0	330	
BC3	5/12/2004			7.8		519			228	-214			0.1		0.1		0.0	0.2	325	
BC3	10/3/2006		8.1	8.0	160.0	883	15	237	233	-187			0.3	0.2	0.3	0.3	0.2	0.1	220	2
	Min		7.5	6.8	160.0	258	10	230	198	-221			0.1	0.2	0.0	0.3	0.0	0.0	220	2
	Max		8.1	8.2	160.0	905	18	280	262	0			1.0	0.2	1.3	0.3	0.5	0.4	459	16
	Avg		7.8	7.9	160.0	629	15	257	229	-160			0.3	0.2	0.4	0.3	0.1	0.1	306	9
	Range		0.6	1.4	1.4	647	8	50	64	221			0.9	0.0	1.3	0.0	0.5	0.4	239	14

Description: Unnamed tributary #14 to Blacks Creek; Sampled along Porter Road (T434); PA DEP sampling point; Same as BMI point 906-37 and Beran Environmental BC8

Latitude: 41.159308554 **Longitude:** 79.924382830

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC3B	3/30/2000			7.9					216	0			0.2		0.0		0.3		302	
BC3B	10/3/2006		8.2	8.0	109.0	702	15	109	186	-165			0.1	0.1	0.1	0.1	0.2	0.1	165	2
	Min		8.2	7.9	109.0	702	15	109	186	-165			0.1	0.1	0.0	0.1	0.2	0.1	165	2
	Max		8.2	8.0	109.0	702	15	109	216	0			0.2	0.1	0.1	0.1	0.3	0.1	302	2
	Avg		8.2	8.0	109.0	702	15	109	201	-83			0.1	0.1	0.1	0.1	0.2	0.1	234	2
	Range		0.0	0.1	0.1	0	0	0	30	165			0.0	0.0	0.1	0.0	0.1	0.0	137	0

Description: Unnamed tributary #14 to Blacks Creek; Sampled near mouth before confluence with Blacks Creek; PA DEP sampling point; Same as BMI sampling point 906-40

Latitude: 41.155892561 **Longitude:** 79.921565453

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC4	8/23/1996	175		5.9					42	48			30.0		19.5		2.6		620	60
BC4	11/7/1996	145		3.4					0	154			3.6		22.2		9.6		403	0
BC4	6/28/2000	130		6.1					72	32			31.5		19.4		6.1		652	20
BC4	1/15/2001		5.2	4.7		1181	5		2	81			19.1	13.5	21.9	19.8	9.4	6.1	784	33
BC4	2/5/2001	47	6.0	6.3		1021	6		36	27			18.1	16.3	13.7	12.9	3.9	0.4	497	18
BC4	10/3/2006		6.4	6.4	113.0	1068	13	48	40	9			20.3	18.4	12.1	11.4	3.8	0.1	454	22
	Min	47	5.2	3.4	113.0	1021	5	48	0	9			3.6	13.5	12.1	11.4	2.6	0.1	403	0
	Max	175	6.4	6.4	113.0	1181	13	48	72	154			31.5	18.4	22.2	19.8	9.6	6.1	784	60
	Avg	124	5.9	5.5	113.0	1090	8	48	32	59			20.4	16.0	18.1	14.7	5.9	2.2	568	26
	Range	128	1.2	3.0	3.0	160	8	0	72	145			27.9	5.0	10.1	8.4	7.0	6.0	381	60

Description: Unnamed "McIntire" tributary #15 to Blacks Creek; Sampled at mouth prior to confluence with Blacks Creek; Downstream of BC16 discharge; PA DEP sampling point; Same as BMI sampling point 906-41, formerly BMI point DS

Latitude: 41.164177066 **Longitude:** 79.918147726

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC4.1	6/28/2000	120		3.3					0	162			7.5		20.9		12.4		468	14
BC4.1	10/4/2006	78	3.5	3.5	612.0	930	12		0	93			3.5	3.4	14.2	13.7	9.9	6.6	348	1
	Min	78	3.5	3.3	612.0	930	12		0	93			3.5	3.4	14.2	13.7	9.9	6.6	348	1
	Max	120	3.5	3.5	612.0	930	12		0	162			7.5	3.4	20.9	13.7	12.4	6.6	468	14
	Avg	99	3.5	3.4	612.0	930	12		0	127			5.5	3.4	17.6	13.7	11.2	6.6	408	8
	Range	42	0.0	0.2	0.2	0	0		0	69			4.1	0.0	6.7	0.0	2.5	0.0	120	13

Description: Unnamed tributary #15 to Blacks Creek; "McIntire" tributary; Sampled upstream of BC16 discharge; PA DEP sampling point; Same as BMI sampling point 906-43

Latitude: 41.164245786 **Longitude:** 79.917445037

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC5	8/23/1996			7.6					298	0			0.2		0.2		0.3		430	16
BC5	8/28/1996			6.2					34	1			0.8		0.5		0.5		223	22
BC5	3/30/2000	15		6.4					46	0			0.2		0.1		0.3		235	
BC5	2/7/2002			6.6					32	0			0.2		0.2		0.3		172	
	Min	15		6.2					32	0			0.2		0.1		0.3		172	16
	Max	15		7.6					298	1			0.8		0.5		0.5		430	22
	Avg	15		6.7					103	0			0.3		0.3		0.3		265	19
	Range	0		1.4	1.4				266	1			0.6		0.3		0.3		258	6

Description: Unnamed tributary #16 to Blacks Creek; Sample point located near mouth prior to confluence with Blacks Creek; Downstream of 906-16; PA DEP sampling point

Latitude: 41.169437466 **Longitude:** 79.919198828

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC6.1	3/30/2000	5		6.8					116	0			0.3		0.2		0.3		471	
BC6.1	5/10/2006	10	7.0		166.0		12	136					0.4							
	Min	5	7.0	6.8	166.0		12	136	116	0			0.3		0.2		0.3		471	
	Max	10	7.0	6.8	166.0		12	136	116	0			0.4		0.2		0.3		471	
	Avg	8	7.0	6.8	166.0		12	136	116	0			0.4		0.2		0.3		471	
	Range	5	0.0	0.0	0.0		0	0	0	0			0.1		0.0		0.0		0	

Description: Spring; Located along Byers Road across from old strip mine; Spring enters Blacks Creek downstream of 906-10 and upstream of 906-11; PA DEP sampling point; Same as BMI sampling point 906-1

Latitude: 41.173093819 **Longitude:** 79.922225214

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC8	8/23/1996			6.9					74	0			0.5		1.8		0.3		160	6
BC8	12/3/1997	6283		7.2		519	7		56	0			0.6		1.4		0.1		123	11
BC8	11/9/1998	1312	7.4	7.5		793	7		86	0			0.4		1.4				231	3
BC8	11/23/1999	282	7.1	7.4		650	10		81	0			0.3		1.4				210	5
BC8	3/30/2000			6.7					76	0			0.7		1.8		0.3		215	
BC8	4/25/2000			7.2					82	0			0.6		1.4		0.3		215	8
BC8	6/28/2000			6.6					60	0			1.0		2.6		0.3		192	6
BC8	10/16/2000	358	7.2	7.5		726	9		79	0			0.5		1.3				265	10
BC8	9/28/2001	553		7.0					94	0			0.8		1.6		0.3		232	
BC8	12/11/2001	470	7.1	7.4		620	5		68	0			0.7		1.6				243	4
BC8	2/7/2002	1600		7.0					62	0			1.3		1.6		0.3		180	
BC8	10/31/2002	1075	7.1	7.4		680	4		71	0			0.7		1.9				301	3
BC8	5/15/2003		7.0	7.2		449	13		52				1.0		2.4		0.2		167	
BC8	6/17/2003		7.0	7.0		504	16	82	61				1.4		1.6		0.3		160	
BC8	7/16/2003		7.0	7.5		267	18	96	81	-64			1.2		0.1		0.0	0.0	255	
BC8	8/13/2003		7.0	6.8		218	17	88	80	-40			0.4		2.2		0.1	0.1	215	
BC8	9/13/2003		7.0	7.8		189	16	90	78	-45			2.0		2.4		0.3	0.0	215	
BC8	10/18/2003		7.0	7.6		470	9	70	59	-45			2.0		2.8		0.6	0.1	145	
BC8	12/11/2003	10098	7.6	6.4		302	4		24	0			1.9		1.5				136	5
BC8	12/16/2003			7.6		464			61	-43			1.6		2.1		0.3	0.0	175	
BC8	1/18/2004			7.4		594			77	-48			2.4		3.2		0.4	0.1		
BC8	2/14/2004			7.8		353			64	-46			2.4		3.3		1.1	0.3	185	
BC8	3/11/2004			7.5		330			68				1.6		2.3		0.6	0.1	185	
BC8	3/29/2004	6059	7.1	7.5		511	9		55	0			2.3		1.6				169	3
BC8	4/16/2004			7.7		418			65	-52			1.6		2.2		0.3	0.1	160	
BC8	5/12/2004			7.6		370			71	-62			2.1		3.1		0.1	0.2	200	
BC8	5/17/2004	898	6.0	4.6		967	13		0	54			9.5		12.7				561	16
BC8	8/4/2004	1437	7.2	7.6		620	19		71	0			0.8		1.5				215	1
BC8	12/22/2004		7.2	7.0		575	0		70	-55			1.4		1.4				268	5
BC8	1/27/2005																			

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC8	6/23/2005	431	7.3	7.6		690	15		91	-76			0.9		2.2				245	3
BC8	9/12/2005	449	7.2	7.5		776	16		93	-76			0.7		1.4				252	2
BC8	12/14/2005	0																		
BC8	3/9/2006		6.0	7.2		613	4		81	-72			2.8		1.5				187	20
BC8	6/20/2006	880	7.2	7.7		751	17		96	-82			0.8		1.4				241	7
BC8	9/5/2006	3232	7.2	7.6		531	15		74	-61			1.1		1.1				149	5
BC8	10/3/2006		7.7	7.3	195.0	529	13	69	63	-47			0.9	0.4	1.3	1.3	0.1	0.1	132	2
	Min	0	6.0	4.6	195.0	189	0	69	0	-82			0.3	0.4	0.1	1.3	0.0	0.0	123	1
	Max	10098	7.7	7.8	195.0	967	19	96	96	54			9.5	0.4	12.7	1.3	1.1	0.3	561	20
	Avg	2083	7.1	7.2	195.0	534	11	83	69	-27			1.4	0.4	2.1	1.3	0.3	0.1	211	6
	Range	10098	1.7	3.3	3.3	778	19	27	96	136			9.2	0.0	12.7	0.0	1.1	0.3	439	19

Description: Blacks Creek; Sampled upstream of RT 58 bridge; PA DEP sampling point; Same as BMI sampling point 906-32 and Beran Environmental sampling point BC3; Essentially the same as Allegheny Mineral (permit #10960302) 40K located ~ 400 ft (?) downstream

Latitude: 41.136679854 **Longitude:** 79.914654924

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC9	8/23/1996			6.9					86	0			0.2		0.6		0.3		156	8
BC9	12/3/1997	89		7.2		174	5		35	0			0.2		0.0		0.2		31	16
BC9	11/9/1998																			
BC9	11/23/1999	7	6.9	7.1		191	9		32	0			0.1		0.1				37	4
BC9	10/16/2000	1	6.8	7.2		213	9		54	0			1.4		0.4				38	7
BC9	12/11/2001	22	6.8	6.9		210	6		23	0			0.1		0.0				60	3
BC9	2/7/2002			6.8					34	0			0.2		0.1		0.3		46	
BC9	10/31/2002	3	6.9	7.1		209	6		33	0			0.1		0.0				30	4
BC9	12/11/2003	359	7.6	5.7		121	4		5	5			0.5		0.1				44	4
BC9	3/29/2004	273	7.4	7.3		192	10		31	0			0.2		0.0				47	4
BC9	5/17/2004	54	7.2	7.1		227	14		58	0			0.3		0.1				55	1
BC9	8/4/2004	121	7.1	7.5		204	18		51	0			0.3		0.1				35	2
BC9	12/22/2004	67	7.2	6.7		214	3		50	-33			0.2		0.0				55	2
BC9	1/27/2005		7.0	7.2		229	1		55	-45			0.2		0.0				47	3
BC9	6/23/2005	2	7.2	7.5		193	13		61	-52			0.5		0.3				23	3
BC9	9/12/2005	1	7.2	7.5		315	16		118	-93			0.4		0.4				24	2
BC9	12/14/2005			7.2		205			46	-36			0.2		0.1				35	4
BC9	3/9/2006	287	7.0	7.0		205	4		45	-41			0.5		0.1				36	6
BC9	6/20/2006	54	7.2	7.4		262	16		63	-54			0.5		0.1				45	9
BC9	9/5/2006	350	6.7	7.2		201	17		42	-28			0.4		0.1				28	4
BC9	10/3/2006		7.7	7.0	183.0	221	14	52	45	-30			0.4	0.2	0.1	0.1	0.2	0.1	35	3
Min		1	6.7	5.7	183.0	121	1	52	5	-93			0.1	0.2	0.0	0.1	0.2	0.1	23	1
Max		359	7.7	7.5	183.0	315	18	52	118	5			1.4	0.2	0.6	0.1	0.3	0.1	156	16
Avg		113	7.1	7.1	183.0	210	10	52	48	-20			0.3	0.2	0.1	0.1	0.2	0.1	45	5
Range		359	1.0	1.8	1.8	194	17	0	112	97			1.3	0.0	0.6	0.0	0.1	0.0	132	15

Description: Unnamed tributary #13 to Blacks Creek; PA DEP sampling point; Same as BMI point 906-34; Same as Allegheny Mineral (permit #1096030) downstream sampling point 64G

Latitude: 41.149183742 **Longitude:** 79.919617864

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC10	4/26/1995	155	8.3	7.0		210	10		42	0			0.2		0.0		0.0		78	1
BC10	5/25/1995	516	6.9	7.1		180	13		34	0			0.1		1.0		0.0		72	6
BC10	7/17/1995	101	6.8	6.0		200	20		48	0			0.4		0.4		0.0		67	9
BC10	8/23/1996			6.5					34	0			0.4		0.1		0.3		72	8
BC10	2/7/2002			6.8					38	0			0.9		0.1		0.3		141	
BC10	10/3/2006		7.6	7.0	172.0	295	15	46	74	-33			0.3	0.2	0.1	0.1	0.1	0.1	63	2
	Min	101	6.8	6.0	172.0	180	10	46	34	-33			0.1	0.2	0.0	0.1	0.0	0.1	63	1
	Max	516	8.3	7.1	172.0	295	20	46	74	0			0.9	0.2	1.0	0.1	0.3	0.1	141	9
	Avg	257	7.4	6.7	172.0	221	14	46	45	-6			0.4	0.2	0.3	0.1	0.1	0.1	82	5
	Range	415	1.5	1.1	1.1	115	10	0	40	33			0.8	0.0	1.0	0.0	0.3	0.0	78	8

Description: Unnamed tributary #12 to Blacks Creek; PA DEP sampling point; Same as BMI point 906-35; Same as Allegheny Mineral (permit #10960302) sampling point 64i

Latitude: 41.149007772 **Longitude:** 79.918716057

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC11	3/23/1995	114		7.8		420	5		102	0			0.0		0.0		0.0		161	10
BC11	4/24/1995	136		7.2		360	8		24	0			0.0		0.0		0.0		148	4
BC11	9/22/1995			7.7		640			164	0			0.2		0.0				290	3
BC11	10/30/1995	14	7.3	7.6		620	6		180	0			0.1		0.0		0.0		306	4
BC11	8/23/1996			7.3					126	0			0.2		0.1		0.3		156	8
BC11	12/3/1997			7.3		526	6		62	0			0.7		1.4		0.1		130	21
BC11	11/9/1998	11	7.4	7.9		923	7		147	0			0.2		0.2				353	2
BC11	11/23/1999	13	7.5	8.0		720	11		130	0			0.1		0.0				272	5
BC11	10/16/2000	13	7.4	7.9		836	9		164	0			0.0		0.0				366	3
BC11	12/11/2001	54	7.3	7.9		690	5		104	0			0.1		0.0				329	4
BC11	2/7/2002			7.6					112	0			0.2		0.0		0.3		218	
BC11	10/31/2002	9	7.4	7.9		828	6		148	0			0.1		0.1				231	1
BC11	12/11/2003	323	7.9	6.9		267	5		48	0			0.2		0.0				110	4
BC11	3/29/2004	283	7.4	8.0		474	8		98	0			0.1		0.0				159	4
BC11	5/17/2004	27	7.3	7.4		550	12		105	0			0.2		0.0				209	2
BC11	8/4/2004		7.4	7.9		460	19		100	0			0.3		0.1				153	6
BC11	12/22/2004	89	7.3	7.8		718	5		132	-97			0.1		0.0				334	6
BC11	1/27/2005	108	7.2	8.0		900	2		161	-132			0.1		0.0				303	4
BC11	6/23/2005	18	7.4	7.9		460	12		100	-80			0.1		0.0				129	6
BC11	9/12/2005	9	7.1	7.9		535	16		105	-91			0.1		0.0				136	4
BC11	9/12/2005	9	7.1	7.9		535	16		105	-91			0.1		0.0				136	4
BC11	12/14/2005			7.9		1034			173	-151			0.2		0.0				448	1
BC11	3/9/2006	54	7.3	7.8		694	6		117	-106			0.5		0.0				262	13
BC11	6/20/2006	54	7.5	8.0		1185	17		174	-146			0.2		0.1				461	10
BC11	9/5/2006	229	7.6	8.0		1444	15		216	-149			0.2		0.0				585	6
BC11	10/3/2006	80	8.0	7.9	182.0	1392	13	198	190	-160			1.0	0.1	0.1	0.1	0.2	0.1	4898	2

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
Min		9	7.1	6.9	182.0	267	2	198	24	-160			0.0	0.1	0.0	0.1	0.0	0.1	110	1
Max		323	8.0	8.0	182.0	1444	19	198	216	0			1.0	0.1	1.4	0.1	0.3	0.1	4898	21
Avg		82	7.4	7.7	182.0	717	10	198	126	-46			0.2	0.1	0.1	0.1	0.1	0.1	434	5
Range		314	0.9	1.2	1.2	1177	17	0	192	160			1.0	0.0	1.4	0.0	0.3	0.0	4788	20

Description: Unnamed tributary #11 to Blacks Creek; Sampled below Allegheny Mineral quarry; PA DEP sampling point; Same as BMI sampling point 906-33; Assumed to be similar to Allegheny Mineral (Permit #10960302) sampling point 40H located ~750 feet downstream

Latitude: 41.139827494 **Longitude:** 79.917724978

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC12	8/23/1996			6.9					62	0			0.3		0.2		0.3		152	
BC12	2/7/2002			7.1					50	0			0.2		0.2		0.3		152	
BC12	5/15/2003		7.0	7.4		343	12		41				0.6		0.5		0.2		137	
BC12	6/17/2003		7.0	7.2			16	66	52				0.7		0.3		0.2		140	
BC12	7/16/2003		7.0	7.8		226	17	104	82	-58			0.7		4.9		0.0	0.0	225	
BC12	8/13/2003		7.0	7.3		165	17	58	55	-33			0.3		0.4		0.2	0.1	165	
BC12	9/13/2003		7.0	7.9		167	16	102	71	-47			0.3		0.4		0.3	0.0	195	
BC12	10/18/2003		7.0	7.5		375	9	56	48	-33			0.3		0.5		0.2	0.0	125	
BC12	12/16/2003			7.8		415			45	-30			0.6		0.8		0.2	0.0	135	
BC12	1/18/2004			7.7		527			63	-35			0.7		1.0		0.2	0.1	195	
BC12	2/14/2004			7.7		303			50	-24			0.6		0.8		0.3	0.2	145	
BC12	3/11/2004			7.7		263			48	-39			0.6		0.8		0.2	0.1	150	
BC12	4/16/2004			7.9		359			51	-36			0.5		0.7		0.2	0.1	130	
BC12	5/12/2004			7.8		301			62	-39			0.2		0.3		0.0	0.0	170	
BC12	9/27/2006	125	7.6	6.8	203.0	501	12	71	78	-59			0.3	0.2	0.2	0.2	0.1	0.1	134	1
	Min	125	7.0	6.8	203.0	165	9	56	41	-59			0.2	0.2	0.2	0.2	0.0	0.0	125	1
	Max	125	7.6	7.9	203.0	527	17	104	82	0			0.7	0.2	4.9	0.2	0.3	0.2	225	1
	Avg	125	7.1	7.5	203.0	329	14	76	57	-33			0.5	0.2	0.8	0.2	0.2	0.1	157	1
	Range	0	0.6	1.1	1.1	362	8	48	41	59			0.6	0.0	4.7	0.0	0.3	0.2	100	0

Description: Unnamed tributary #6 to Blacks Creek; Sampled below culvert on Murrin Road after confluence with unnamed tributary #7 (906-19); Downstream of 906-20; PA DEP sampling point; Same as BMI sampling poin 906-18 and Beran Environmental BC3

Latitude: 41.137222870 **Longitude:** 79.905526717

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC12A	9/28/2001	90		7.3					96	0			0.2		0.0		0.3			
	Min	90		7.3					96	0			0.2		0.0		0.3			
	Max	90		7.3					96	0			0.2		0.0		0.3			
	Avg	90		7.3					96	0			0.2		0.0		0.3			
	Range	0		0.0	0.0				0	0			0.0		0.0		0.0			

Description: Unnamed tributary #6 to Blacks Creek; Sample point located at Rt 58 Bridge upstream of 906-20 and BC12 and downstream of 906-29; PA DEP sampling point

Latitude: 41.14083 **Longitude:** 79.90528

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC13	3/30/2000	30		7.6					314	0			0.2		0.1		0.3		548	
	Min	30		7.6					314	0			0.2		0.1		0.3		548	
	Max	30		7.6					314	0			0.2		0.1		0.3		548	
	Avg	30		7.6					314	0			0.2		0.1		0.3		548	
	Range	0		0.0	0.0				0	0			0.0		0.0		0.0		0	

Description: Spring; Flows into Blacks Creek downstream of 906-15 and upstream of BC14.1; PA DEP sampling point

Latitude: 41.170894372 **Longitude:** 79.920597450

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC14	8/28/1996	20		6.2					56	78			1.0		42.4		0.1		614	22
BC14	11/7/1996	35		6.3					46	30			0.4		21.1		0.1		285	0
BC14	3/11/1997			6.3					156	62			67.0		28.4		0.2		529	40
BC14	2/2/2000		6.3	6.5		1047	10		119	13			37.2	37.1	11.8	11.2	0.0	0.0	57	19
BC14	3/30/2000	10		6.1					42	0			0.2		1.9		0.3		415	0
BC14	6/28/2000	20		6.3					70	0			1.9		8.6		0.3		488	12
BC14	2/5/2001		6.2	6.5		1073	9		137	0			38.5	34.6	10.5	10.1	0.1	0.0	566	9
	Min	10	6.2	6.1		1047	9		42	0			0.2	34.6	1.9	10.1	0.0	0.0	57	0
	Max	35	6.3	6.5		1073	10		156	78			67.0	37.1	42.4	11.2	0.3	0.0	614	40
	Avg	21	6.3	6.3		1060	10		89	26			20.9	35.9	17.8	10.6	0.1	0.0	422	15
	Range	25	0.1	0.4	0.4	26	1		114	78			66.9	2.5	40.6	1.2	0.3	0.0	557	40

Description: Discharge; Oil well upwelling north of T-434 (Porter Rd.); Flows directly into Blacks Creek; Located downstream of BC14.1 and upstream of BC15 and 906-42; PA DEP & BMI sampling point; Formerly BMI point NWELL

Latitude: 41.167284433 **Longitude:** 79.918937382

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC14.1	3/11/1997			6.9					68	0			0.2		1.5		1.7		179	0
BC14.1	2/2/2000		6.6	7.6		688	0		91	0			0.2	0.1	1.2	1.2	1.0	0.0	265	4
BC14.1	3/30/2000			6.7					70	0			0.2		1.5		1.6		211	0
BC14.1	1/15/2001		6.3	7.4		545	1		60	0			0.3	0.1	1.3	1.3	0.3	0.1	185	3
BC14.1	2/5/2001		7.2	7.3		468	2		49	0			0.3	0.2	1.1	1.0	0.5	0.0	181	5
	Min		6.3	6.7		468	0		49	0			0.2	0.1	1.1	1.0	0.3	0.0	179	0
	Max		7.2	7.6		688	2		91	0			0.3	0.2	1.5	1.3	1.7	0.1	265	5
	Avg		6.7	7.2		567	1		68	0			0.2	0.1	1.3	1.2	1.0	0.1	204	2
	Range		0.9	0.9	0.9	220	2		42	0			0.2	0.1	0.5	0.3	1.4	0.1	86	5

Description: Blacks Creek; Sampled upstream of discharges BC14 and and BC15; Upstream of stream point 906-42 and downstream of point 905-15; PA DEP & BMI sampling point; Formerly BMI sampling point UP

Latitude: 41.167564427 **Longitude:** 79.919207389

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC15	8/28/1996	100		6.3					116	12			40.6		12.6		0.1		527	52
BC15	11/7/1996	100		6.3					134	4			38.4		9.3		0.1		265	64
BC15	3/11/1997			6.4					134	16			40.7		15.2		0.4		397	42
BC15	2/2/2000	60	6.1	6.5		1125	10		115	2			34.4	33.4	10.6	10.4	0.1	0.0	435	20
BC15	3/30/2000	80		6.3					118	0			32.8		9.3		0.3		401	6
BC15	6/28/2000	60		6.4					114	0			29.9		8.8		0.3		371	10
BC15	1/15/2001		6.0	6.4		1022	9		67	0			34.5	34.5	10.0	9.5	0.1	0.0	465	17
BC15	2/5/2001		6.5	6.5		1113	9		125	0			36.3	33.5	9.7	9.2	0.1	0.0	485	10
	Min	60	6.0	6.3		1022	9		67	0			29.9	33.4	8.8	9.2	0.1	0.0	265	6
	Max	100	6.5	6.5		1125	10		134	16			40.7	34.5	15.2	10.4	0.4	0.0	527	64
	Avg	80	6.2	6.4		1087	9		115	4			35.9	33.8	10.7	9.7	0.2	0.0	418	28
	Range	40	0.5	0.2	0.2	103	1		67	16			10.8	1.1	6.4	1.3	0.3	0.0	262	58

Description: Discharge; Oil well upwelling North of T-434 (Porter Rd.) Closest to the road; Flows directly into Blacks Creek; Located downstream of BC14.1 and BC14 and upstream of 906-42; PA DEP & BMI sampling point; BMI formerly called BC14.

Latitude: 41.165894455 **Longitude:** 79.918377357

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC16	8/28/1996	175		6.3					190	96			73.9		26.0		0.1		754	72
BC16	11/7/1996	100		6.3					228	16			62.2		18.6		0.1		388	0
BC16	3/11/1997			6.4					228	32			44.7		19.3		0.2		488	28
BC16	3/30/2000	60		6.5					66	0			6.8		4.2		1.2		391	8
BC16	6/28/2000	91		6.3					238	0			55.1		17.1		0.3		688	18
BC16	2/5/2001	33	5.9	6.4		1473	10		166	0			51.3		14.0		0.1		865	15
BC16	2/19/2001	70	5.8	6.4		1436	10	145	169	0			49.3	44.8	16.0	13.5	0.5	0.3	628	11
BC16	4/19/2001	106		6.4					206	0			59.1		18.6		0.3		536	14
BC16	5/8/2001	90		6.2					174	0			65.7		20.4		0.3		867	24
BC16	9/28/2001	8		6.3					156	101			71.7		21.3		0.3			22
BC16	11/7/2001	3		6.3					128	74			61.0		15.1		0.6		736	42
BC16	2/7/2002	45		6.3					168	26			55.3		16.0		0.3		641	
BC16	2/8/2006	90		6.3					167	-22			56.7		13.9		0.3		644	8
BC16	5/9/2006	72		6.4					185	-33			43.6		10.5		0.3		559	10
BC16	8/3/2006	84		6.3					120	-72			40.4		10.2		0.3		540	2
BC16	10/4/2006	89	6.4	6.2	92.0	1356	11	188	141	-13			52.0	45.2	10.6	10.4	0.0	0.0	423	14
Min		3	5.8	6.2	92.0	1356	10	145	66	-72			6.8	44.8	4.2	10.4	0.0	0.0	388	0
Max		175	6.4	6.5	92.0	1473	11	188	238	101			73.9	45.2	26.0	13.5	1.2	0.3	867	72
Avg		74	6.0	6.3	92.0	1422	10	167	171	13			53.0	45.0	15.7	11.9	0.3	0.2	610	19
Range		172	0.6	0.3	0.3	117	1	43	172	173			67.1	0.4	21.8	3.0	1.2	0.3	479	72

Description: Discharge; Oil well upwelling South of Porter Road (T-434); Flows into unnamed "McIntire" tributary #15 to Blacks Creek; Located downstream of BC4.1 and upstream of BC4; PA DEP & BMI sampling point

Latitude: 41.164244086 **Longitude:** 79.917603365

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC17	4/25/2000	122		3.4					0	140			4.2		6.0		14.2		201	6
BC17	6/28/2000			3.3					0	170			7.6		7.7		17.1		255	4
Min		122		3.3					0	140			4.2		6.0		14.2		201	4
Max		122		3.4					0	170			7.6		7.7		17.1		255	6
Avg		122		3.4					0	155			5.9		6.8		15.7		228	5
Range		0		0.1	0.1				0	30			3.5		1.7		2.9		54	2

Description: Mine Drainage; PA DEP sampling point; Unsure of exact location; Assumed to be sampled at Byers Road road culvert formed by and downstream of AMD discharges 906-7, -8, and -9 and upstream of 906-6

Latitude: 41.173354320 **Longitude:** 79.922267515

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC19	1/28/1997	30		6.7					168	0			14.5		7.1		0.1		425	24
BC19	3/11/1997			6.6					190	0			25.7		7.3		0.2		364	36
BC19	3/30/2000	40		6.4					170	0			26.2		6.9		0.3		659	36
BC19	6/28/2000			6.4					198	0			27.0		7.6		0.3		467	14
BC19	9/28/2001	30		6.5					256	0			25.4		7.6		0.3			
BC19	11/7/2001	20		6.5					230	0			28.8		8.5		0.3		660	12
BC19	5/6/2004		6.3	6.5		1200	11	180	146	-93			32.2	31.7	7.1	6.7	0.0	0.0	402	16
	Min	20	6.3	6.4		1200	11	180	146	-93			14.5	31.7	6.9	6.7	0.0	0.0	364	12
	Max	40	6.3	6.7		1200	11	180	256	0			32.2	31.7	8.5	6.7	0.3	0.0	660	36
	Avg	30	6.3	6.5		1200	11	180	194	-13			25.7	31.7	7.4	6.7	0.2	0.0	496	23
	Range	20	0.0	0.3	0.3	0	0	0	110	93			17.7	0.0	1.6	0.0	0.2	0.0	296	24

Description: Discharge; Oil well upwelling south of confluence of unnamed "McIntire" tributary #15 and Blacks Creek; Formerly flowed directly into Blacks Creek; Currently captured and treated by the BC19 & 19B passive treatment system; PA DEP & BMI sampling point

Latitude: 41.163888889 **Longitude:** 79.918888889

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
BC19B	3/30/2000	20		6.5					248	0			26.2		7.8		0.3		545	20
BC19B	6/28/2000	24		6.4					280	0			30.7		9.3		0.3		574	8
BC19B	3/25/2004	25	6.3	6.4		1412			217	-169			32.7	31.3	7.0	6.9	0.0	0.0	496	19
BC19B	5/6/2004	35	6.3	6.6		1350	10	258	221	-182			27.4	26.8	6.0	6.0	0.0	0.0	578	21
BC19B	10/18/2004			6.7					242	-84			28.6		7.7		0.0		426	12
BC19B	10/21/2004		6.0	6.6		1350	10	252	220	-148			28.8	28.2	6.1	6.1	0.1	0.1	585	13
BC19B	1/12/2005		6.1	6.5		1365	10	255	247	-130			28.3	9.0	6.8	6.5	0.0	0.0	653	7
BC19B	2/1/2005	27		6.5					260	-83			25.6		6.7		0.0		448	8
BC19B	4/6/2005		6.0	6.7		1246	10		216	-167			27.4	26.3	7.1	6.8	0.0	0.0	554	3
BC19B	5/9/2005	27		6.5					260	-83			25.6		6.7		0.0		452	10
BC19B	8/2/2005	38		6.7					238	-126			24.7		6.5		0.3		420	14
BC19B	11/9/2005	38		6.5					203	-90			26.1		6.1		0.3		484	8
BC19B	2/8/2006	38		6.4					228	-115			30.5		7.8		0.3		505	2
BC19B	5/9/2006	38		6.5					229	-147			26.2		6.2		0.3		451	16
BC19B	10/3/2006	30	6.6	6.5	81.0	1374	13	240	196	-153			31.6	17.5	6.6	6.3	0.1	0.0	409	4
	Min	20	6.0	6.4	81.0	1246	10	240	196	-182			24.7	9.0	6.0	6.0	0.0	0.0	409	2
	Max	38	6.6	6.4	81.0	1412	13	258	280	0			32.7	31.3	9.3	6.9	0.3	0.1	653	21
	Avg	31	6.2	10.5	81.0	1350	11	251	234	-112			28.0	23.2	7.0	6.4	0.1	0.0	505	11
	Range	18	0.6	60.0	60.0	166	3	18	84	182			8.0	22.3	3.3	0.9	0.3	0.1	244	20

Description: Discharge; Oil well upwelling just south of BC19; Formerly flowed directly into Blacks Creek; Currently captured and treated by the BC19 & 19B passive treatment system; PA DEP & BMI sampling point

Latitude: 41.162526320 **Longitude:** 79.918812857

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
MC1	1/27/1997			3.9		2960				919			372.0		96.1		36.8		2200	0
MC1	2/2/2000		4.1	4.4		2571	11		0	827			372.5	368.8	90.0	88.8	25.2	24.4	2411	1
MC1	1/15/2001		4.3	3.9		2804	7		0	901			348.8	308.8	95.0	87.3	21.4	20.6	2606	8
MC1	2/5/2001		3.9	4.0		2812	4		0	777			336.3		69.0		24.4		2227	13
MC1	4/19/2001	20		3.8					0	1042			300.0		83.6		61.7		2952	
MC1	5/8/2001	15		3.9					0	998			300.0		87.9		67.0		1689	26
MC1	9/28/2001	2		4.5					16	1057			319.0		77.3		20.6			10
MC1	11/7/2001	1		4.5					14	1190			300.0		89.4		22.5		2093	14
MC1	2/7/2002	12		4.2					11	1119			300.0		85.4		33.5		1843	
MC1	5/2/2002			3.0					0	1185			268.0		82.6		79.0		2154	60
MC1	10/15/2002	12		2.8					0	1065			316.0		99.5		37.3		2128	
MC1	11/21/2002			2.8					0	945			316.0		96.3		29.5		1908	
MC1	12/20/2002	40		3.1					0	609			208.0		59.1		17.5		1179	
MC1	1/14/2003			2.9					0	1028			331.0		88.6		41.2		2570	
MC1	2/12/2003			3.0					0	987			298.0		91.9		43.2		2032	
MC1	3/12/2003	40		3.0					0	962			296.0		81.1		49.5		1863	
MC1	5/1/2003	35		2.8					0	1062			275.0		105.0		68.3		1835	
MC1	6/25/2003			2.8					0	1135			271.0		95.3		58.1		2094	
MC1	7/23/2003			2.8		2930			0	1012	124.0		248.0		84.4		50.0		1976	
MC1	12/10/2003			3.8		2910			0	1069	328.0		361.0		75.2		54.1		2216	
MC1	7/18/2006	5		2.6					0	804			139.2			66.7		41.6	1738	8
MC1	9/12/2006	5		2.8					0	840			183.0		68.9		49.0		1390	12
Min		1	3.9	2.6		2571	4		0	609	124.0		139.2	308.8	59.1	66.7	17.5	20.6	1179	0
Max		40	4.3	4.5		2960	11		16	1190	328.0		372.5	368.8	105.0	88.8	79.0	41.6	2952	60
Avg		17	4.1	3.4		2831	7		2	979	226.0		293.6	338.8	85.8	80.9	42.4	28.8	2053	15
Range		39	0.4	1.9	1.9	389	7		16	582	204.0		233.3	60.0	45.9	22.1	61.5	21.0	1773	60

Description: Abandoned Mine Discharge; Located on the H&D Coal Company bond forfeiture "McIntire" mine site; Sampled at 6" pipe into a blue barrel flowing into existing treatment pond (TB1); PA DEP sampling point

Latitude: 41.169817069 **Longitude:** 79.907772089

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
MC2	1/27/1997			3.2		2940				785			272.0		90.4		32.0		2000	8
MC2	1/15/2000	8	3.2	3.3		2854	7		0	828			320.0	308.8	93.3	89.0	21.3	19.1	2398	21
MC2	2/2/2000			3.2		2768	4		0	720			297.0	269.5	93.3	91.5	25.2	22.6	2188	40
MC2	2/5/2001	15	3.1	3.3		2820	5		0	800			288.8	232.5	83.0	79.3	24.0	23.2	2243	9
MC2	7/22/2002	22	3.3			3450			0	1166	378.0		378.0		90.4		55.7		2280	
MC2	4/2/2004		3.1						0	942	281.0		296.0	272.0	76.5	70.4	73.6	67.3	2262	
MC2	10/4/2006	30	2.8	2.9	699.0	2926	14		0	754			349.0	121.0	90.9	73.2	52.0	36.9	1635	10
	Min	8	2.8	2.9	699.0	2768	4		0	720	281.0		272.0	121.0	76.5	70.4	21.3	19.1	1635	8
	Max	30	3.3	3.3	699.0	3450	14		0	1166	378.0		378.0	308.8	93.3	91.5	73.6	67.3	2398	40
	Avg	19	3.1	3.2	699.0	2960	8		0	856	329.5		314.4	240.8	88.2	80.7	40.5	33.8	2143	18
	Range	22	0.6	0.3	0.3	682	10		0	446	97.0		106.0	187.8	16.8	21.1	52.3	48.2	763	32

Description: Abandoned Mine Discharge; Located on the H&D Coal Company bond forfeiture "McIntire" mine site; Sampled at 12" pipe flowing into existing treatment pond (TB1); PA DEP sampling point

Latitude: 41.169817069 **Longitude:** 79.907772089

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
MC3	5/8/2001	15		3.8					0	1550			495.0		102.0		68.9		2283	20
MC3	9/28/2001	85		4.5					18	1066			300.0		83.3		22.4			4
MC3	11/7/2001	10		4.5					15	1184			300.0		88.2		22.2		2239	16
MC3	2/7/2002	6		3.4						1155			300.0		87.5		34.4		1955	
	Min	6		3.4					0	1066			300.0		83.3		22.2		1955	4
	Max	85		4.5					18	1550			495.0		102.0		68.9		2283	20
	Avg	29		4.1					11	1239			348.8		90.3		37.0		2159	13
	Range	79		1.1	1.1				18	484			195.0		18.7		46.7		328	16

Description: Abandoned Mine Discharge; Located on H&D bond forfeiture "McIntire" mine site ~30 feet east of MC1; Flows into existing treatment pond (TB1); PA DEP sampling point;

Latitude: 41.169903730 **Longitude:** 79.907632949

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
QAS1	3/17/2004	752	7.0	6.9		513	3		57	0			0.4		0.6		0.2		195	3
QAS1	5/13/2004	754	7.5	7.5		563	19		73	0			0.5		0.6		0.1		244	6
QAS1	9/10/2004	1000	6.4	6.4		253	14		33	0			0.4		0.4		0.2		111	4
QAS1	12/15/2004	302	6.9	6.8		357	1		43	-31			0.4		0.4		0.1		116	2
QAS1	2/2/2005	562	7.4	7.6		630	0		71	-49			0.3		0.8		0.2		305	2
QAS1	6/23/2005	123	7.8	7.6		582	19		79	-55			0.7		0.2		0.0		186	1
QAS1	8/24/2005	101	7.4	7.4		703	19		90	-69			0.9		0.4		0.1		232	3
QAS1	12/29/2005	1000	7.1	7.1		308	4		26	-22			0.3		0.4		0.1		100	9
QAS1	3/27/2006	1000	7.6	7.5		496	9		63	-56			0.2		0.2		0.1		238	2
QAS1	5/31/2006	434	7.0	7.0		519	20		65	-60			0.5		0.2		0.2		155	4
QAS1	9/19/2006	302	7.4	7.4		325	16		47	-30			0.5		0.3		0.3		82	4
	Min	101	6.4	6.4		253	0		26	-69			0.2		0.2		0.0		82	1
	Max	1000	7.8	7.6		703	20		90	0			0.9		0.8		0.3		305	9
	Avg	575	7.2	7.2		477	11		59	-34			0.5		0.4		0.2		179	4
	Range	899	1.4	1.3	1.3	450	20		64	69			0.7		0.6		0.3		223	8

Description: Blacks Creek; Located downstream of BC8 and upstream of QAS4; Quality Aggregates (permit #1096031) sampling point;

Latitude: 41.122496296 **Longitude:** 79.913878421

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
QAS2	10/23/1995	50	7.7	7.6		583	12		78	0			0.6		0.7		0.1		137	3
QAS2	1/24/1996																			
QAS2	2/8/1996	6	7.2	7.1		611	9		71	0			0.7		1.7		0.2		185	5
QAS2	3/20/1996	10	7.0	6.8		89	10		23	0			0.3		0.0		0.5		14	8
QAS2	4/18/1996	5	6.8	6.9		113	10		29	0			0.2		0.0		0.2		17	1
QAS2	5/15/1996	4	6.9	6.9		115	10		34	0			0.3		0.0		0.3		15	1
QAS2	6/17/1996	2	6.6	7.0		187	12		87	0			2.8		0.4		0.0		6	12
QAS2	3/17/2004	0																		
QAS2	5/13/2004	0																		
QAS2	9/10/2004	27	6.4	6.4		250	17		34	0			0.5		0.4		0.2		105	1
QAS2	12/15/2004	3	7.5	7.4		557	1		96	-80			0.2		0.1		0.2		180	10
QAS2	2/2/2005	0																		
QAS2	6/23/2005	0																		
QAS2	8/24/2005	0																		
QAS2	12/29/2005	2	7.8	8.0		598	2		143	-117			0.3		0.0		0.3		188	18
QAS2	3/27/2006	3	7.9	8.0		527	7		101	-83			0.2		0.0		0.1		173	1
QAS2	5/31/2006	0																		
QAS2	9/19/2006	3	7.6	7.7		514	18		101	-65			0.5		0.1		0.7		147	8
Min		0	6.4	6.4		89	1		23	-117			0.2		0.0		0.0		6	1
Max		50	7.9	8.0		611	18		143	0			2.8		1.7		0.7		188	18
Avg		7	7.2	7.3		377	10		72	-31			0.6		0.3		0.3		106	6
Range		50	1.5	1.6	1.6	522	17		120	117			2.6		1.7		0.7		182	17

Description: Unnamed tributary #2 to Blacks Creek; Quality Aggregates (permit #1096031) sampling point;

Latitude: 41.118362435 **Longitude:** 79.917264330

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
QAS3	10/23/1995																			
QAS3	1/24/1996	20	7.5	7.7		390	10		72	0			0.2		0.0		0.3		43	
	Min	20	7.5	7.7		390	10		72	0			0.2		0.0		0.3		43	
	Max	20	7.5	7.7		390	10		72	0			0.2		0.0		0.3		43	
	Avg	20	7.5	7.7		390	10		72	0			0.2		0.0		0.3		43	
	Range	0	0.0	0.0	0.0	0	0		0	0			0.0		0.0		0.0		0	

Description: Unnamed tributary #1 to Blacks Creek; Quality Aggregates (permit #1096031) sampling point;

Latitude: 41.113058233 **Longitude:** 79.914524941

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
QAS4	1/29/1969			6.0					16	0			0.7						182	
QAS4	5/15/1969			6.4					20	0			0.8						154	
QAS4	8/20/1969			6.6					22	0			1.6						106	
QAS4	9/24/1969			7.1					48	0			0.4						134	
QAS4	10/22/1969			6.6					28	0			1.0						115	
QAS4	11/3/2000	500		7.6					88	0			1.0		0.8		0.1		181	5
QAS4	1/17/2001			7.3					70	0			0.3		0.6		0.1		161	6
QAS4	4/3/2001			7.6					67	0			0.3		0.8		0.1		165	2
QAS4	7/11/2001			7.4					90	0			0.3		0.5		0.0		219	5
QAS4	5/15/2003		6.5	7.2		361	16		50	0			0.4		0.5		0.1		175	
QAS4	6/19/2003		7.0	7.6		423	18	80	60				0.9		0.5		0.1		120	
QAS4	7/17/2003		7.5	7.5		226	22	102	87	-72			0.3		2.6		0.0		185	
QAS4	8/14/2003		7.0	6.9		165	23	92	71	-44			0.2		0.2		0.1	0.1	140	
QAS4	9/13/2003		7.0	7.8		166	21	108	77	-44			0.3		0.3		0.2	0.0	170	
QAS4	10/19/2003		7.0	7.4		381	10	52	60	-48			0.2		0.3		0.3	0.1	110	
QAS4	12/17/2003			7.6		373			48	-29			0.6		0.8		0.2	0.0	125	
QAS4	2/15/2004			7.8		306			60	-43			1.1		1.4		0.2	0.2	155	
QAS4	3/10/2004			7.5		246			50				0.6		0.9		0.2	0.1	130	
QAS4	3/17/2004	1000	7.0	6.9		510	2		63	0			0.4		1.0		0.1		184	1
QAS4	4/16/2004			7.7		347			54	-45			0.5		0.7		0.0	0.0	130	
QAS4	5/13/2004	1000	7.5	7.5		582	20		77	0			0.6		0.8		0.2		237	6
QAS4	5/13/2004			7.6		323			77	-43			0.9		1.3		0.0	0.0	165	
QAS4	9/10/2004	1000	6.5	6.4		248	16		36	0			0.6		0.5		0.3		100	
QAS4	12/15/2004	1000	7.0	6.9		398	1		52	-39			0.4		0.6		0.0		322	3
QAS4	2/2/2005	671	7.4	7.5		630	0		79	-46			0.4		1.4		0.2		272	7
QAS4	6/23/2005	234	7.7	7.6		600	24		81	-55			0.6		0.7		0.1		179	12
QAS4	8/24/2005	129	7.6	7.5		673	19		98	-72			0.5		0.5		0.2		218	1
QAS4	12/29/2005	1000	6.7	6.8		77	2		10	-3			0.1		0.0		0.0		16	1
QAS4	3/27/2006	1000	7.2	7.4		518	9		70	-63			0.5		0.5		0.1		175	4
QAS4	5/31/2006	609	7.0	7.0		548	20		81	-73			0.5		0.5		0.2		153	4

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
QAS4	9/19/2006	799	7.4	7.3		397	16		63	-30			0.7		0.2		0.4		105	2
QAS4	10/3/2006		7.7	6.9	220.0	400	13	67	58	-43			0.4	0.2	0.2	0.2	0.1	0.1	89	2
	Min	129	6.5	6.0	220.0	77	0	52	10	-73			0.1	0.2	0.0	0.2	0.0	0.0	16	1
	Max	1000	7.7	7.8	220.0	673	24	108	98	0			1.6	0.2	2.6	0.2	0.4	0.2	322	12
	Avg	745	7.1	7.2	220.0	387	14	84	60	-26			0.6	0.2	0.7	0.2	0.1	0.1	158	4
	Range	871	1.2	1.8	1.8	596	24	56	88	73			1.5	0.0	2.6	0.0	0.4	0.2	307	11

Description: Blacks Creek; Sampled downstream of route T-560 bridge near mouth before confluenting with Slippery Rock Creek; PA DEP sampling point; Same sampling point as Quality Aggregates S4, BMI 906-30, Beran Environmental BC1 and Operation Scarlift T4

Latitude: 41.115331313 **Longitude:** 79.917408921

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
RS1	1/15/2001		2.9	2.9		2215	0		0	574			92.8	88.8	62.5	59.0	16.2	15.6	1622	7
RS1	2/5/2001	26	2.9	3.0		1841	1		0	424			68.3	66.0	46.0	43.6	15.3	13.9	1091	6
	Min	26	2.9	2.9		1841	0		0	424			68.3	66.0	46.0	43.6	15.3	13.9	1091	6
	Max	26	2.9	3.0		2215	1		0	574			92.8	88.8	62.5	59.0	16.2	15.6	1622	7
	Avg	26	2.9	3.0		2028	1		0	499			80.5	77.4	54.3	51.3	15.8	14.7	1357	7
	Range	0	0.0	0.1	0.1	374	1		0	150			24.5	22.8	16.5	15.5	0.9	1.8	531	1

Description: Unnamed "McIntire" tributary #15 to Blacks Creek; Sample point located half way between TRX and RS2; BMI sampling point

Latitude: 41.166493586 **Longitude:** 79.908885176

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
RS2	1/15/2001		2.8	2.8		2270	0		0	518			95.0	93.5	63.8	61.5	17.1	15.6	1801	6
RS2	2/5/2001		2.9	3.0		1814	1		0	411			63.5	61.0	8.7	8.6	14.6	13.6	1144	6
RS2	5/28/2004		2.8						0	456	1.5			56.6		43.0		29.1	1053	
	Min		2.8	2.8		1814	0		0	411	1.5		63.5	56.6	8.7	8.6	14.6	13.6	1053	6
	Max		2.9	3.0		2270	1		0	518	1.5		95.0	93.5	63.8	61.5	17.1	29.1	1801	6
	Avg		2.8	2.9		2042	1		0	462	1.5		79.3	70.4	36.2	37.7	15.8	19.4	1333	6
	Range		0.1	0.2	0.2	456	1		0	106	0.0		31.5	36.9	55.0	52.9	2.5	15.6	748	0

Description: Unnamed "McIntire" tributary #15 to Blacks Creek; Sample point located below RS1 prior to flowing into existing pond (SB1); BMI sampling point

Latitude: 41.165952287 **Longitude:** 79.911320708

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
SB1	11/15/1996	45		3.1					0	292			24.2		33.5		14.8		694	0
SB1	1/27/1997	76		3.0		1770				312			43.7		46.5		22.6		990	0
SB1	2/2/2000	13	3.3	3.0		1825	6		0	354			32.3	31.7	41.4	40.8	15.1	14.9	808	6
SB1	1/15/2001	13	2.8	2.9		2073	7		0	419			23.6	22.9	56.8	48.5	28.8	27.3	1563	4
SB1	2/5/2001	14	2.9	3.0		1860	6		0	392			32.0	30.9	48.8	45.0	20.2	18.4	1001	7
SB1	2/19/2001	31	3.0	3.0		1662	6		0	357			40.1	37.1	43.0	41.6	15.7	14.4	741	5
SB1	9/28/2001	12	2.9	2.7		2488	15		0	503			35.5		63.5		40.2		2089	4
SB1	5/28/2004		2.9						0	361	5.0			37.0		36.8		25.1	909	
	Min	12	2.8	2.7		1662	6		0	292	5.0		23.6	22.9	33.5	36.8	14.8	14.4	694	0
	Max	76	3.3	3.1		2488	15		0	503	5.0		43.7	37.1	63.5	48.5	40.2	27.3	2089	7
	Avg	29	3.0	3.0		1946	8		0	374	5.0		33.0	31.9	47.6	42.5	22.5	20.0	1099	4
	Range	64	0.5	0.4	0.4	826	9		0	211	0.0		20.2	14.3	30.0	11.7	25.4	12.9	1395	7

Description: Existing Sediment Pond built within the unnamed "McIntire" tributary #15 to Blacks Creek; Sampled at white pipe and spillway; Located below RS2 and upstream of BC4.1; PA DEP & BMI sampling point

Latitude: 41.165283646 **Longitude:** 79.912747689

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
TB1	11/15/1996	47		3.3					0	898			244.0		71.2		28.5		1732	0
TB1	1/27/1997			3.3		2990				879	292.0		330.0	290.0	91.7		35.9		2100	0
TB1	2/2/2000	13	3.3	3.2		2670	3		0	775			288.5	284.0	89.0	86.5	23.3	21.2	2250	34
TB1	1/15/2001	10	2.9	3.0		2902	2		0	796			273.8	246.3	95.5	81.3	20.4	19.6	2517	5
TB1	2/5/2001	12	3.0	3.1		2572	3		0	671			257.5	218.3	71.3	69.5	20.6	16.9	1972	6
TB1	7/22/2002	22	2.9			3800			0	1151	185.2		250.3	252.2	28.2	28.9	57.6	58.5	2207	
TB1	4/2/2004		2.9						0	840	119.0		195.0	182.0	67.6	63.4	58.7	54.5	1938	
TB1	5/28/2004		2.9						0	817	135.0			183.0		70.1		41.6	1506	
	Min	10	2.9	3.0		2572	2		0	671	119.0		195.0	182.0	28.2	28.9	20.4	16.9	1506	0
	Max	47	3.3	3.3		3800	3		0	1151	292.0		330.0	290.0	95.5	86.5	58.7	58.5	2517	34
	Avg	21	3.0	3.2		2987	3		0	853	182.8		262.7	236.5	73.5	66.6	35.0	35.4	2028	9
	Range	37	0.5	0.3	0.3	1228	1		0	480	173.0		135.0	108.0	67.3	57.6	38.4	41.6	1011	34

Description: Existing treatment pond at the H&D "McIntire" minesite; Generally sampled at spillway as effluent pipe has become plugged;
Receives the MC1, MC2, and MC3 abandoned mine discharges; Located upstream of sampling point TRX; BMI sampling point

Latitude: 41.169316141 **Longitude:** 79.907798212

Blacks Creek Water Quality Database

Sample Point	Date	Flow (gpm)	Field pH	Lab pH	ORP (mv)	Spec. cond. (umhos/cm)	Field T (C)	Alk (Field) (mg/L)	Alk (Lab) (mg/L)	Acid. (mg/L)	Fe+2 (mg/L)	Fe+3 (mg/L)	Fe (mg/L)	D. Fe (mg/L)	Mn (mg/L)	D. Mn (mg/L)	Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	TSS (mg/L)
TRX	11/15/1996			3.0					0	552			68.7		55.5		24.1		1128	0
TRX	2/2/2000		2.9	2.9		2521	1		0	670			150.3	148.3	86.5	83.0	23.5	23.3	1927	11
TRX	1/15/2001		2.9	2.9		2260	1		0	570			111.8	106.3	60.8	53.0	17.5	17.1	1593	14
TRX	2/5/2001		3.0	3.1		1925	1		0	479			88.3	80.3	48.5	47.8	16.3	14.6	1355	5
TRX	2/19/2001	38	2.9	3.1		1921	3		0	426			94.8	94.8	56.0	52.3	20.5	19.3	1103	19
TRX	7/22/2002	22	2.6			3310			0	1123	4.2		152.2	154.8	28.7	29.2	179.9	184.1	2161	
TRX	4/2/2004		2.9						0	546	14.0		99.3	92.4	47.6	44.4	43.8	39.6	1386	
TRX	5/28/2004		2.8						0	671	1.5			103.0		60.2		40.0	1377	
	Min	22	2.6	2.9		1921	1		0	426	1.5		68.7	80.3	28.7	29.2	16.3	14.6	1103	0
	Max	38	3.0	3.1		3310	3		0	1123	14.0		152.2	154.8	86.5	83.0	179.9	184.1	2161	19
	Avg	30	2.8	3.0		2387	2		0	630	6.6		109.3	111.4	54.8	52.8	46.5	48.3	1504	10
	Range	16	0.4	0.2	0.2	1389	2		0	697	12.5		83.5	74.6	57.8	53.9	163.6	169.6	1058	19

Description: Unnamed "McIntyre" tributary #15 to Blacks Creek; Sampled at the Porter Road (T434) crossing, on the south side of the bridge; Located downstream of existing treatment pond (TB1) and upstream of RS1; PA DEP & BMI sampling point

Latitude: 41.168013602 **Longitude:** 79.907195925