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Introduction

14 digit Hydrologic Unit Code (HUC) 05010008020220 encompasses the Blackleggs Creek Watershed located in southwestern Indiana County and southeastern Armstrong County. The portion of this HUC located in Armstrong County consists of 6.06 square miles of the Whiskey Run (1.17 square miles) and Big Run (4.89 square miles) Sub Watersheds (Figure 1). This comprises 24% of the entire Whiskey Run Sub Watershed and 55% of the entire Big Run Sub Watershed. The Pennsylvania Department of Environmental Protection (PA DEP 2001) list both these sub watersheds as cold water fisheries (CWF).

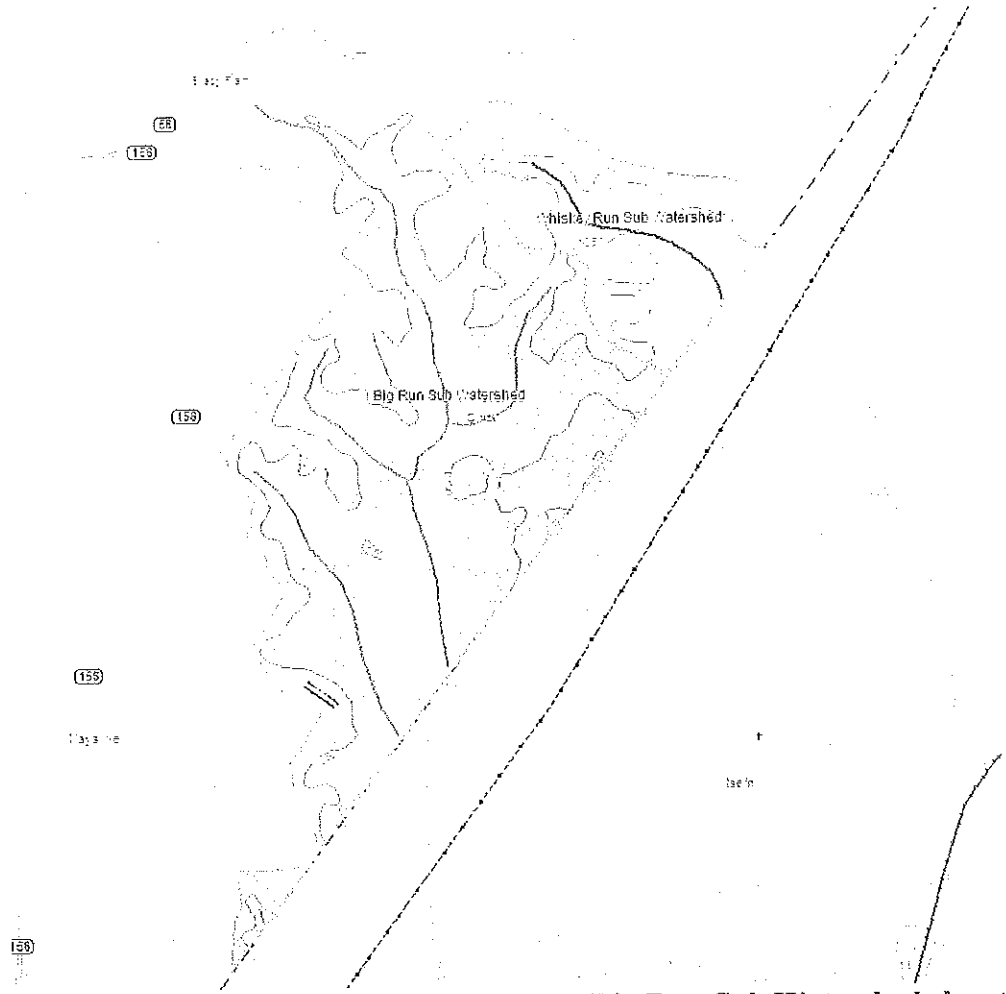

Figure 1. The portions of the Whiskey Run and Big Run Sub Watersheds located in Armstrong County.

The Armstrong County portion of this HUC is very remote with only small pockets of human habitation. However, this area has been extensively mined and suffers the consequences of that mining. Abandoned Mine Drainage (AMD) is the top priority for the Blackleggs Creek Watershed Association (BCWA) with offices in Clarksburg, Indiana County. They are a very active association that has started to treat sources of AMD throughout the watershed, particularly in the Big Run Sub Watershed. The BCWA's major goal is to improve Blackleggs Creek to the point that trout are stocked all the way to its confluence with the Kiskiminetas River in Saltsburg, Indiana County. Their activities will be described in more detail later.

Nutrient and sedimentation loading from agricultural practices, sedimentation from dirt and gravel roadways and illegal dumping activity also impact Whiskey Run and Big Run, but are minor in comparison to the AMD issues.

Methods

Stream segments with the potential for non-point source (NPS) pollution problems were investigated. All points of NPS pollution were located utilizing a Garmin GPS 12MAP Unit. Field pH (Oakton Waterproof pHTestr 1), specific conductivity (Oakton Waterproof TDSTestr Low) and temperature (Taylor Model 9841) were taken at strategic locations to determine if the site caused impairment and if that site should be documented and sampled for lab analysis of water quality.

All NPS pollution sites documented were then organized into a GIS database that allows data to be organized spatially. Employees of CWM Environmental, with offices in Kittanning, Armstrong County, and Thomas J. Clark, the Indiana and Armstrong County

Watershed Specialist with offices in Indiana, Indiana County, determined prioritization and restoration recommendations.

Mining Impacts

The entire Whiskey Run (10.2 stream miles) and Big Run (approximately 15.3 stream miles) Sub Watersheds are listed on PA DEP's 303d List of Impaired Waters for pH and metal pollution (2002). Because of this, the restoration of Big Run and Whiskey Run are the top priorities for the BCWA (Figure 2 and 3).

However, most of the AMD discharges impacting Whiskey Run and practically all of the discharges impacting Big Run originate in the Indiana County section of the sub watersheds. Three small but very acidic AMD discharges impact Whiskey Run, while the Iselin #10 Discharge (SMP 03793072), being actively treated by the Keystone Coal Mining Corp, impacts Big Run in Armstrong County (Figure 4 and 5 and Table 1 and 2).

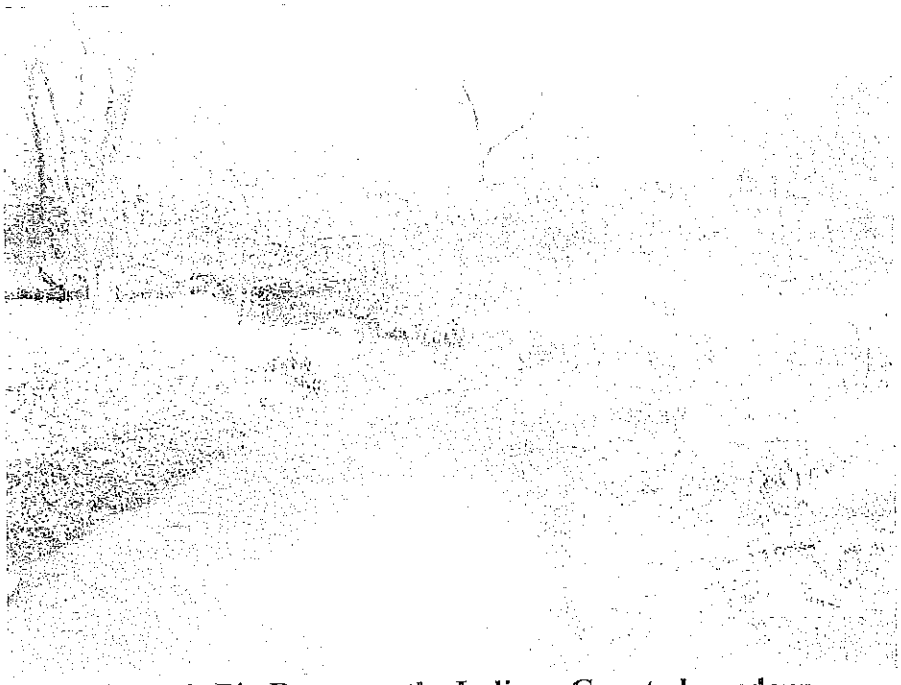

Figure 2. Big Run near the Indiana County boundary.

Figure 3. Whiskey Run near the Indiana County boundary.

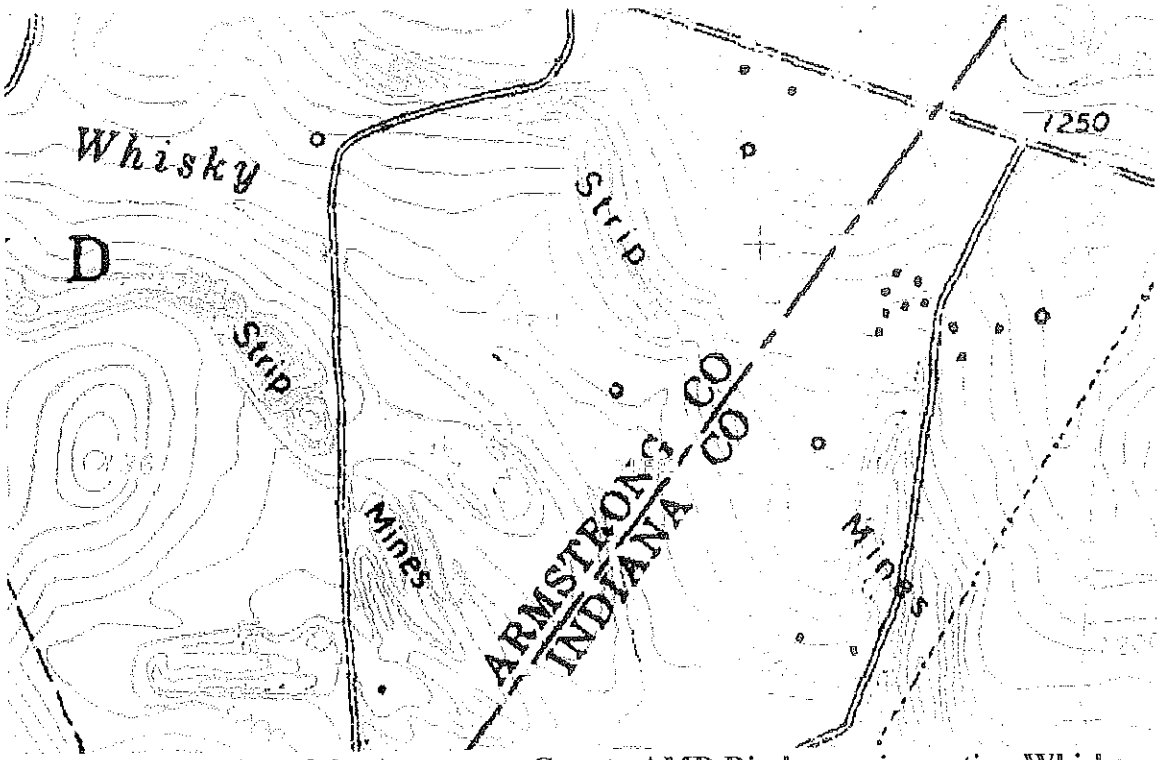

Figure 4. Location of the Armstrong County AMD Discharges impacting Whiskey Run.

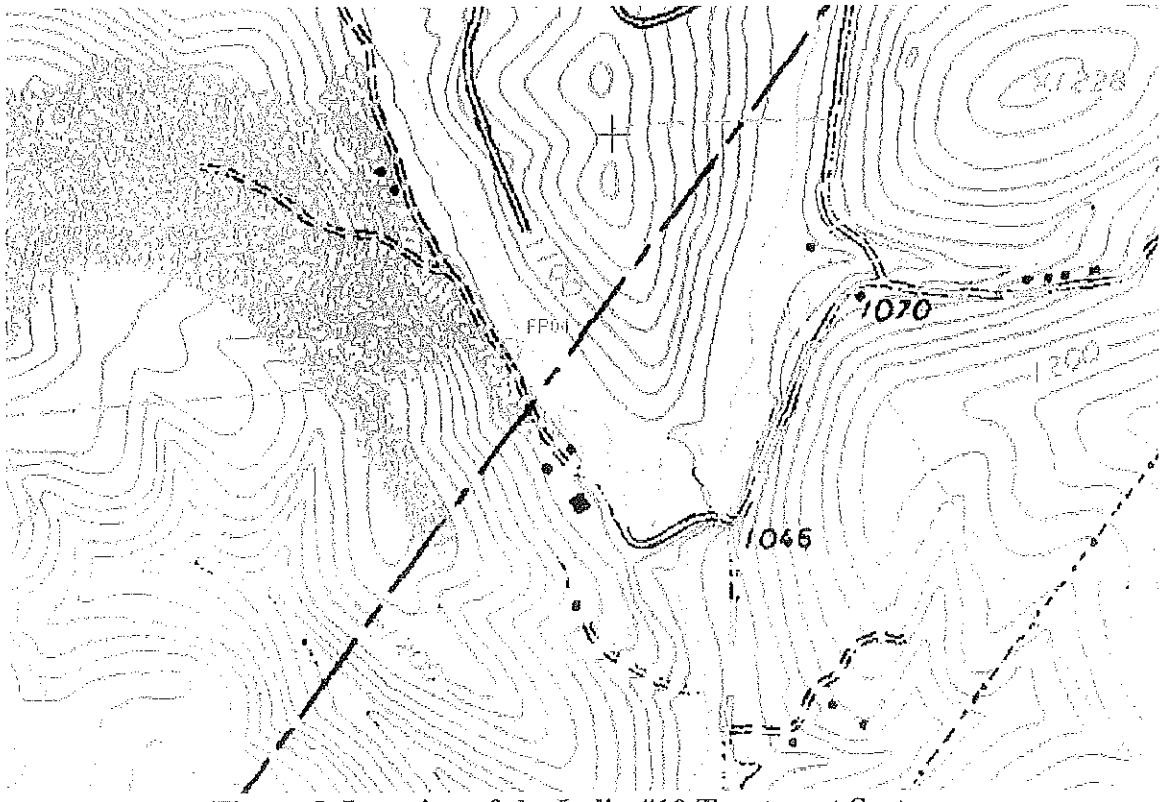

Figure 5. Location of the Iselin #10 Treatment System.

Table 1. Water quality of the discharges impacting Whiskey Run and Big Run and the water quality of both streams at the county border.

Location	Flow	pH	Sp. Cond.	Alk.	Acid.	Fe	Mn	Al	SO_4	TSS
	GPM	Lab	uS/cm	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Whiskey Run @ AC/IC border	153.80	4.42	1500	0.00	98.00	0.74	34.70	10.58	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Big Run @ AC/IC border	403.92	7.55	1400	164.00	0.00	0.48	1.48	0.10	[illegible]	[illegible]

Table 2. Macroinvertebrate community at the county line of both tributaries.

	Big Run	Whiskey Run
Plecoptera (Stonefly)		
Chloroperlidae	1	
Tricoptera (Caddisfly)		
Hydropsychidae	48	100
Coleoptera (Beetle)		
Elmidae	2	
Megaloptera (Fishfly and Dobsonfly)		
Sialidae	3	
Hemiptera (True Bugs)		
Veliidae		2
TOTAL INSECTS	**54**	**102**
INSECTS PER SQUARE FOOT	**27**	**51**
TOTAL TAXA	**4**	**2**
SCORE	**9**	**3**
RATING	**Poor-Fair**	**Poor**

The BCWA is currently very active in the Big Run Sub Watershed. Just across the border in Indiana County, several large flow acidic discharges enter Big Run, decreasing the pH and increasing the acidity and metal concentrations substantially. In 2001, the BCWA received a $202,236 PA DEP Growing Greener Grant to construct a passive treatment system for the Big Run #2 Discharge (Big Run Restoration Phase I) which contains 89 mg/l of acidity, 3.1 mg/l of aluminum and a 1250 GPM flow. The BCWA should be completed with this project by the end of 2003. Once completed, this project will eliminate approximately 244 tons/year of acidity and 8.5 tons/year of aluminum from entering the Big Run Sub Watershed. This should drastically improve the water quality of the entire Blackleggs Creek Watershed and consequently the Kiskiminetas River.

In addition the BCWA received a $374,219 2003 PA DEP Growing Greener Grant to treat the Big Run #7 Discharge (Big Run Phase II Restoration). Once the treatment system is completed an additional 275 tons/year of acidity and 26 tons/year of aluminum will be eliminated from entering Big Run.

Funding for the Big Run Phase III and IV Restoration Projects will then be requested by the BCWA. Once the entire four phase project is completed, six miles of Big Run and Blackleggs Creek should be restored, possibly removing it from the PA DEP 303d List of Impaired Waters. This will also substantially improve the Kiskiminetas River.

Even though these projects are occurring in Indiana County, the Armstrong Conservation District (ACD) and Kiskiminetas Watershed Association (KWA) should be supporting the BCWA in their efforts since restoration of Big Run means improvement to the Blackleggs Creek and the Kiskiminetas River.

Whiskey Run on the other hand does have some discharges in the Armstrong County section; however, these problems are minute to the discharges impacting Whiskey Run in the Indiana County section of the sub watershed. KR01, KR02 and KR03 input approximately 16.15 tons/year of acidity, 3.83 ton/year of manganese and 1.65 tons/year of aluminum, with KR02 contributing 74% of that acidity, 70% of that manganese and 80% of that aluminum.

The ACD and the KWA should look into what could be one with KR02 whenever the BCWA is completed with their Indiana County restoration efforts on Whiskey Run. By that time, however, enough dilution may be taking place in Whiskey Run that treatment of KR02 may be inconsequential.

Agricultural Impacts

Information regarding the BMPs needed on all ten farms in the Armstrong County section of this HUC are summarized in Table 3. A legend describing the abbreviated BMPs in Table 3 can be found in Table 4. The ten farms are located in Figure 6.

Table 3. BMPs needed on farms in the Armstrong County section of this HUC.

Location	CP	NMP	MSA	PMS	SC	MT	Wtr	Div	Ter	CC	SBF	Con	Sprg
	needed	needed	needed	# of plans	acres	acres	acres	ft	ft	acres	ft	#	#
Whiskey Run													
T1423												1	
T10246								2650					
Big Run													
T1247				32									2
T1246				31									
T2170				3									
T10395													
T1240													
T1233				24			2						
T1231													
T1253												1	
Totals	0	0	0	90	0	0	2	2650	0	0	0	2	2

Table 4. Legend describing the BMPs listed in Table 3.

Abbreviation	BMP
CP	Conservation Plan
MSA	Manure Storage Areas
PMS	Pasture Management System
SC	Strip Crop
MT	Minimum Tillage
Wtr	Waterways
Div	Diversions
Ter	Terraces
CC	Cover Crop
SBF	Stream Bank Fencing
Con	Contracts
Sprg	Spring Development

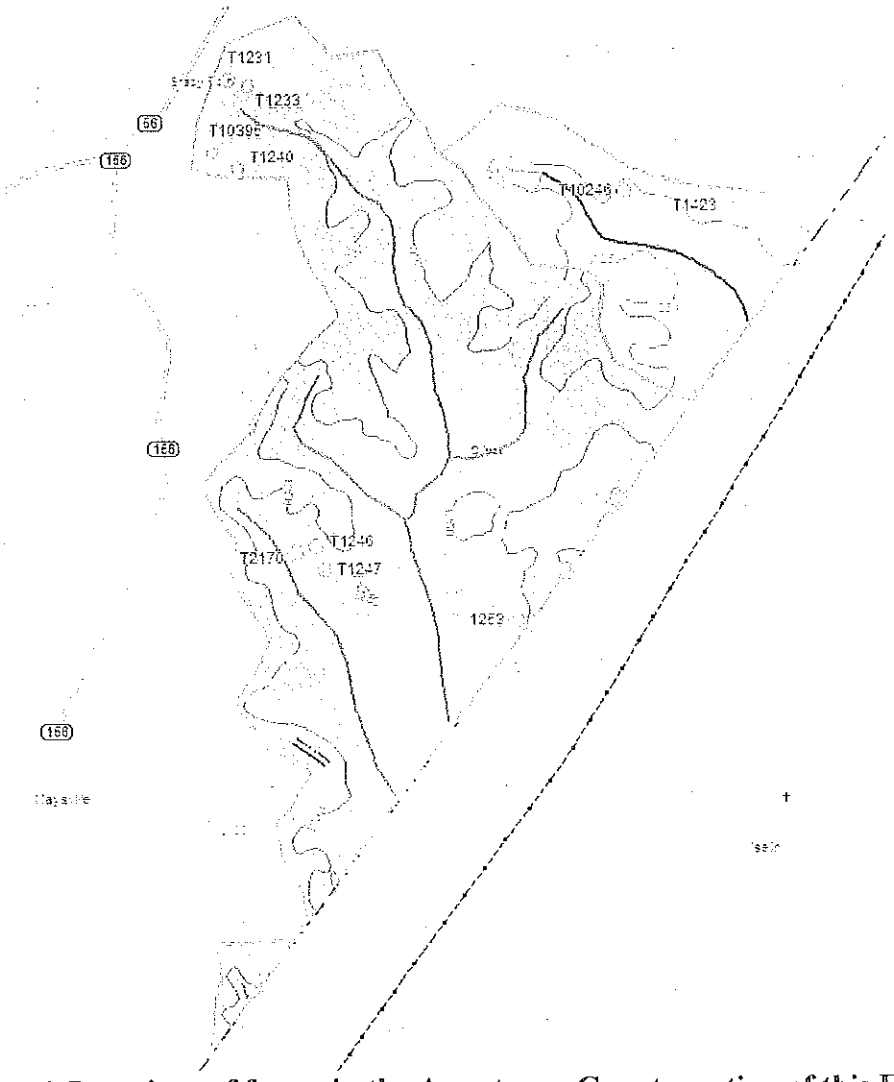

Figure 6. Locations of farms in the Armstrong County section of this HUC.

Even though Table 2 lists the BMPs needed on each farm in this HUC, much of this information is older than 10 years and does no reflect the changes in conservation practices over time.

The first thing that needs to occur is an update of this data to reflect these changes. For example, no stream bank fencing is needed in the entire Armstrong County section of this HUC according to this database, but upon closer examination, Farm T1247 along Big Run is in need of approximately 600 ft of stream bank fencing and riparian corridor

enhancement, which is not reflected in the database. Other farms have similar lacks in information.

Once this update is completed, producers should be contacted via a mailed or verbal survey to determine the interest in the installation of the conservation practices listed in the database. This interest may be enhanced by a watershed wide cost-share grant program that will incorporate conservation practices on the producer's land, thus allowing the farmer to decrease the NPS pollution potential and increase the health of his/her farm. With the database updated and producers surveyed, a future Growing Greener Grant proposal could be constructed with assistance from the Indiana and Armstrong County Watershed Specialist. This cost-share BMP grant proposal may be more successful if completed in the entire Blackleggs Creek Watershed partnering with the BCWA and the Indiana County Conservation District (ICCD).

Urban Impacts

Due to the remoteness of this section of the Kiskiminetas River Watershed and the lack of large population centers, urban NPS pollution potential is low. However, there are problem areas that should be addressed once the higher priority pollution problems, such as the AMD impacting Whiskey Run and Big Run, have been corrected.

With only small pockets of population, much of the roadways in the Armstrong County section of this HUC are unimproved township roads that can input large amount of sediment into streams during runoff events (Figure 7). All unimproved roadways that have not had a Dirt and Gravel Road Project completed in the past need documented, especially the roads that intersect with stream crossings. Once this is completed, the ACD needs to partner with South Bend and Kiskiminetas Townships to implement projects,

most likely funded through either the Dirt and Gravel Roads program or the PA DEP Growing Greener Initiative, to reduce the sedimentation problems occurring on their roadways.

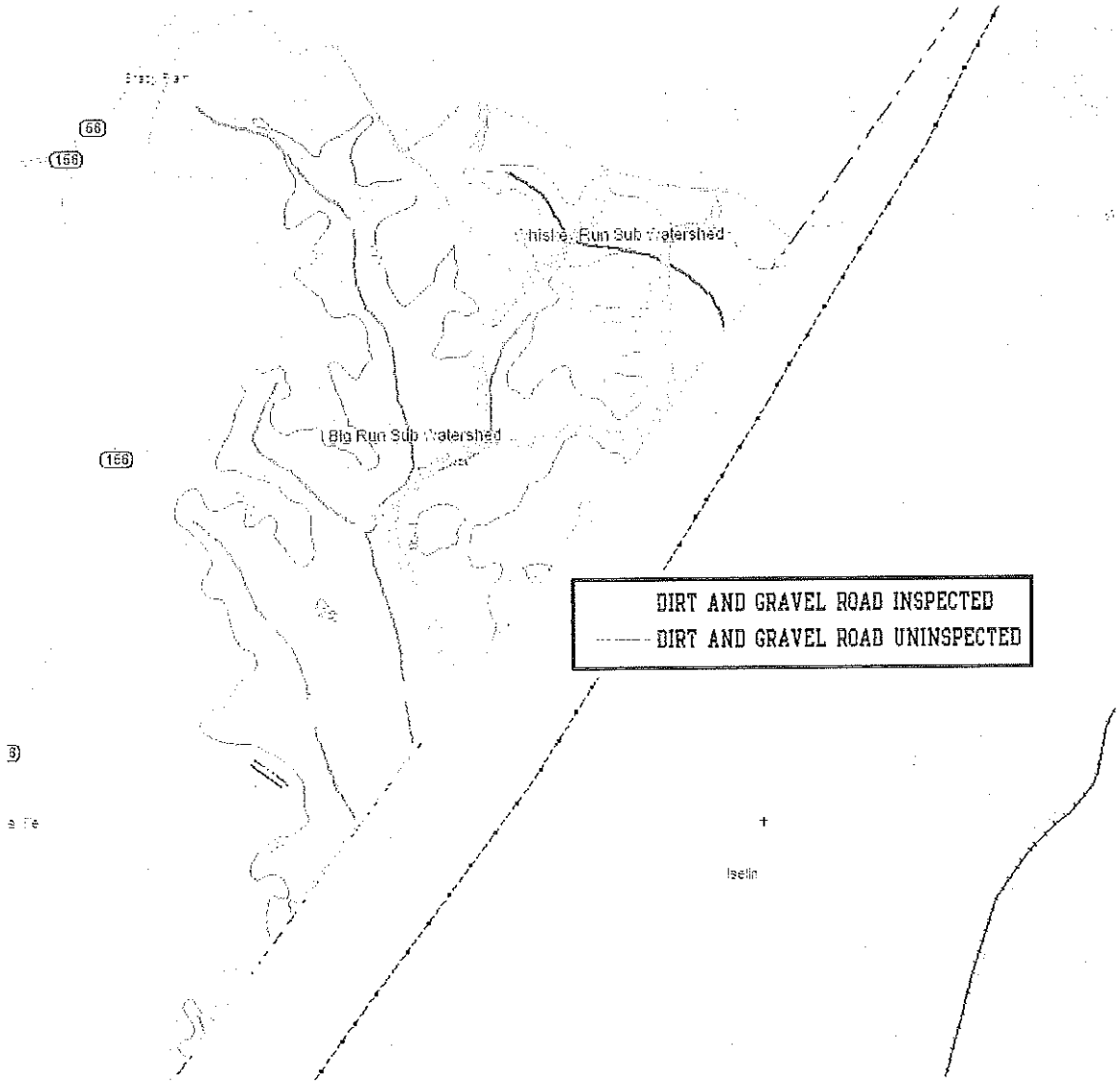

Figure 7. Location and status of the dirt and gravel roadways in the Armstrong County section of this HUC.

Because of the remoteness of the watershed and the lack of traffic along the many townships roads, illegal dumping proliferates as well. Many township roads have un-gated roads and trails that attract illegal dumpers due to their seclusion. Property owners

of these roads and trails and the townships need to be encouraged to gate such roads to reduce/eliminate the ease of dumping at certain locations.

Currently, a PA CleanWays Chapter does not exist in Armstrong County (Figure 8). PA CleanWays can be used as a conduit of money and assistance for the removal and reclamation of illegal dumpsites and illegal dumpsite education. The Indiana County Chapter of PA CleanWays has been able to assist many watershed associations and municipalities with their dumpsite problems. They have even secured two Growing Greener Grants totaling $28,066 for the removal and reclamation of two large illegal dumps in Indiana County. One major recommendation of this reclamation plan will be to organize an Armstrong County PA CleanWays Chapter to deal with the dumps that can plague a watershed such as the Kiskiminetas River.

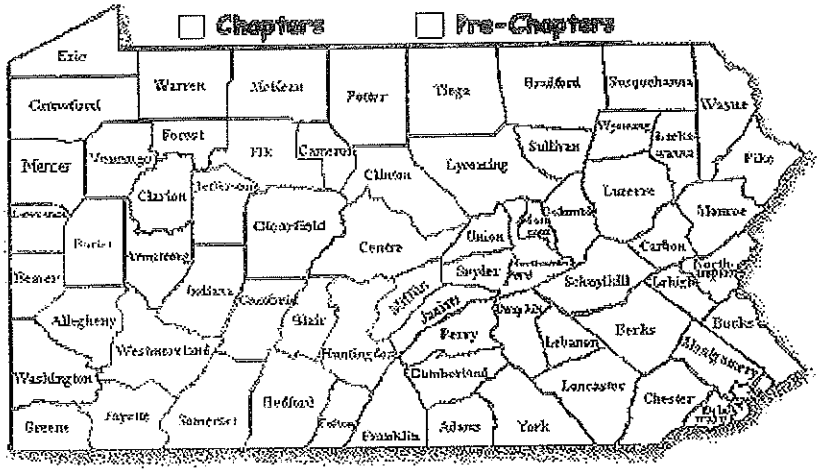

Figure 8. A map of PA CleanWays county chapters in Pennsylvania.

Streamside riparian buffers are also lacking in some areas of the Armstrong County section of this HUC. Property owners who maintain lawns up to the stream bank mainly cause this lack in buffers. Erosion and sedimentation problems can exist in these areas due to a lack of vegetative roots that hold stream bank soil in place during heavy runoff periods. The only cure for this type of NPS pollution in this watershed, or any watershed,

is that residents need to be educated on the positive aspects of riparian buffers, which not only improve water quality, but also improve the health of their property. This may be successful through a brochure that can be mailed to watershed property owners explaining the importance of the riparian area on not only water quality, but also the health of their property. Funds to complete projects of this type can be secured through the League of Women Voters Watershed Restoration and Education Network Grants.

Scattered and remote population centers also have the potential of containing malfunctioning on-lot septic systems. Malfunctioning systems can input large amounts of sewage into the watershed increasing the amount of nutrients and possibly decreasing the oxygen concentration of the water. Malfunctioning on-lot septic systems were not investigated during this assessment, but should be, especially in areas that will not be tied to a municipal sewage service in the near future.

Thermal Impacts

With the Big Run Four Phase Restoration Project occurring and Whiskey Run restoration planned, increasing pH and decreasing metal concentrations should greatly improve the Big Run, Whiskey Run and, consequently, the Blackleggs Creek and Kiskiminetas River Watersheds. However, with AMD treatment systems, heated effluent water can become a concern. If enough treated water enters a stream system, the temperature characteristics of that stream may be compromised, possibly altering it from a cold water stream to a cool or warm water stream. This temperature increase can then alter the fish community.

The BCWA is trying to minimize this impact in the construction of their systems. In addition the Armstrong and Indiana County Conservation Districts may be able to help

the BCWA's efforts. There is one large pond/small lake (seven acres) in the headwaters of Whiskey Run in Armstrong County and there are three large ponds/small lakes (4.46 acres total) on Big Run just over the boundary in Indiana County (Figure 9). These four impoundments are most likely privately owned, hence probably cannot be removed, however, the ownership of these impoundments need to be researched. If they are publicly owner or the private owner is in favor of their removal, projects should be initiated. Removal will not only decrease the summertime temperatures of Big Run and Whiskey Run, but removal will also restore the stream channel in these reaches.

Even though a reduction in thermal pollution is not a high priority in this restoration plan, projects to reduce temperature should be initiated if problems arise on Big Run and/or Whiskey Run.

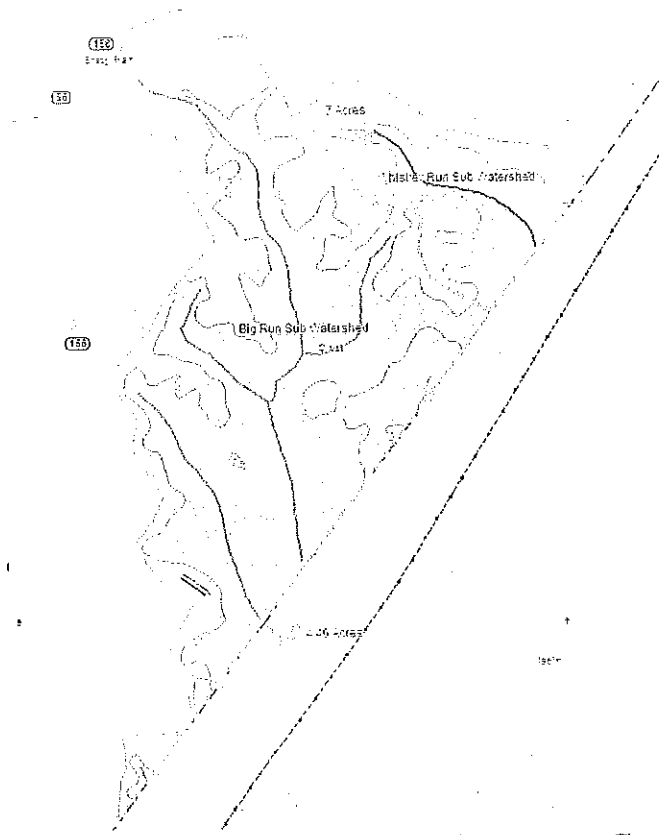

Figure 9. Locations of large impoundments in the Armstrong County section of this HUC.

Overall Recommendations

1. Support the Blackleggs Creek Watershed Association in their efforts to treat the large discharges impacting the Big Run and Whiskey Run Sub watersheds.
2. Encourage the continued treatment of the Iselin #10 Discharge by the Keystone Coal Mining Corp. in the Big Run Sub watershed.
3. Update the agricultural BMPs needed on the ten farms in the Armstrong County section of the HUC. Once updated, survey the agricultural community's interest in installation of the conservation practices needed on each farm. This interest may be enhanced by a watershed wide cost-share grant proposal possibly partnering with the Blackleggs Creek Watershed Association and the Indiana County Conservation District.
4. All unimproved roads that have not had a Dirt and Gravel Road project completed in the past need documented. Once this is complete, the Armstrong Conservation District needs to partner with South Bend and Kiskiminetas Townships to implement projects most likely funded through the Dirt and Gravel Road Program or the Growing Greener Initiative.
5. Establish the Armstrong County Chapter of PA CleanWays to deal with the illegal dumping in the watershed. After establishment, coordinate efforts with South Bend and Kiskiminetas Townships to locate and document illegal dumpsites.
6. Investigate the treatment/re-mining potential of the discharges, especially KR02, impacting the headwaters of Whiskey Run.
7. Investigate and encourage local landowners, especially large tract landowners, on the importance of ceasing lawn maintenance activities up to the stream bank so

that riparian areas can be protected or reestablished. The ACD or the Blackleggs Creek Watershed Association may be able to educate through a brochure that can be mailed to watershed property owners explaining the importance of the riparian area on not only water quality, but also the health of their property. Funds to complete such a project can be secured from the League of Women Voters Watershed Restoration and Education Network Grants.

8. Locate malfunctioning on-lot sewage systems, particularly in areas that will not be tied to a municipal sewage service in the near future.
9. Research the owners of the large impoundments in both the Whiskey Run and Big Run Sub Watersheds. Investigate interest in removing these impoundments to reduce the thermal pollution potential, especially after the AMD treatment systems are online in both watersheds.

Introduction

14 digit Hydrologic Unit Code (HUC) 05010008020240 encompasses an approximately 33.0 square mile portion of the Kiskiminetas River Watershed located in Armstrong County (Figure 10). Eleven tributaries (Sulphur Run, Long Run, Flat Run, Roaring Run, Sugar Hollow, and six unnamed) enter the Kiskiminetas River in this section (Figure 11 and Table 5). The Pennsylvania Department of Environmental Protection (PA DEP 2001) lists all these streams, except Sulphur Run and Roaring Run, as warm water fisheries (WWF). Sulphur Run and Roaring Run are listed as cold water fisheries (CWF).

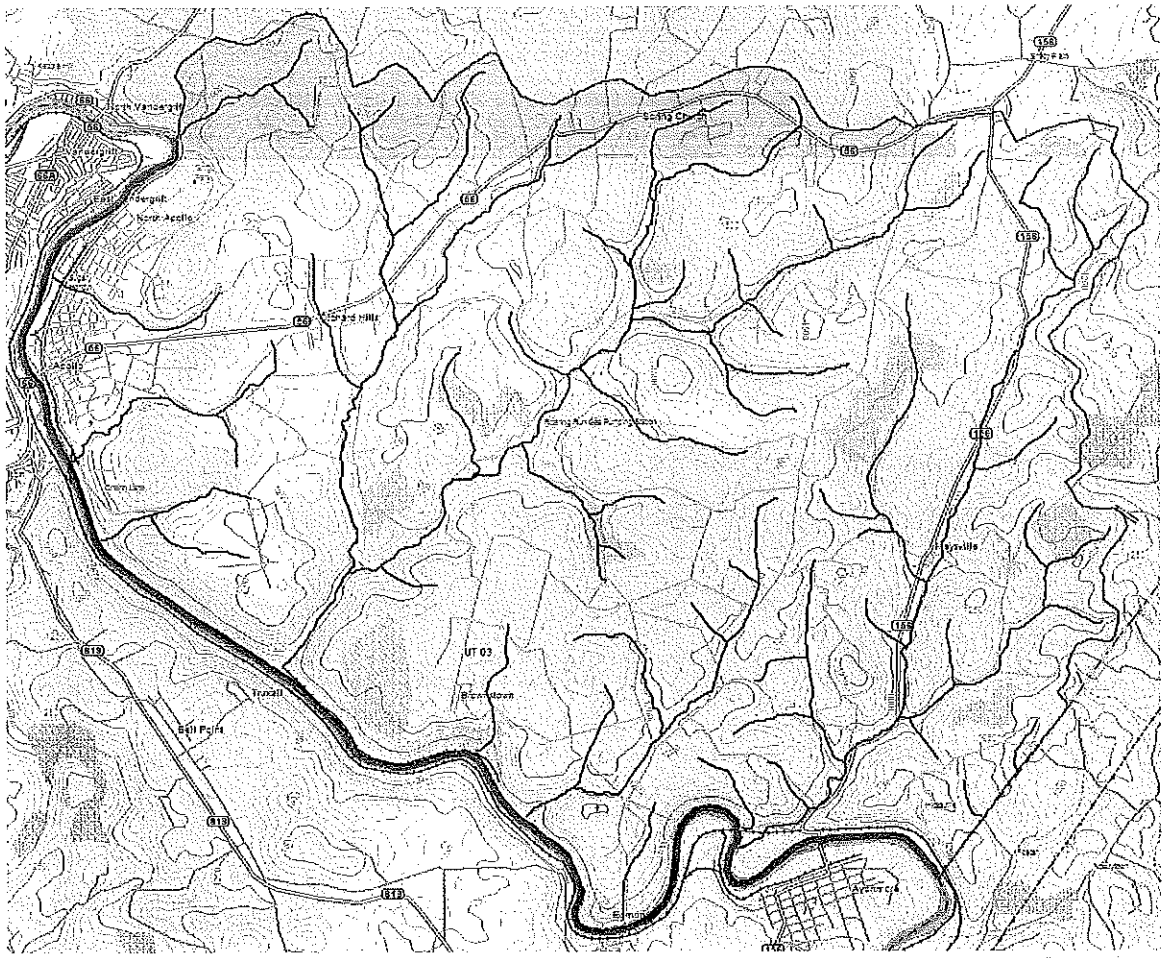

Figure 10. The portion of the 05010008020240 HUC located in Armstrong County.

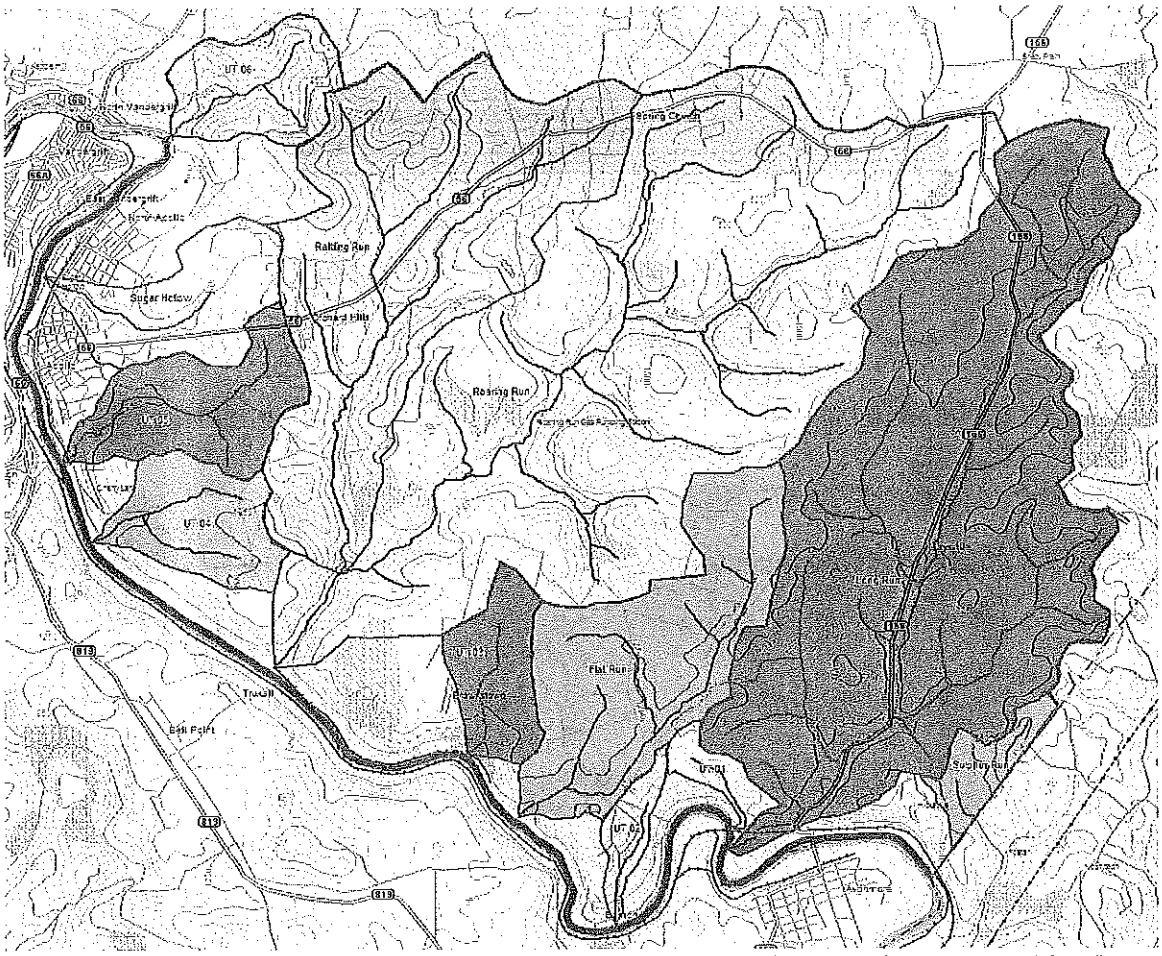

Figure 11. Major and minor tributaries of the Kiskiminetas River located in the Armstrong County section of HUC 05010008020240.

Table 5. Size and length of streams located in this HUC.

Stream	Area	Length
	Square Miles	Stream Miles
Kiskiminetas River	33.00	11.78
Sulphur Run	0.32	0.72
Long Run	7.87	18.82
UT01	0.21	0.74
UT02	0.22	0.88
Flat Run	2.30	5.83
UT03	0.63	1.01
Roaring Run	13.85	29.70
Rattling Run	4.41	9.03
UT04	0.79	1.95
UT05	1.06	2.47
Sugar Hollow	0.97	1.39
UT06	0.80	1.64

The Kiskiminetas River has the distinction of being not only one of the most degraded rivers in Pennsylvania, but also one of the most improved in terms of water quality and fish abundance and diversity. The Kiskiminetas River Watershed has a long history of pollution from sewage, industrial effluents, and particularly abandoned mine drainage (AMD). In 1980, the Pennsylvania Department of Environmental Protection (PA DEP) conducted an aquatic survey of the Kiskiminetas River and found only one frog and no fish. However, in 1990 the Pennsylvania Fish and Boat Commission (PF&BC) conducted a similar survey and found fish populating the river once again, but in low numbers. By the 2000 return of the PF&BC, 22 species of fish, including the threatened smallmouth buffalo (*Ictiobus bubalus*) and mooneye (*Hiodon tergisus*), were collected from the river and a substantial smallmouth bass (*Micropterus dolomieui*) fishery was discovered thriving (PF&BC 2002).

This improvement of the Kiskiminetas River is mainly the result of water quality improvements, particularly in the Conemaugh River, Stonycreek River, Blacklick Creek, and Loyalhanna Creek drainages. Continued work in these areas, as well as in the Kiskiminetas River Watershed proper, shall improve the water quality and, consequently, the fishery even more, with the ultimate goal of total restoration.

The Armstrong County portion of this HUC generally becomes more populated as you move from east to west. Located in the western corner of this HUC is Apollo Borough. However, much of this watershed is forested and rural and has been extensively mined in the past suffering the consequences of that mining. Abandoned Mine Drainage (AMD) is one of the top priorities for the Kiskiminetas Watershed Association (KWA), with offices in Leechburg, and the Roaring Run Watershed Association (RRWA), with

offices in Apollo. They are two extremely active organizations. RRWA, being one of the older watershed associations in Pennsylvania, has already completed mining restoration projects in the Roaring Run Sub Watershed and on the Kiskiminetas River and are eyeing more. The KWA, being one of the younger watershed associations in Pennsylvania, just received a 2003 Pennsylvania Department of Environmental Protection (PA DEP) Growing Greener Grant funding their first AMD treatment project. Both associations' activities will be described in more detail later.

Nutrient and sedimentation loading from agricultural practices, sedimentation from dirt and gravel roadways, illegal dumping, and urban runoff also impact this portion of the Kiskiminetas Watershed, but are slightly minor in comparison to the AMD issues.

Methods

Stream segments with the potential for non-point source (NPS) pollution problems were investigated. All points of NPS pollution were located utilizing a Garmin GPS 12MAP Unit. Field pH (Oakton Waterproof pHTestr 1), specific conductivity (Oakton Waterproof TDSTestr Low) and temperature (Taylor Model 9841) were taken at strategic locations to determine if the site caused impairment and if that site should be documented and sampled for lab analysis of water quality.

All NPS pollution sites documented were then organized into a GIS database that allows data to be organized spatially. Employees of CWM Environmental, with offices in Kittanning, Armstrong County, and Thomas J. Clark, the Indiana and Armstrong County Watershed Specialist with offices in Indiana, Indiana County, determined prioritization and restoration recommendations.

Mining Impacts

Sulphur Run

Sulphur Run is a small watershed (1.95 total square miles) that originates in Armstrong County and flows into Indiana County before it's confluence with the Kiskiminetas River downstream of Blackleggs Creek (Figure 11). Only 16% of the entire watershed is located in Armstrong County. The entire watershed (5.2 stream miles) is listed as AMD impaired on the PA DEP's 303d List of Impaired Waters.

Sulphur Run is heavily impacted by mining mostly in the Indiana County section and, because of this, was not assessed. However, members of the Kiski-Conemaugh Stream Team have been sampling the mouth of Sulphur Run in Indiana County for almost four years. Table 6 demonstrates the adverse water quality at the mouth of Sulphur Run due to the AMD impacts. Sulphur Run, even though a small watershed, inputs heavy loadings of acidity, manganese and aluminum into the Kiskiminetas River.

To identify, quantify and determine possible restoration projects that can be completed in the Sulphur Run Sub Watershed, an assessment needs completed. The KWA and the Indiana County Conservation District should be encouraged to obtain funding to complete such a project.

Table 6. Water quality at the mouth of Sulphur Run collected by the KC Stream team. www.kcstreamteam.org/data.htm

Location	Date	pH	Acid	Alk	T Fe	Fe^{+2}	T Mn	T Al	SO4	TSS	Temp
		Lab	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	°F
Sulphur Run Mouth	1/24/00	3.4	230.00	0.00	1.71	0.20	13.40	37.50	845.0	4.0	nd
	4/24/00	3.2	254.00	0.00	8.38	0.75	8.43	29.80	568.0	8.0	50.0
	7/24/00	3.2	246.00	0.00	2.92	0.32	11.60	32.60	799.0	2.0	59.0
	10/17/00	3.3	222.00	0.00	2.22	0.45	11.80	37.30	811.0	2.0	nd
	2/7/01	3.4	158.00	0.00	3.78	0.47	6.05	18.00	nd	2.0	38.0
	2/17/01	3.4	225.40	0.00	2.12	0.25	9.10	27.60	870.0	12.0	40.0
	4/30/01	3.0	350.00	0.00	14.10	0.93	9.96	39.30	895.0	2.0	nd
	7/17/01	3.1	283.40	0.00	3.50	0.31	10.70	33.00	807.1	6.0	62.0
	2/17/02	3.4	225.40	0.00	2.12	0.25	9.10	27.60	870.0	12.0	40.0
	10/28/02	3.2	296.80	0.00	2.21	0.28	11.40	34.20	740.5	8.0	nd
	2/24/03	3.5	132.60	0.00	3.60	0.14	5.08	15.30	349.2	10.0	nd
	5/6/03	3.0	304.00	0.00	8.34	nd	11.60	37.30	849.6	12.0	53.0
	8/10/03	3.2	265.40	0.00	3.05	0.28	11.60	31.30	862.4	2.0	nd
	Ave	**3.3**	**245.62**	**0.00**	**4.47**	**0.39**	**9.99**	**30.83**	**772.2**	**6.3**	**48.9**

Long Run

Long Run (7.87 square miles), the second largest sub watershed in the Armstrong County section of this HUC, is also one of the better in terms of water quality and macroinvertebrate populations (Figure 11 and 12 and Tables 7 and 13). However, two active mine drainage treatment systems of the Canterbury Coal Company have the potential of impacting Long Run if not perpetually treated.

Canterbury Coal CMAP03841302 has two treatment facilities which discharge to Long Run. NPDES Outfall 001 treats drainage from CMAP03743701 and CMAP03950701 (active coal refuse disposal areas) and CRDA#4(a revegetated pre-primacy site CRDA) and discharges effluent to one of the main tributaries of Long Run (Figure 13). NPDES Outfall 002 pumps water from the David Mine, treats it and discharges directly to Long Run just upstream of the Couch farm. No pumping is done of the Dianne Mine, which is supposedly a down dip mine with no potential to discharge.

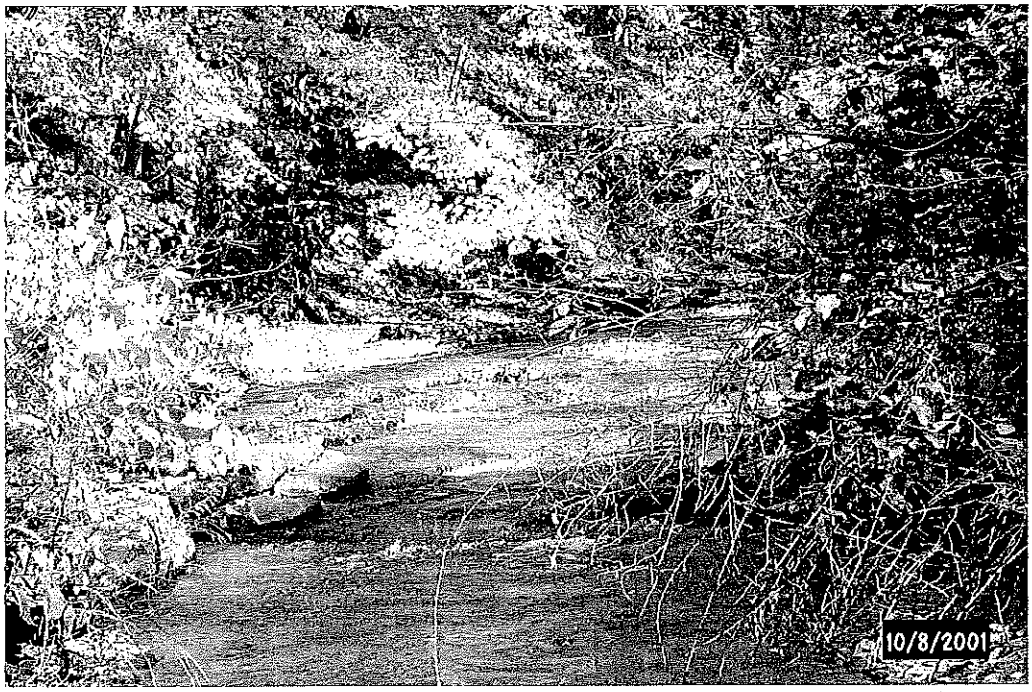

Figure 12. Long Run near it's confluence with the Kiskiminetas River.

Table 7. Water quality at the mouth of Long Run.

Location	Flow	pH	Sp. Cond.	Alk.	Acid.	Fe	Mn	Al	SO_4	TSS
	GPM	Lab	uS/cm	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Long Run Mouth	5385.6	7.06	2250	32.80	0.00	0.04	0.03	0.10	1060.00	3.00

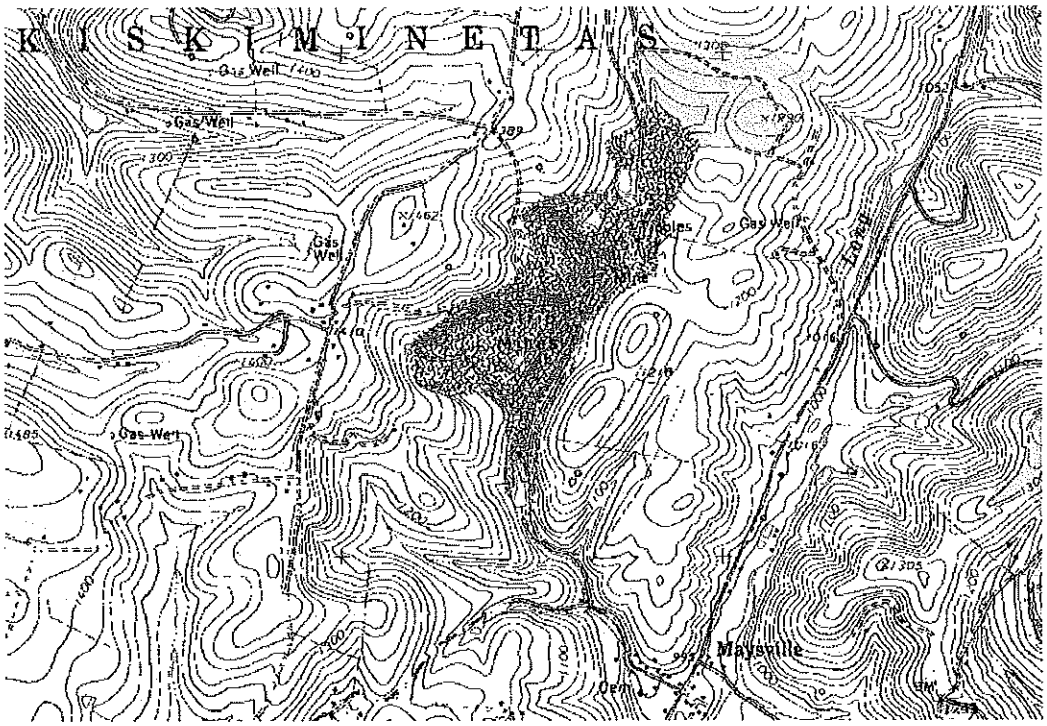

Figure 13. Location of Canterbury Coal Company's NPDES Outfall 001.

As long as these discharges are continually treated by the Canterbury Coal Company, the integrity of Long Run's water quality and aquatic biota will be maintained. For the last few years, the KWA and the Parks Townships Sportsmen's Club have coordinated the stocking of trout in the Kiskiminetas River by selling support pins to interested individuals, companies, and organizations. This stocking has been a major success, especially since the trout are seemingly able to holdover in the river even during the hot summer months. Because of this success, both organizations are planning to expand their efforts by stocking trout in some of the tributary streams of the Kiskiminetas River (no tributary in the Armstrong County section of the Kiskiminetas River is stocked with trout by the PF&BC). Long Run would make an excellent candidate for their expanded stocking program, particularly the final 1.6 miles from the last State Route 156 bridge to the mouth.

Discharge KR09

Discharge KR09 enters the Kiskiminetas River approximately 1500' upstream from the mouth of Flat Run (Figure 14 and Table 8). It originates from a steep bank and, consequently, would not allow passive treatment to occur successfully because of the lack of usable land.

Many of the other discharges that flow right into the Kiskiminetas that I will be discussing later are very similar to KR09, originating from a steep bank, discharging right into the Kiskiminetas River. Passive treatment is, or is almost, impossible for all of these discharges due to the steepness of the flow and the lack of available land for treatment. Currently, the PA DEP Bureau of Abandoned Mine Reclamation (BAMR) is initiating a pilot project on the Ninevah Borehole, a large flow (~500 GPM) acidic discharge

impacting the Conemaugh River in Westmoreland County. Site conditions preclude the use of a passive treatment system (lack of open space). The chosen technology is alkaline injection into the mine and a polishing wetland for the water coming out of the borehole. The vision for this opportunity has come from the fact that Reliant Energy is building a fluidized bed coal burning plant close by and needs to dispose of the fly ash from the plant. The water now is a pH of 2 and this type of fly ash has a pH of 14. It is thought that with injection, the fly ash will set up like cement, producing upon contact with the water, water with a pH such that the passive treatment system can separate metals and polish the water before it enters the stream. If this project is successful, similar discharges on the Kiskiminetas River, like KR09, may be more easily treated.

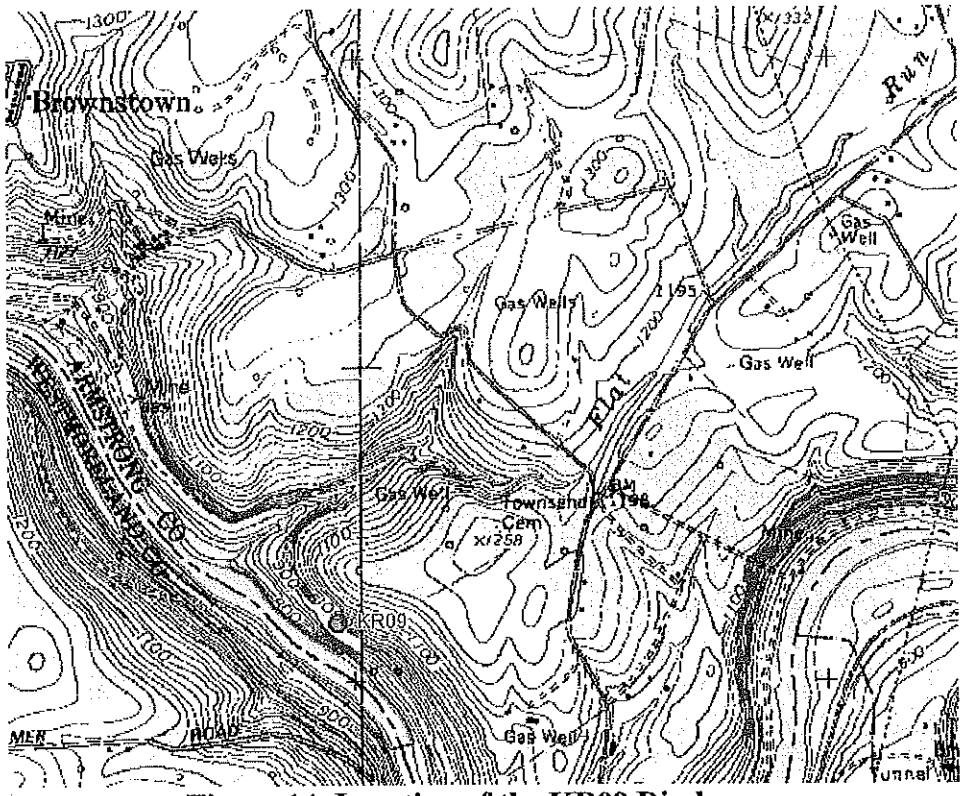

Figure 14. Location of the KR09 Discharge.

Table 8. One time water quality sample of the KR09 Discharge.

Location	Est. Flow	pH	Sp. Cond.	Alk.	Acid.	Fe	Mn	Al	SO_4	TSS
	GPM	Lab	uS/cm	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Discharge KR09	125.0	2.55	1900	0.00	358.00	21.90	2.49	44.10	810.00	2.00

Flat Run

Flat Run, a 2.3 square mile sub watershed is virtually clear of mine discharges until the very mouth of the stream where several small seeps and mine spoil piles adversely impact the water quality and macroinvertebrate community (Figure 11 and Table 9 and 13). These impacts reduce the pH of Flat Run by an average of 0.7 pH units, decrease the average alkalinity concentration by 45%, and increase the average iron (Fe) and aluminum (Al) concentrations by 530% and 484% respectively. The average acidity concentration also increases from 0.0 mg/l upstream to an average of 12.58 mg/l at the mouth.

Table 9. Water quality of Flat Run upstream and downstream of the mining impacts near its mouth. www.kcstreamteam.org/data.htm

Location	Date	pH	Alk.	Acid.	Fe	Mn	Al	SO_4	TSS
		Lab	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Flat Run Above Seeps	2/17/02	6.6	16.20	0.00	0.11	0.02	0.20	37.40	4.00
	5/4/03	7.1	35.40	0.00	0.30	0.05	0.50	41.50	3.00
	8/10/03	7.0	44.60	0.00	0.49	0.05	0.33	45.50	10.00
	11/2/03	7.5	36.40	0.00	0.13	0.02	0.20	40.60	2.00
	Average	**7.1**	**33.15**	**0.00**	**0.26**	**0.04**	**0.31**	**41.25**	**4.75**
Flat Run Below Seeps	2/7/01	6.7	15.60	0.00	0.35	0.05	0.25	41.00	36.00
	4/29/01	6.7	22.00	0.00	0.58	0.11	0.44	74.10	10.00
	7/16/01	5.8	13.40	28.00	2.86	0.36	1.56	112.00	26.00
	2/17/02	6.5	13.80	0.00	0.53	0.07	0.54	44.00	2.00
	5/22/02	6.4	22.00	11.80	1.39	0.13	0.99	25.60	26.00
	7/21/02	4.0	0.00	86.00	2.14	1.93	6.89	484.00	4.00
	10/27/02	6.6	17.00	0.00	1.34	0.19	0.65	103.60	10.00
	2/23/03	6.9	11.20	0.00	3.25	0.24	2.82	26.30	32.00
	8/10/03	6.8	36.40	0.00	0.92	0.11	0.55	52.60	8.00
	11/2/03	7.3	32.60	0.00	0.48	0.07	0.28	54.40	2.00
	Average	**6.4**	**18.40**	**12.58**	**1.38**	**0.33**	**1.50**	**101.76**	**15.60**

Because these impacts occur very close to the mouth of Flat Run and hardly have an impact to the Kiskiminetas River, funding to correct these minor problems will be difficult to obtain. The most effective strategy may be to wait for the Roaring Run Watershed Association to extend the Roaring Run Trail up to the town of Edmon. This planned extension will take the trail directly over Flat Run where the impacts are located. Funding to correct these problems may be more easily obtained at that time, especially for the spoil pile removals.

Roaring Run Trail Discharges

Eleven discharges enter the Kiskiminetas River between UT03 and Roaring Run. An additional discharge is found between Roaring Run and the parking lot for the Roaring Run Trail (Figure 15 and Table 10). All are acidic and range in flow from virtually 0.0 GPM to as high as 500 GPM. Table 10 organizes the water quality collected through this assessment, by Stream Team volunteers, and the United States Department of Agriculture Natural Resources Conservation Service.

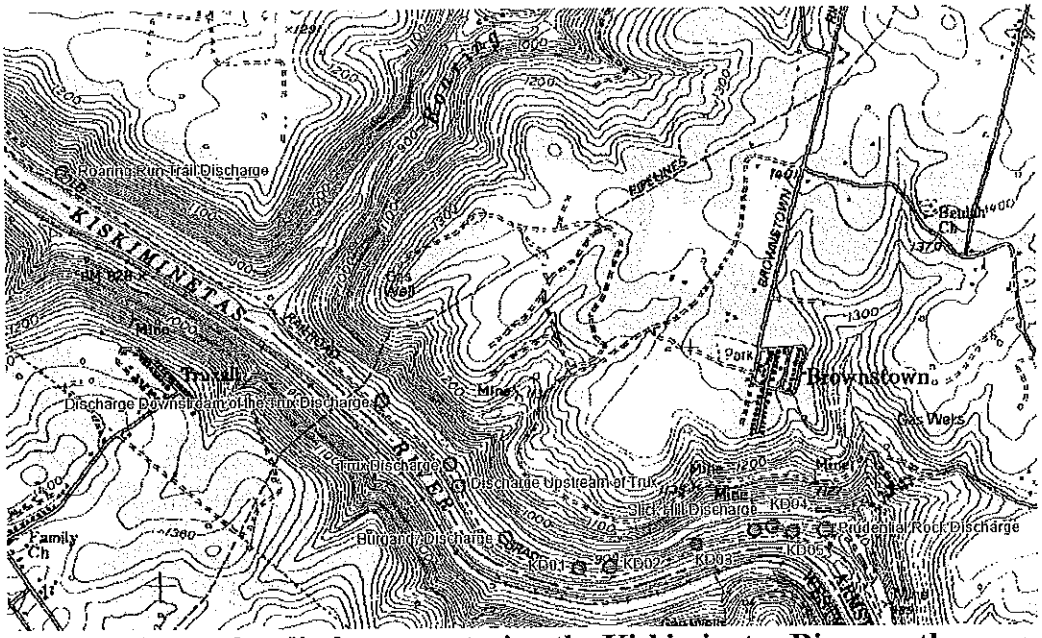

Figure 15. The twelve discharges entering the Kiskiminetas River on the present Roaring Run Trail and the planned extension.

Table 10. Water quality of the twelve discharges entering the Kiskiminetas River on the present Roaring Run Trail and the planned extension.

Location	Date	Flow	pH	pH	Cond	Acid.	Alk.	Fe	Mn	Al	SO4	TSS
		GPM	Field	Lab	uS/cm	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
PRD	3/28/2002	nd	nd	4.00	nd	59.20	0.00	1.98	0.37	2.45	54.30	4.00
	4/11/2002	nd	nd	3.40	380.00	87.40	0.00	7.62	0.89	7.61	128.00	24.00
	5/16/2002	1.27	nd	3.80	220.00	58.20	0.00	5.72	0.41	3.23	65.50	2.00
	6/13/2002	197.50	nd	3.30	420.00	nd	0.00	nd	nd	nd	nd	nd
	7/11/2002	5.39	nd	3.30	1310.00	807.00	0.00	75.00	5.90	74.40	812.00	2.00
	9/26/2002	1.35	nd	2.70	2000.00	nd	0.00	nd	nd	nd	2500.00	nd
	10/10/2002	4.04	nd	2.60	2000.00	1544.00	0.00	188.00	12.10	147.00	1153.80	26.00
	11/8/2002	17.07	nd	3.00	1050.00	353.00	0.00	32.40	3.49	32.10	381.00	4.00
	12/19/2002	188.97	nd	3.40	420.00	74.20	0.00	4.91	0.83	7.28	107.00	2.00
	3/27/2003	14.36	nd	3.50	422.00	87.60	0.00	6.62	0.79	6.94	114.10	2.00
	5/8/2003	117.59	nd	3.50	349.00	65.80	0.00	4.34	0.67	5.31	100.00	2.00
	Average	**60.84**	**nd**	**3.30**	**857.10**	**348.49**	**0.00**	**36.29**	**2.83**	**31.81**	**541.57**	**7.56**
KR05	12/18/2003	35 (est.)	3.80	nd	360.00	nd	nd	nd	nd	nd	nd	nd
KR04	12/18/2003	50 (est.)	3.10	nd	890.00	nd	nd	nd	nd	nd	nd	nd
SHD	3/28/2002	nd	nd	2.90	nd	370.20	0.00	931.00	9.27	48.10	448.00	2.00
	4/11/2002	13.47	nd	3.00	1290.00	341.80	0.00	6.46	11.80	39.40	681.00	10.00
	5/16/2002	179.54	nd	2.90	1240.00	292.00	0.00	6.71	9.33	32.40	561.00	2.00
	6/13/2002	13.47	nd	3.10	1320.00	nd	0.00	nd	nd	nd	nd	nd
	9/26/2002	0.00	nd	nd	nd	nd	0.00	nd	nd	nd	nd	nd
	10/10/2002	nd	nd	2.60	2000.00	914.80	0.00	36.00	40.00	115.00	1174.40	26.00
	11/8/2002	4.49	nd	2.90	1960.00	615.40	0.00	19.40	19.60	70.30	1062.70	2.00
	12/19/2002	17.51	nd	3.00	1490.00	325.40	0.00	7.31	11.70	43.80	612.00	2.00
	3/27/2003	12.12	nd	3.00	1450.00	330.80	0.00	4.79	9.82	35.20	583.00	4.00
	5/8/2003	103.22	nd	3.00	1508.00	310.20	0.00	6.48	12.50	37.90	639.00	6.00
	Average	**42.98**	**nd**	**2.90**	**1532.25**	**437.58**	**0.00**	**127.27**	**15.50**	**52.76**	**720.14**	**6.75**
KR03	12/18/2003	10 (est.)	2.80	nd	>2000	nd	nd	nd	nd	nd	nd	nd
KR02	12/18/2003	10 (est.)	3.80	nd	1870.00	nd	nd	nd	nd	nd	nd	nd
KR01	12/18/2003	20 (est.)	2.60	nd	>2000	nd	nd	nd	nd	nd	nd	nd
BD	1-Sep	101.00	nd	2.76	4400.00	1200.00	0.00	461.00	20.90	141.20	3738.00	4.00
	1-Oct	58.00	nd	2.86	4780.00	1200.00	0.00	596.00	17.53	145.30	3560.00	72.00
	2-Jun	43.00	nd	2.95	4630.00	1000.00	0.00	606.00	44.00	185.70	1998.00	8.00
	2-Jul	64.00	nd	2.87	4810.00	1000.00	0.00	406.00	20.90	128.20	2047.00	5.00
	2-Aug	40.32	nd	2.96	4720.00	1000.00	0.00	1052.00	45.15	265.50	4119.00	93.00
	Average	**62.49**	**nd**	**2.88**	**4710.00**	**1100.00**	**0.00**	**593.29**	**24.99**	**164.20**	**3414.00**	**68.50**

Location	Date	Flow	pH	pH	Cond	Acid.	Alk.	Fe	Mn	Al	SO4	TSS
		GPM	Field	Lab	uS/cm	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
DUT	3/28/2002	nd	nd	2.70	nd	1160.00	0.00	192.80	27.20	104.20	1373.00	22.00
	4/11/2002	4.49	nd	2.50	2000.00	1197.60	0.00	83.50	46.90	113.00	1968.00	30.00
	5/16/2002	44.89	nd	2.60	2000.00	945.00	0.00	123.00	31.90	87.30	1600.00	20.00
	6/13/2002	4.49	nd	2.60	2000.00	nd	0.00	nd	nd	nd	nd	nd
	9/26/2002	0.00	nd	nd	nd	nd	0.00	nd	nd	nd	nd	nd
	10/10/2002	0.90	nd	2.60	2000.00	1220.20	0.00	49.70	60.90	153.00	1172.90	22.00
	11/8/2002	14.81	nd	2.70	2000.00	1157.00	0.00	118.00	49.10	114.00	2087.40	10.00
	12/19/2002	36.36	nd	2.80	2000.00	865.60	0.00	107.00	34.70	80.90	1922.40	8.00
	3/27/2003	30.07	nd	2.90	2000.00	1556.00	0.00	65.40	34.20	35.89	2305.50	12.00
	5/8/2003	5.83	nd	3.00	2000.00	481.40	0.00	7.11	28.70	62.20	1646.70	20.00
	Average	**15.76**	**nd**	**2.70**	**2000.00**	**1072.85**	**0.00**	**93.31**	**39.20**	**93.81**	**1759.49**	**18.00**
TD	1/26/1996	500 (est.)	nd	3.00	nd	1058.00	0.00	239.00	17.80	84.30	1808.00	48.00
	3/19/1996	500 (est.)	nd	3.20	nd	1090.00	0.00	244.00	16.80	71.20	2136.50	10.80
	4/26/1996	500 (est.)	nd	2.90	nd	1024.00	0.00	230.00	14.50	62.80	2290.90	<3.00
	6/24/1996	500 (est.)	nd	2.80	nd	1116.00	0.00	225.00	15.40	72.30	1653.40	<3.00
	8/21/1996	500 (est.)	nd	3.10	nd	1132.00	0.00	270.00	14.00	62.40	2338.50	<3.00
	10/4/1996	500 (est.)	nd	3.10	nd	1080.00	0.00	273.00	12.20	53.40	2018.70	26.00
	11/14/1996	500 (est.)	nd	3.40	nd	996.00	0.00	281.00	13.50	57.20	2145.00	48.00
	1/24/1997	300 (est.)	nd	3.20	nd	978.00	0.00	241.00	13.40	54.70	2142.00	4.00
	2/26/1997	300 (est.)	nd	3.30	nd	932.00	0.00	247.00	15.00	57.60	1977.80	<3.00
	4/24/1997	300 (est.)	nd	3.50	nd	932.00	0.00	259.00	12.50	50.30	1802.60	16.00
	5/28/1997	500 (est.)	nd	3.10	nd	862.00	0.00	188.00	13.80	51.90	2003.40	<3.00
	8/15/1997	300 (est.)	nd	3.00	nd	938.00	0.00	271.00	11.50	44.60	1941.60	8.00
	10/3/1997	300 (est.)	nd	2.90	nd	926.00	0.00	247.00	12.20	45.30	1890.20	<3.00
	12/17/1997	300 (est.)	nd	3.40	nd	896.00	0.00	259.00	13.40	50.40	2073.80	<3.00
	1/23/1998	300 (est.)	nd	3.40	nd	818.00	0.00	233.00	13.20	49.50	1827.80	16.00
	3/13/1998	300 (est.)	nd	3.20	nd	774.00	0.00	222.00	15.30	54.90	1786.50	34.00
	4/10/1998	300 (est.)	nd	3.00	nd	768.00	0.00	183.00	13.90	51.00	1636.00	14.00
	7/10/1998	300 (est.)	nd	2.90	nd	784.00	0.00	193.00	11.70	46.60	1919.50	10.00
	8/6/1998	200 (est.)	nd	3.30	nd	764.00	0.00	232.00	11.00	36.40	2017.30	4.00
	9/14/1998	200 (est.)	nd	3.50	nd	782.00	0.00	264.00	12.50	45.20	1957.00	8.00
	10/6/1998	250 (est.)	nd	3.50	nd	834.00	0.00	238.00	10.90	37.30	1919.50	28.00
	12/4/1998	150 (est.)	nd	3.10	nd	814.00	0.00	295.00	12.70	47.90	1887.00	<3.00
	3/12/1999	250 (est.)	nd	3.30	nd	892.00	0.00	236.00	16.60	62.10	1659.00	10.00
	4/20/1999	250 (est.)	nd	3.10	nd	770.00	0.00	178.00	13.80	48.70	1522.60	<3.00
	5/24/1999	200 (est.)	nd	3.30	nd	742.00	0.00	195.00	15.50	52.20	1496.00	<3.00
	6/11/1999	200 (est.)	nd	3.10	nd	666.00	0.00	215.00	13.40	43.50	1572.10	20.00
	7/20/1999	200 (est.)	nd	3.40	nd	722.00	0.00	205.00	10.90	38.30	1587.20	20.00
	8/23/1999	200 (est.)	nd	3.40	nd	790.00	0.00	251.00	12.40	45.00	2075.00	6.00
	9/17/1999	200 (est.)	nd	3.10	nd	796.00	0.00	248.00	11.70	41.90	1837.00	<3.00
	10/20/1999	250 (est.)	nd	3.30	nd	776.00	0.00	221.00	11.80	43.60	2395.90	12.00
	12/10/1999	250 (est.)	nd	3.10	nd	860.00	0.00	253.00	13.70	49.10	1798.30	6.00
	1/18/2000	200 (est.)	nd	3.40	nd	808.00	0.00	259.00	13.80	47.40	2290.90	<3.00
	2/18/2000	300 (est.)	nd	3.10	nd	820.00	0.00	58.70	11.50	46.50	1733.00	26.00

Location	Date	Flow	pH	pH	Cond	Acid.	Alk.	Fe	Mn	Al	SO4	TSS
		GPM	Field	Lab	uS/cm	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
	3/17/2000	250 (est.)	nd	3.10	nd	888.00	0.00	180.00	14.50	52.70	2049.80	10.00
	4/14/2000	250 (est.)	nd	2.90	nd	816.00	0.00	178.00	15.10	52.20	1758.00	<3.00
	5/12/2000	200 (est.)	nd	2.90	nd	696.00	0.00	175.00	13.40	43.00	1245.20	4.00
	Average	**nd**	**nd**	**3.20**	**nd**	**870.60**	**0.00**	**227.40**	**13.50**	**51.50**	**1894.30**	**16.90**
DDT	12/18/2003	50 (est.)	3.10	nd	1170.00	nd	nd	nd	nd	nd	nd	nd
RRTD	2-Jan	15.00	nd	2.59	3400.00	1000.00	0.00	189.70	56.10	211.40	2176.00	6.00
	2-Feb	10.00	nd	6.13	391.00	2.80	4.80	0.03	0.36	0.32	145.50	2.00
	2-Mar	33.00	nd	3.48	721.00	105.00	0.00	7.10	1.70	13.00	302.00	20.00
	2-Apr	83.00	nd	4.35	384.00	37.60	0.00	0.87	0.58	4.12	199.00	2.00
	2-May	25.00	nd	3.73	491.00	52.00	0.00	1.40	0.68	4.93	250.00	2.00
	2-Jun	28.00	nd	6.10	1062.00	50.00	10.00	21.39	1.79	0.44	481.00	7.00
	2-Jul	4.00	nd	2.99	1309.00	190.80	0.00	1.61	2.90	14.80	580.00	47.00
	2-Aug	5.00	nd	3.32	1313.00	112.80	0.00	0.88	4.14	12.50	560.00	<3.00
	2-Sep	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
	2-Oct	2.00	nd	3.82	1128.00	82.80	0.00	2.40	0.08	5.90	477.00	<3.00
	2-Nov	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
	2-Dec	500.00	nd	6.53	171.00	0.00	3.60	0.21	0.22	0.74	55.80	6.00
	Average	**58.75**	**nd**	**4.30**	**1037.00**	**163.38**	**1.84**	**22.56**	**6.86**	**26.82**	**522.63**	**11.50**

The Prudential Rock Discharge's average input to the Kiskiminetas River is 46.51 tons/year of acidity, 4.84 tons/year of Fe, and 4.25 tons/year of Al (Figure 16 and Table 10). There may be enough available land for the successful treatment of this discharge. The amount of available land should be looked into and, if so, completed by the KWA and RRWA, especially as the Roaring Run Trail extension is progressing.

KR05 and KR04 are smaller flow discharges originating from the same general area as the Prudential Rock Discharge (Table 10). The water qualities of these two discharges need to be sampled on a regular basis as only field parameters were collected. Once collected, treatment options and funding should be obtained by the KWA and RRWA. These two discharges are so close to the Prudential Rock Discharge that all three could very well be treated in one system, thus decreasing treatment size and cost.

Figure 16. Picture of the Prudential Rock Discharge.

The Slick Hill Discharge's average input to the Kiskiminetas River is 41.26 tons/year of acidity, 12.00 tons/year of Fe, 1.46 tons/year of Mn, and 4.97 tons/year of Al (Figure 17 and Table 10). There may be enough available land for the successful treatment of this discharge. The amount of available land should be looked into and, if so, completed by the KWA and RRWA, especially as the Roaring Run Trail expansion is progressing.

KR03, KR02, and KR01 are smaller flow discharges originating between the Slick Hill Discharge and the Burgundy Discharge from the same general mining impacted stretch of the north bank (Table 10). The water qualities of these three discharges need to be sampled on a regular basis as only field parameters were collected. Once collected, treatment options and funding should be obtained by the KWA and RRWA.

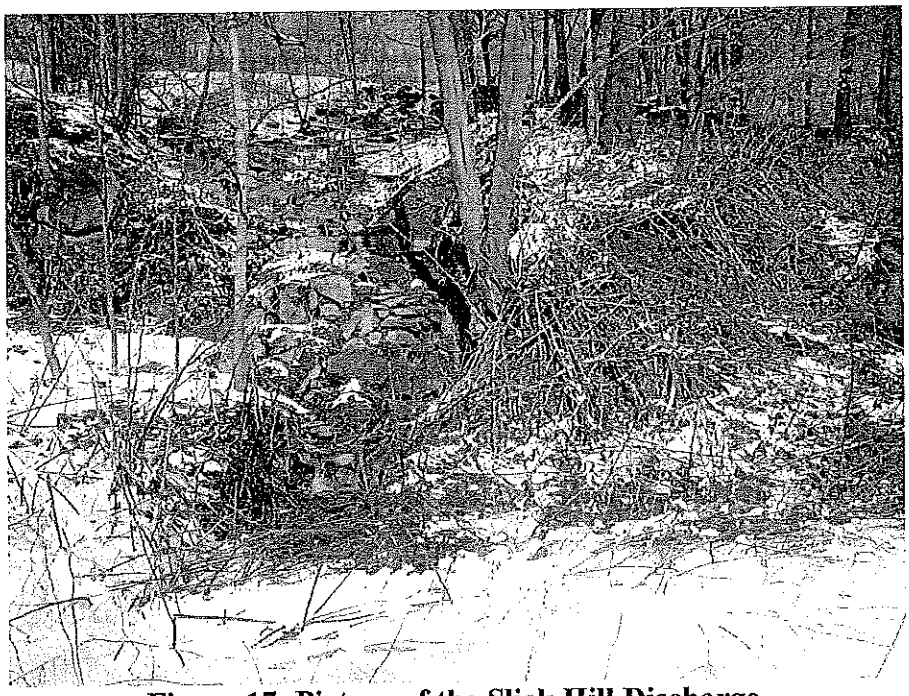

Figure 17. Picture of the Slick Hill Discharge.

The Burgundy Discharge is the first discharge sampled monthly by employees of CWM Environmental (Figure 18 and Table 10). The reasons it was selected were the degraded quality of the water, the land available for treatment, and the location is very close to the beginning of the planned extension of the Roaring Run Trail. The Burgundy Discharge's average input to the Kiskiminetas River is 150.79 tons/year of acidity, 81.33 tons/year of Fe, 3.43 tons/year of Mn, and 18.91 tons/year of Al.

There seems to be enough room to be able to treat this discharge, however, he quality of the discharge may make passive treatment difficult. The area where it originates also resembles the Trux Discharge area before it was reclaimed by the RRWA through a PA DEP Growing Greener Grant (Figure 19). If, upon further study, passive treatment would not be successful, the RRWA and KWA should obtain funding to complete a similar land reclamation project as was completed at the Trux Discharge.

Figure 18. Picture of the Burgundy Discharge.

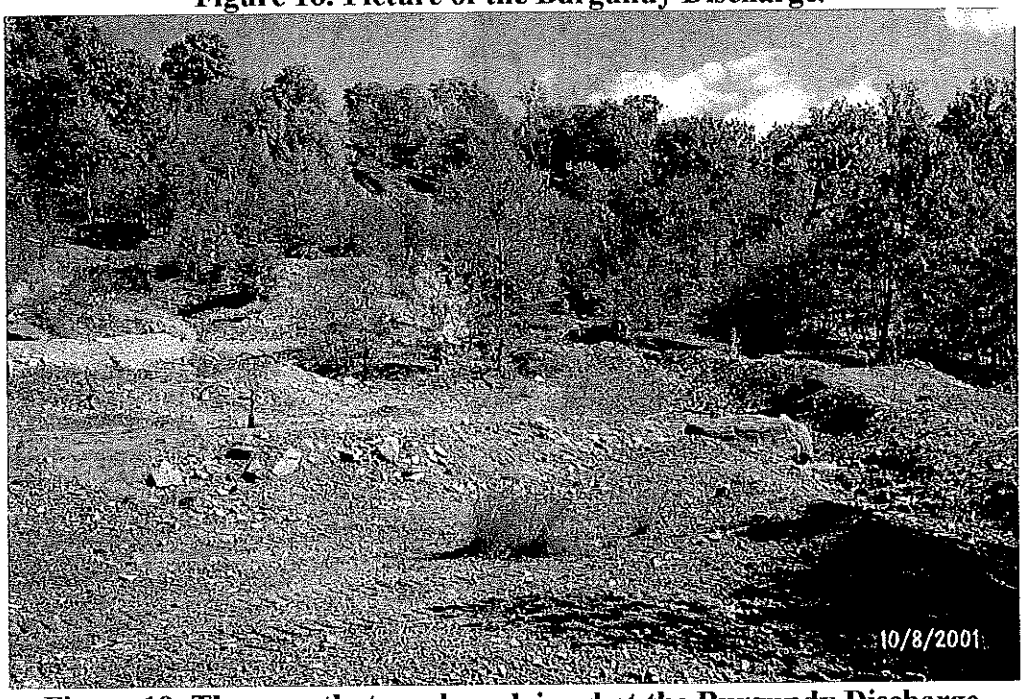

Figure 19. The area that needs reclaimed at the Burgundy Discharge.

The Discharge Upstream of Trux's average input to the Kiskiminetas River is 37.09 tons/year of acidity, 3.23 tons/year of Fe, 1.36 tons/year of Mn, and 3.24 tons/year of Al (Figure 20 and Table 10). This discharge originates on a steep slope and, consequently, does not seem to have enough available land for passive treatment. If the

Ninevah Borehole Alkaline Fly Ash Pilot Project is a success, the RRWA and KWA should look into this for possible in-situ treatment.

Figure 20. Picture of the Discharge Upstream of Trux.

The Trux discharge is the top discharge in terms of acidity and metal loading in the entire Kiskiminetas River Watershed proper (Figure 21 and Table 10). I could not find accurate background flow measurements of the Trux Discharge, but using estimated flow and analyzed water quality, this discharge inputs approximately on average 392.65 tons/year of acidity, 102.56 tons/year of Fe, 6.09 tons/year of Mn, and 23.22 tons/year of Al into the Kiskiminetas River.

The Trux Discharge, similarly to other discharges we discussed, originates on a steep slope near the bank of the river, not allowing successful passive treatment to occur. Consequently, the RRWA obtained a $144,926 1999 PA DEP Growing Greener Grant to stabilize and re-vegetate four acres surrounding the Trux Discharge. Toxic soil was removed from the site and the area was graded, stabilized, limed and planted. This project

also included riverbank reinforcement and construction of a fish habitat structure (Figure 21 and 22). The project was a huge success for the RRWA; however, the Trux Discharge could not be treated and still greatly degrades the Kiskiminetas River. As stated before, if the Ninevah Borehole Alkaline Fly Ash Pilot Project is a success, it may be applicable to the Trux Discharge. This may be a perfect candidate for the next fly ash injection project and PA DEP BAMR should be contacted in the future to gauge interest.

Figure 21. The area surrounding the Trux Discharge before reclamation.

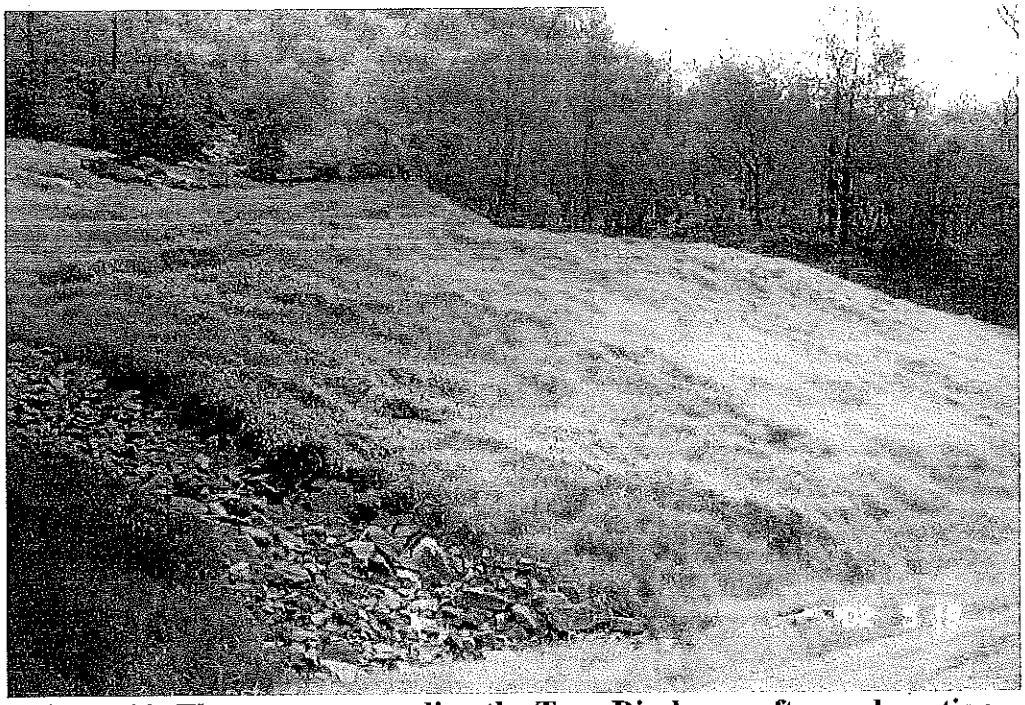

Figure 22. The area surrounding the Trux Discharge after reclamation.

The one positive of the Trux Discharge is that its water quality seems to be improving, especially in terms of the two major constituents, acidity and Fe (Figure 23).

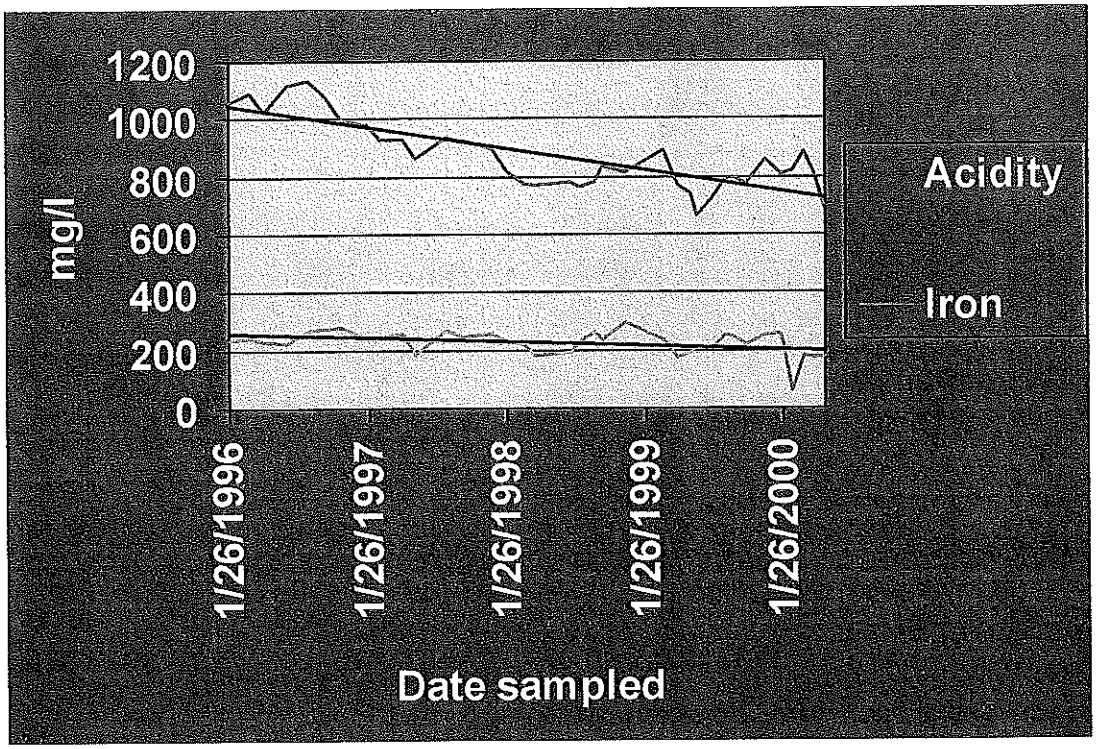

Figure 23. Acidity and Fe concentration of the Trux Discharge over time.

The Discharge Downstream of Trux is a lower flow discharge originating on a steep slope as well, limiting the available passive treatment area (Figure 24 and Table 10). The water qualities of this discharge needs to be sampled on a regular basis as only field parameters were collected. Once collected, treatment options, if feasible, and funding should be obtained by the KWA and RRWA.

The Roaring Run Trail Discharge also originates on a steep slope, limiting the available passive treatment area (Figure 25 and Table 10). The Roaring Run Trail Discharge's average input into the Kiskiminetas River is 21.06 tons/year of acidity 2.90 tons/year of Fe, and 3.46 tons/year of Al

Figure 24. Picture of the Discharge Downstream of Trux.

Figure 25. Picture of the Roaring Run Trail Discharge.

Since passive treatment of this discharge may be difficult to near impossible because of the surrounding terrain, the RRWA may want to use the discharge and adjacent mine spoil pile as an educational station along the Roaring Run Trail. A kiosk could be constructed and installed describing how AMD is formed, how AMD impacts receiving streams, the reason that the mine spoil is adjacent, etc. Funding for such a project could be obtained from the Western Pennsylvania Coalition for Abandoned Mine Reclamation (WPCAMR) Regional Watershed Support Initiative (RWSI) or the League of Women Voters Water Resources Education Network Grants (WREN).

These twelve discharges are the largest AMD impact to the Kiskiminetas River proper. Studying the collected data, an approximate average of 625 GPM of highly acidic, metal laden water enters the Kiskiminetas River from these discharges (~900,000 GPD). Not only do these discharges need treated for total Kiskiminetas River recovery, but land reclamation also needs completed, starting from the Burgundy Discharge and

ending around the entry of UT03, an approximate distance of 4450 ft. As the RRWA extends their trail up to the town of Edmon, these sources of pollution need assessed for reclamation measures. If unable to treat a discharge with present technology, land reclamation should be completed as it was done at the Trux Discharge Site.

Roaring Run

Roaring Run (13.85 square miles), the largest sub watershed in the Armstrong County section of this HUC and the second largest Kiskiminetas River tributary in Armstrong County, has sections that are slightly to moderately impacted by AMD (Figure 11 and 26 and Tables11 and 13). However, Roaring Run is also arguably the tributary with the most potential in the Kiskiminetas River Watershed proper.

Figure 26. Roaring Run near its confluence with the Kiskiminetas River.

Besides the western side of Rattling Run (4.41 square miles), Roaring Run's largest tributary, the watershed is heavily forested, especially in the 350 acres owned and

conserved by the RRWA (Figure 27), however, some of the larger, more impacting AMD discharges are also found in this acreage (Figure 28 and Table 12).

Table 11. Water quality around the mouth of Roaring Run.
www.kcstreamteam.org/data.htm

Location	Date	pH	Cond.	Acid.	Alk.	Fe	Mn	Al	SO4	TSS
		Lab	uS/cm	mg/L	mg/L	mg.l	mg/l	ug/L	mg/L	mg/L
Roaring Run US of Rattling Run	5/5/1999	7.1	nd	0.00	42.00	0.30	0.16	0.20	nd	8.00
	1/23/2000	6.9	nd	0.00	26.00	0.00	0.48	0.50	146.00	2.00
	4/23/2000	7.0	nd	0.00	24.00	0.36	0.28	0.36	69.00	14.00
	7/23/2000	6.7	nd	0.00	32.00	0.18	0.15	0.20	170.00	2.00
	10/16/2000	7.1	nd	0.00	36.00	0.99	0.27	0.53	83.00	14.00
	2/7/2001	6.8	nd	0.00	22.00	0.40	0.28	0.30	102.00	34.00
	4/29/2001	6.8	nd	0.00	24.00	0.37	0.36	0.37	150.00	2.00
	7/16/2001	6.0	nd	17.00	22.00	0.29	0.28	0.30	276.00	2.00
	2/17/2002	6.6	nd	0.00	28.00	0.46	0.41	0.43	111.00	2.00
	5/22/2002	6.4	nd	24.40	20.00	0.52	0.24	0.47	63.60	6.00
	7/21/2002	6.2	nd	4.20	12.20	0.05	0.14	0.20	548.00	6.00
	10/27/2002	7.0	nd	0.00	32.00	0.38	0.33	0.27	186.80	4.00
	2/23/2003	7.0	nd	0.00	14.80	5.18	0.43	3.69	39.80	22.00
	5/4/2003	7.0	nd	0.00	29.00	0.30	0.32	0.50	214.60	3.00
	8/10/2003	7.6	nd	0.00	50.00	0.75	0.25	0.48	167.10	6.00
	11/2/2003	7.5	nd	0.00	41.60	0.22	0.25	0.22	150.50	16.00
	Average	**6.86**	nd	**2.85**	**28.48**	**0.67**	**0.29**	**0.56**	**165.16**	**8.94**
Rattling Run Mouth	na	6.6	645	nd	nd	nd	nd	nd	nd	nd
Roaring Run Mouth	Jul-01	7.16	690	0	22.80	0.22	0.20	0.32	220.00	4.00

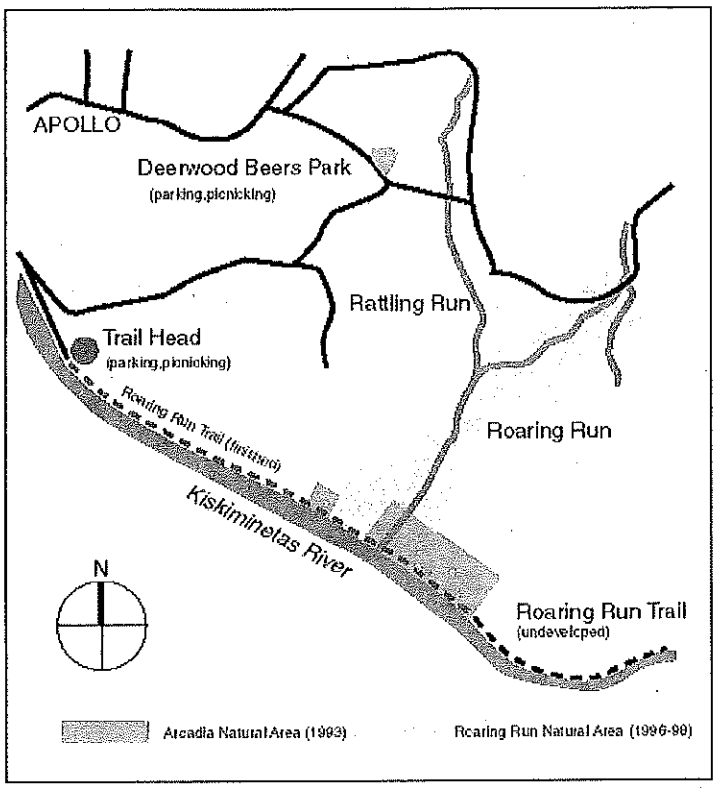

Figure 27. Area owned and conserved by the RRWA.

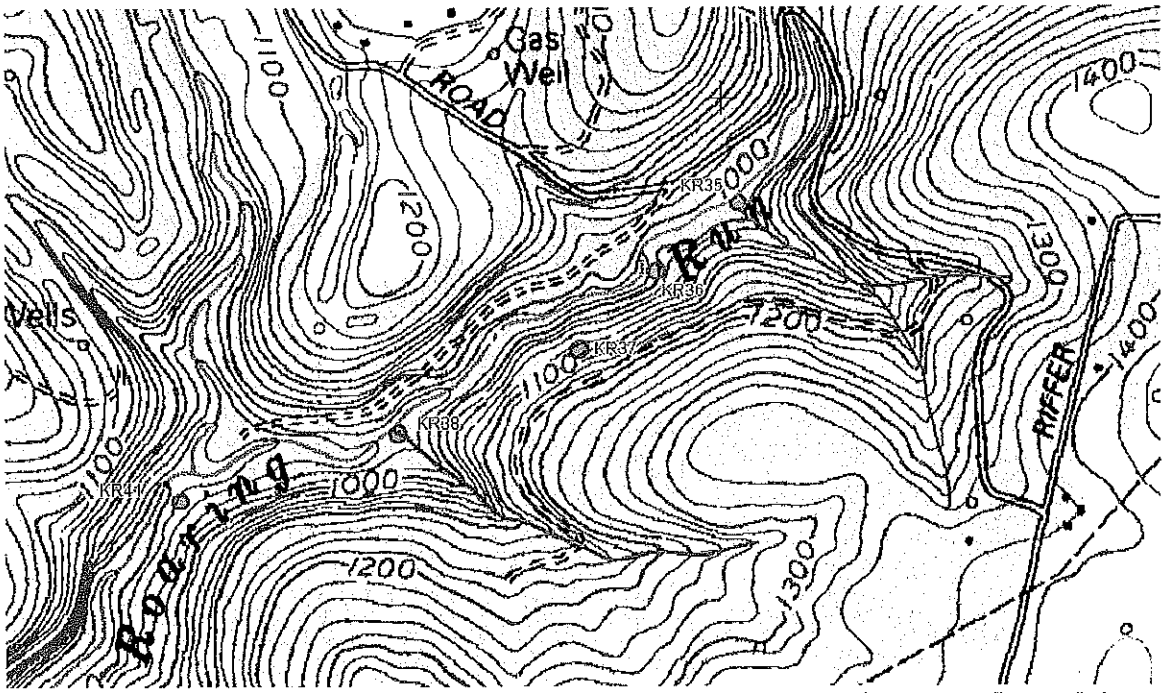

Figure 28. Five discharges impacting Roaring Run in the Roaring Run Natural Area

Table 12. The water quality of five AMD flows in the Roaring Run Natural Area.

Location	Est. Flow	pH	Cond.	Acid.	Alk.	Fe	Mn	Al	SO4	TSS
	GPM	Lab	uS/cm	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
KR35	50	2.8	1575	197.00	0.00	14.20	3.14	9.12	538.00	1.00
KR36	50	3.0	1575	271.00	0.00	48.80	3.62	17.80	762.00	47.00
KR37	50	3.2	950	117.00	0.00	13.20	4.94	6.19	360.00	19.00
KR38	nd	3.3	790	nd	nd	nd	nd	nd	nd	nd
KR41	25	3.5	770	nd	nd	nd	nd	nd	nd	nd

A short study was completed in this section of Roaring Run in December of 2003 to document the impacts these discharges have on the water quality of Roaring Run. The pH and conductivity of Roaring Run decreases by 1.8 units and increases by 30 from upstream to downstream of these five discharges. Fe and Al precipitation is also visible in Roaring Run upstream of the confluence of Rattling Run (Figure 29). Rattling Run then enters and dilutes Roaring Run, improving the water quality slightly.

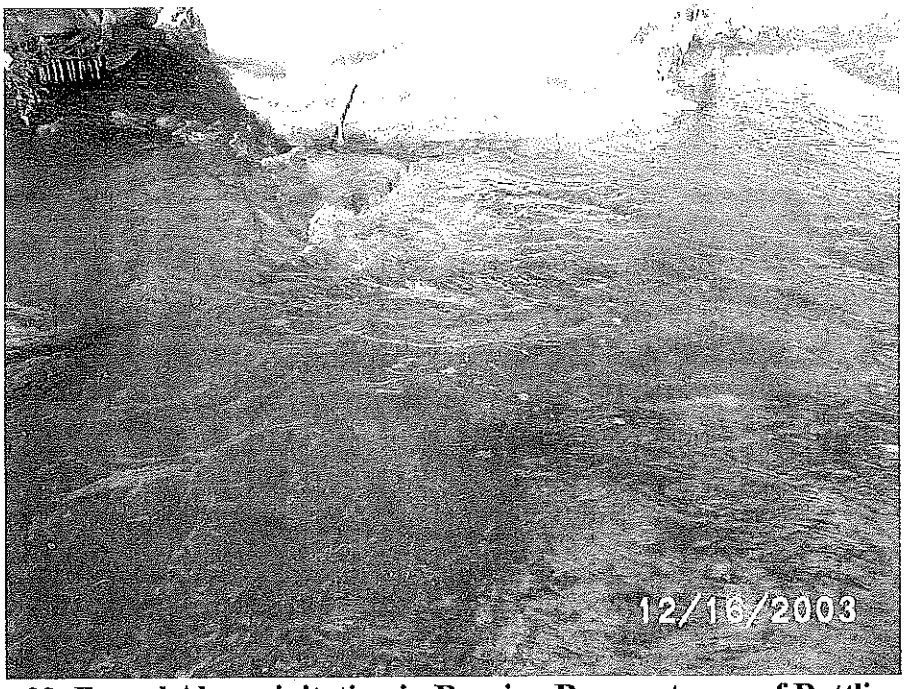

Figure 29. Fe and Al precipitation in Roaring Run upstream of Rattling Run.

The first task that needs completed for possible treatment of these discharges is that water quality needs to be sampled on a more regular basis. Members of the RRWA and KWA that sample for the Stream Team should consider discontinuing sampling other streams so that these discharges could be sampled quarterly. Once several quarters are collected, prioritization of the discharges should be completed using such criteria as impact to Roaring Run, available land for treatment, type of system needed, etc. Once this is completed, funding should be searched for and obtained for the design of the treatment systems for the top priority discharges. Then funding could be obtained for construction.

The treatment of these discharges are the top priority in the Roaring Run Watershed. They not only impact the most scenic and utilized stretch of Roaring Run, but they also may lessen the potential of stocking the lower section of Roaring Run with trout. As mentioned in the Long Run section, the Parks Township Sportsmen's Club and the KWA are looking for possible tributary streams to stock. The final 1.8 miles of Roaring Run, from the last bridge to the mouth, has, most likely, the largest trout stocking potential in the entire Armstrong County section of the Kiskiminetas River. This stocking could be a success now, but if these discharges are treated, the success will be a certainty.

AMD is also a problem upstream of these discharges, particularly in three areas. The first is a relatively large flow discharge impacting Rattling Run (Figure 30). This discharge was not discovered during the preliminary assessment of Roaring Run, most likely due to the assessment being completed (2001-2002) during two major drought years. This discharge has an approximate flow of 150 GPM and a pH of 3.6. However, it

seems to have low metal concentration with a conductivity of only 520. The RRWA should look into beginning a sampling program on this discharge as well, possible discontinuing the sampling of some streams through Stream Team to meet the need of data in the Roaring Run Watershed.

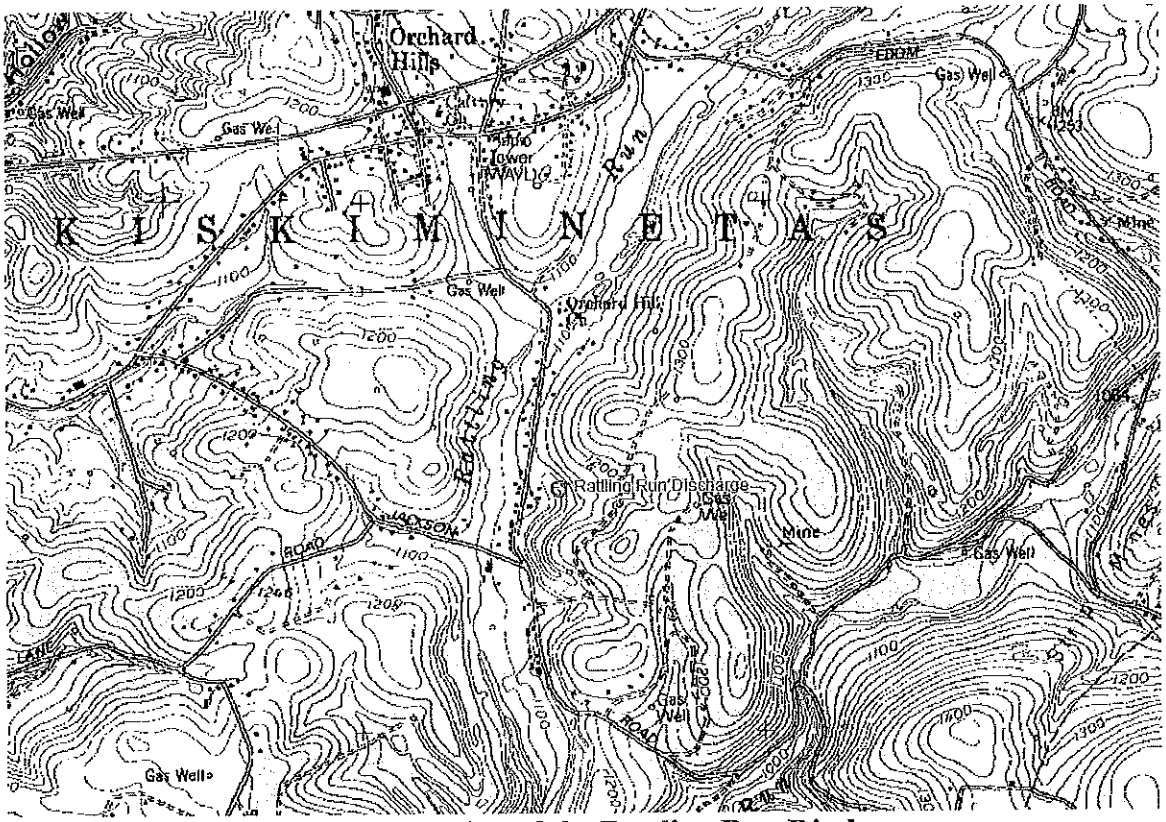

Figure 30. Location of the Rattling Run Discharge.

The second area containing AMD problems is a stretch of the main stem of Roaring Run containing a few small discharges and spoil piles, an active mine (Rosebud Mining Company Tracy Lynne Mine) and a tributary with a moderate flow discharge (Figure 31).

The RRWA may also want to sample this tributary discharge with Stream Team funding as described before. Upon preliminary inspection, this discharge seems to be the highest flow discharge in this section (~30 GPM, pH 3.3, cond 300) and may be easily treated due to what looks to be low metal concentrations.

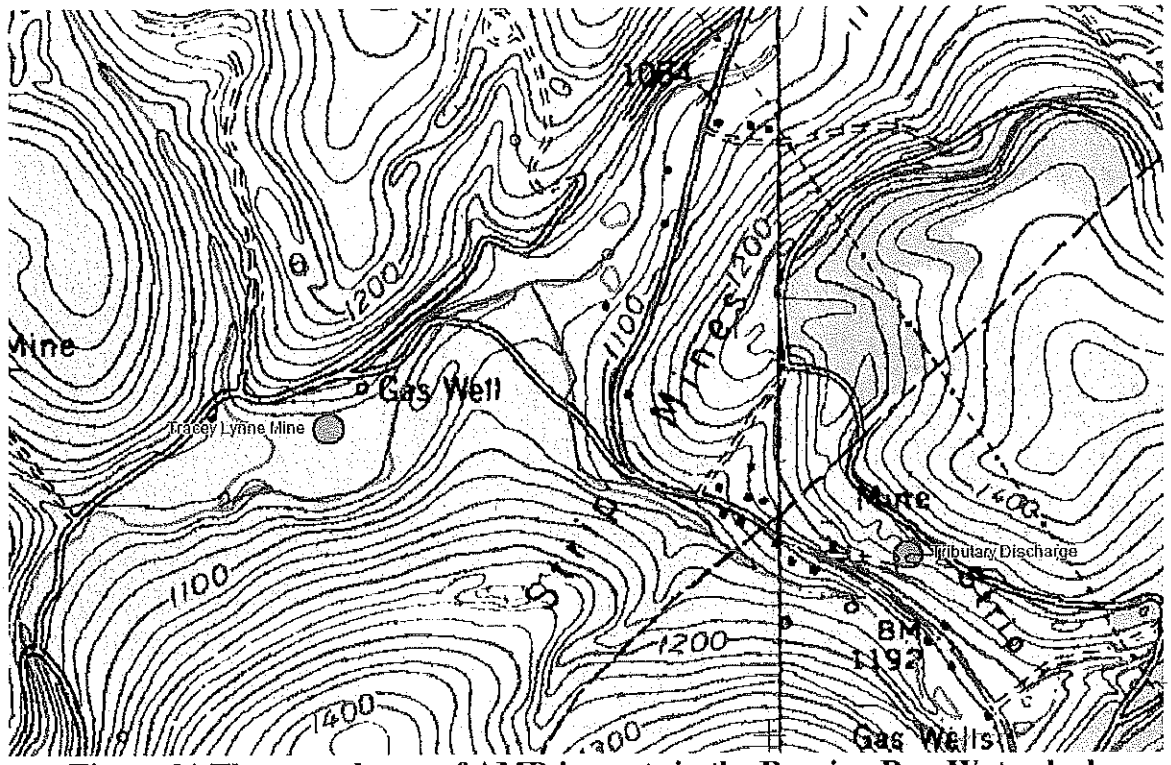

Figure 31 The second area of AMD impacts in the Roaring Run Watershed.

This entire section should also be investigated again, as much of the preliminary assessment was completed during the drought years of 2001 and 2002. Discharges that may be flowing now, may have been dry or of very low flow during the preliminary assessment.

The third area is on the headwaters tributary that flows adjacent to a Canterbury Coal Company operation. During the preliminary assessment, no AMD impacts were noted as the mouth of the tributary had adequate water quality (pH 7.5 cond. 1320) and fish present. The RRWA should keep an eye on this tributary, possibly monitoring it visually and with field equipment to make sure that the integrity of the stream water quality is in check.

Table 13. Macroinvertebrate communities found at the mouth of each named tributary.

	Long Run	Flat Run	Roaring Run	Sugar Hollow Run
Ephemeroptera (Mayfly)				
Siphlonuridae		2	2	
Plecoptera (Stonefly)				
Chloroperlidae			2	1
Leutridae			3	
Perlidae	3			
Tricoptera (Caddisfly)				
Hydropsychidae		2	24	18
Philopotamidae	72			
Unknown Caddisfly	3	1		
Coleoptera (Beetle)				
Elmidae	19	1	5	
Gyrinidae			1	
Psephenidae	2			1
Diptera (True Flies)				
Empididae				1
Tipulidae	1		1	14
Hexatoma	5			
Chironomidae	4	3	1	3
Oiligochatea (Aquatic Worm)				1
Gilled Snail	1			
Lunged Snail	2			
TOTAL INSECTS	**112**	**9**	**39**	**39**
INSECTS PER SQUARE FOOT	**56**	**4.5**	**19**	**19.5**
# of Taxa	**10**	**5**	**8**	**7**
SCORE	**21**	**10**	**18**	**13**
RATING	**V-good**	**Poor-Fair**	**Good**	**Fair**

Agricultural Impacts

Information regarding the BMPs needed on all forty farms in the Armstrong County section of this HUC are summarized in Table 14. A legend describing the abbreviated BMPs in Table 14 can be found in Table 15. The forty farms are located in Figure 32.

Table 14. BMPs needed on farms in the Armstrong County section of this HUC.

Location	CP	NMP	MSA	PMS	SC	MT	Wtr	Div	Ter	CC	SBF	Con	Sprg
	needed	needed	needed	# of plans	acres	acres	acres	ft	ft	acres	ft	#	#
Long Run													
T867				2									
T885				61									
T1082							97					1	
T1068					12		1						
T1073					1					2			1
T1073					33					80		1	
T1076				2									
T1077				11									
UT01													
T885					5		400			56			
UT02													
T880				2	41	5				5			
UT03													
T875							400			66		1	
T876				3									
T878				129			3						3
Roaring Run													
T690				17	24		2			48			
T694					34					48			
T702													
T856							2100			144			
T857				17	15	28	400						
T864				5	42	42	550						
T865					22								
T866					5								
T883													
T1052													
T1054				32									
T1057				19									
T1062													

Location	CP	NMP	MSA	PMS	SC	MT	Wtr	Div	Ter	CC	SBF	Con	Sprg
	needed	needed	needed	# of plans	acres	acres	acres	ft	ft	acres	ft	#	#
T1071				11									
T1072				9									1
T10014													
T10068					5					5			
T10206													
T10207													
T10280				6									
T10334				18									1
T10359				9									1
T10423				6									
UT04													
T696				3						37			
UT05													
T688					37			50		37		1	
T692					38					38			
UT06													
T677													
Totals	0	0	0	362	314	75	3953	50	0	566	0	4	7

Table 15. Legend describing the BMPs listed in Table 14.

Abbreviation	BMP
CP	Conservation Plan
MSA	Manure Storage Areas
PMS	Pasture Management System
SC	Strip Crop
MT	Minimum Tillage
Wtr	Waterways
Div	Diversions
Ter	Terraces
CC	Cover Crop
SBF	Stream Bank Fencing
Con	Contracts
Sprg	Spring Development

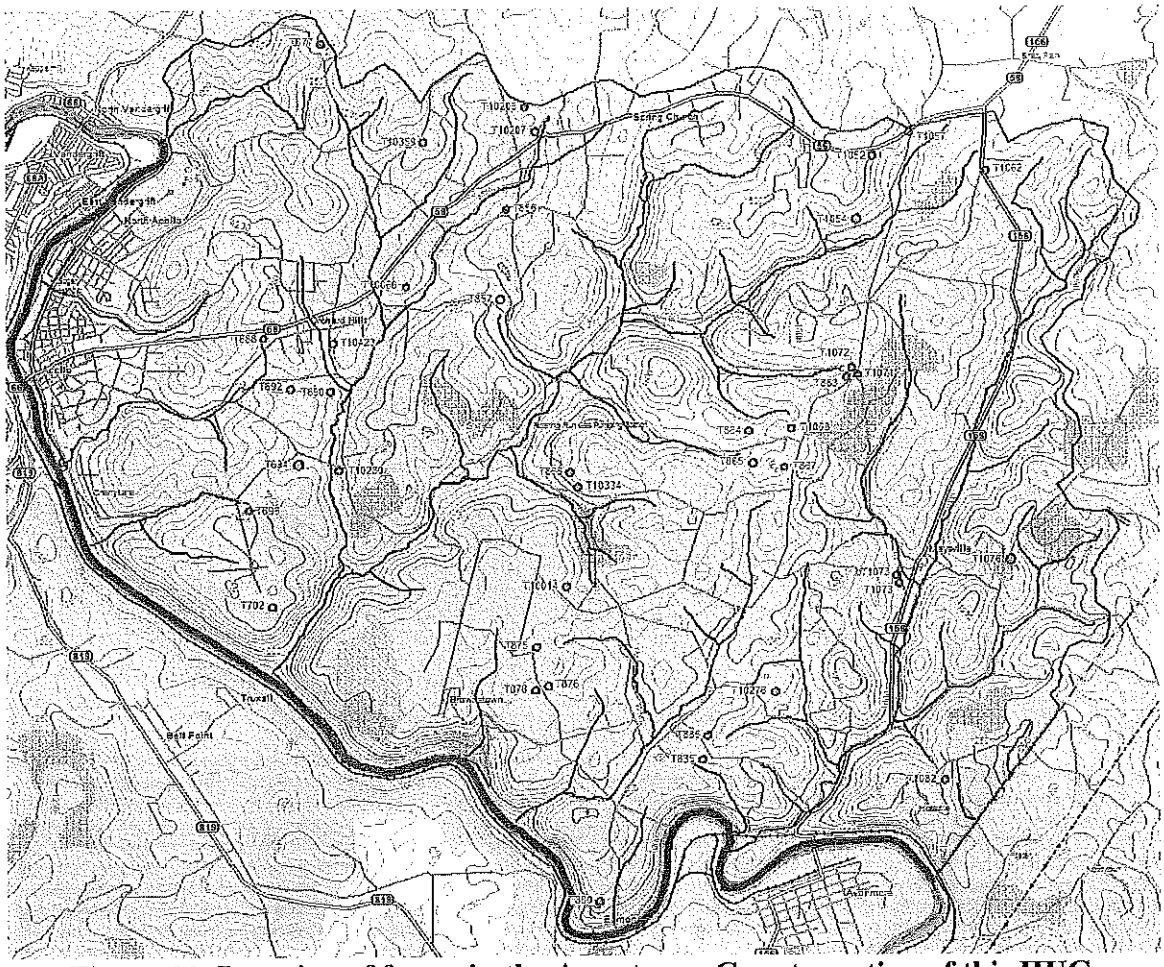

Figure 32. Location of farms in the Armstrong County section of this HUC.

Even though Table 14 lists the BMPs needed on each farm in this HUC, much of this information is older than 10 years and does no reflect the changes in conservation practices over time.

The first thing that needs to occur is an update of this data to reflect these changes. For example, no stream bank fencing is needed in the entire Armstrong County section of this HUC according to this database, but upon closer examination, numerous farms in this HUC are in need of stream bank fencing and riparian corridor enhancement, which is not reflected in the database. Some farms are not even listed in the database.

There are eight farms in particular in need of intensive stream bank fencing projects to reduce the erosion by limiting livestock access to those streams using cattle

crossings (Figure 33 and 34). Limiting the livestock access to particular points throughout the pasture will also reduce the nutrient loadings to those streams by reducing the amount of manure in the stream channel. These eight proposed stream bank fencing projects constitute approximately a total of 2.5 stream miles (13220 ft).

The RRWA and KWA, in partnership with the Armstrong Conservation District (ACD), should approach the owners of these stretches in order to gauge interest in a stream bank fencing/stabilized cattle crossing cost share grant proposal. If there is interest and the grant is funded, completed projects could then be used as demonstration projects for other farmers around the watershed.

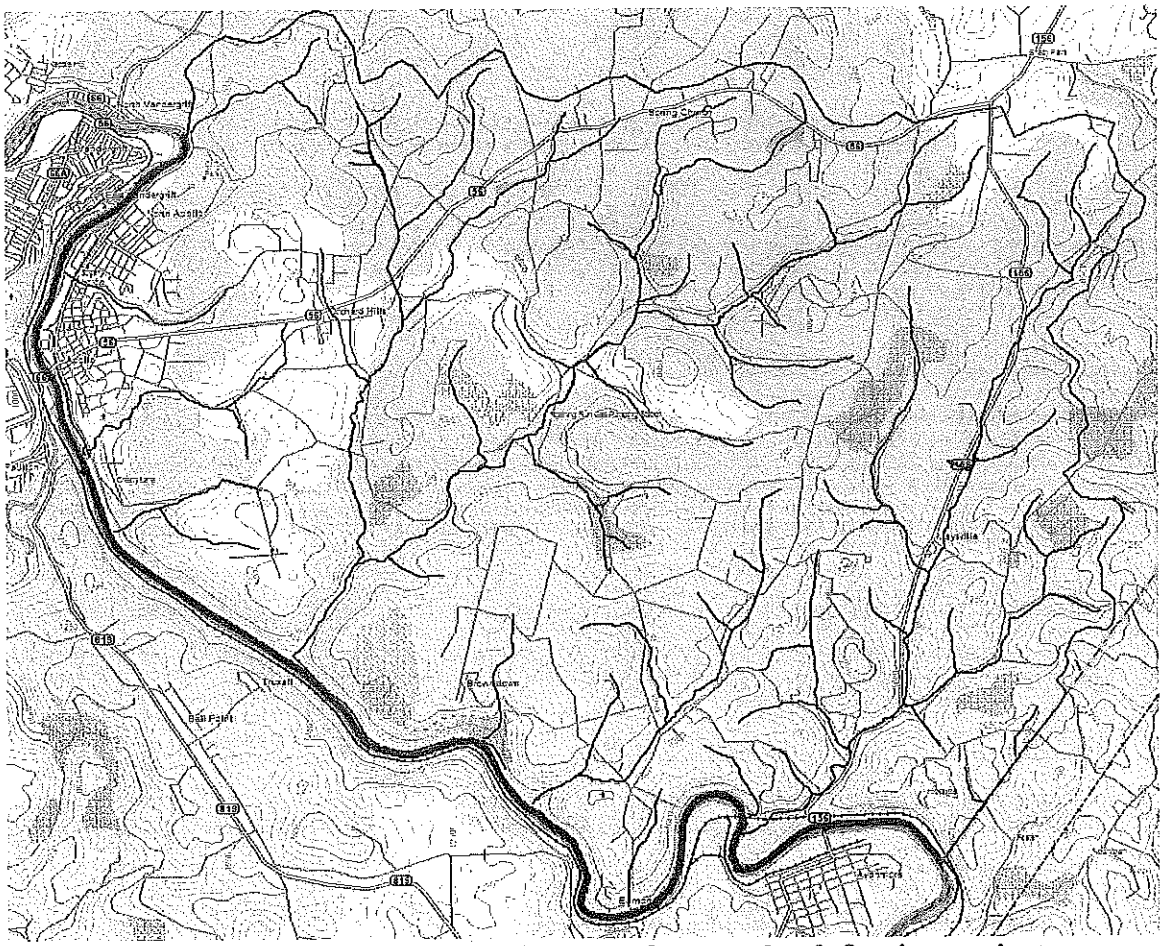

Figure 33. Stretches of stream in need of stream bank fencing projects.

Figure 34. Stretch of Long Run in need of stream bank fencing.

There are also other areas in the watershed were cropland infringes upon the stream channel, especially in the headwaters of Flat Run (Figure 35). The RRWA and KWA should encourage the ACD to work with farmers in this area to increase the riparian buffer along stream banks.

Figure 35. Cropland/hayfields infringing on Flat Run's riparian area.

Urban Impacts

This portion of the Kiskiminetas River Watershed becomes generally more urbanized as you move from east to west. While there are only slight urban pollution problems affecting Long Run and Flat Run, these problems increase in the Roaring Run Sub Watershed, particularly Rattling Run.

The more visible urban pollution problems are flood plain encroachment and maintained residential lawns into the riparian area. The consequences are reduced/eliminated stream bank vegetation which normally leads to increased erosion and sedimentation loading. Identified urban pollution areas are located in Figure 36.

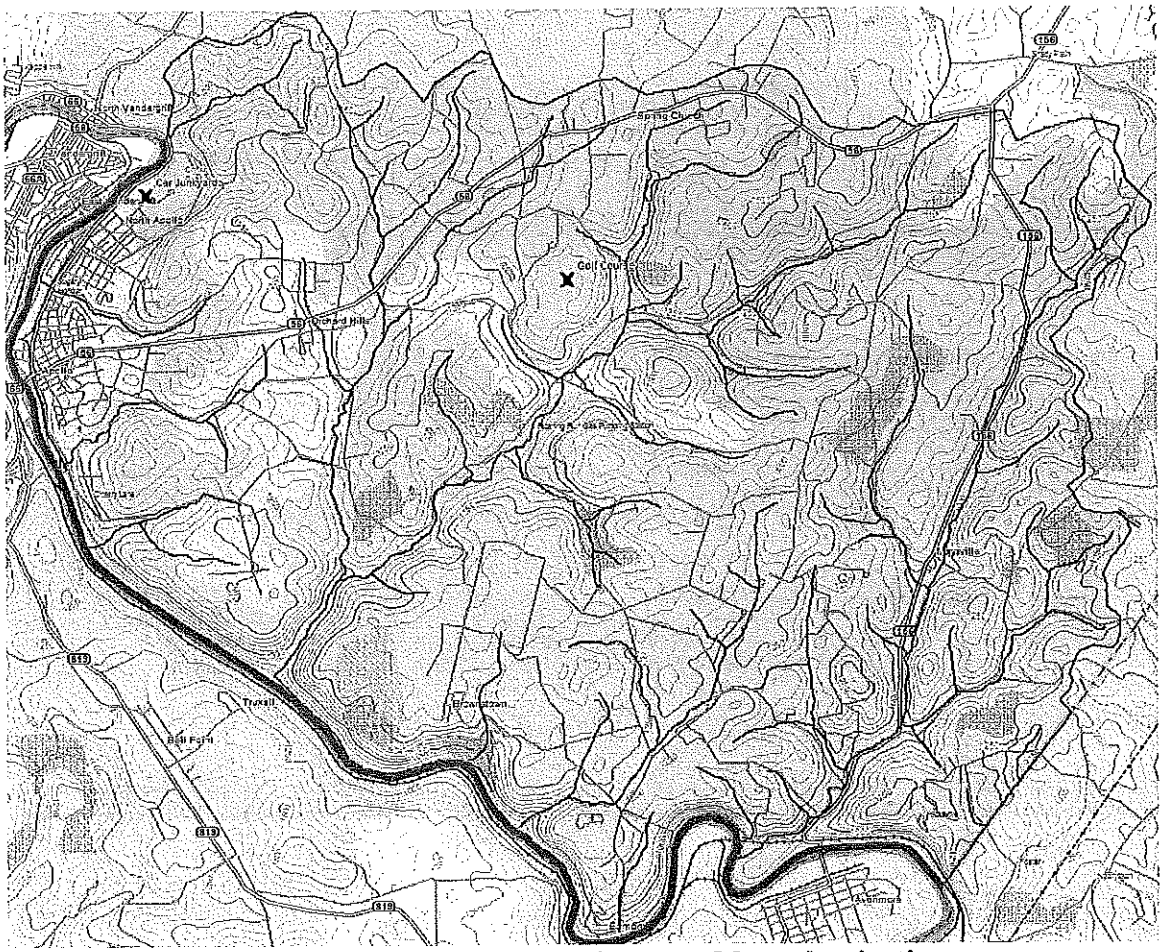

Figure 36. Stream segments impacted by urbanization.

A possible cure for this type of NPS pollution in this watershed, or any watershed, is that residents need to be educated on the positive aspects of riparian buffers and flood plains, which not only improve water quality, but also improve the health of their property and community. This may be successful through a brochure that can be mailed to watershed property owners explaining the importance of the riparian area and flood plain on not only water quality, but also the health of their property. Funds to complete projects of this type can be secured through the League of Women Voters Watershed Restoration and Education Network Grants.

With only small pockets of population in much of the watershed, many of the roadways in the Armstrong County section of this HUC are unimproved township roads that can input large amount of sediments into streams during runoff events (Figure 37). All unimproved roadways that have not had a Dirt and Gravel Road Project completed in the past needs documented and inspected, especially the roads that intersect with stream crossings. Once this is completed, the ACD needs to partner with South Bend, Kiskiminetas and Parks Townships and Apollo and North Apollo Borough to implement projects, most likely funded through either the Dirt and Gravel Roads program or the PA DEP Growing Greener Initiative, to reduce the sedimentation problems occurring on their roadways.

Because of the remoteness of the watershed and the lack of traffic along the many townships roads, illegal dumping proliferates as well. Many township roads have un-gated roads and trails that attract illegal dumpers due to their seclusion. Property owners of these roads and trails and the townships need to be encouraged to gate such roads to reduce/eliminate the ease of dumping at certain locations.

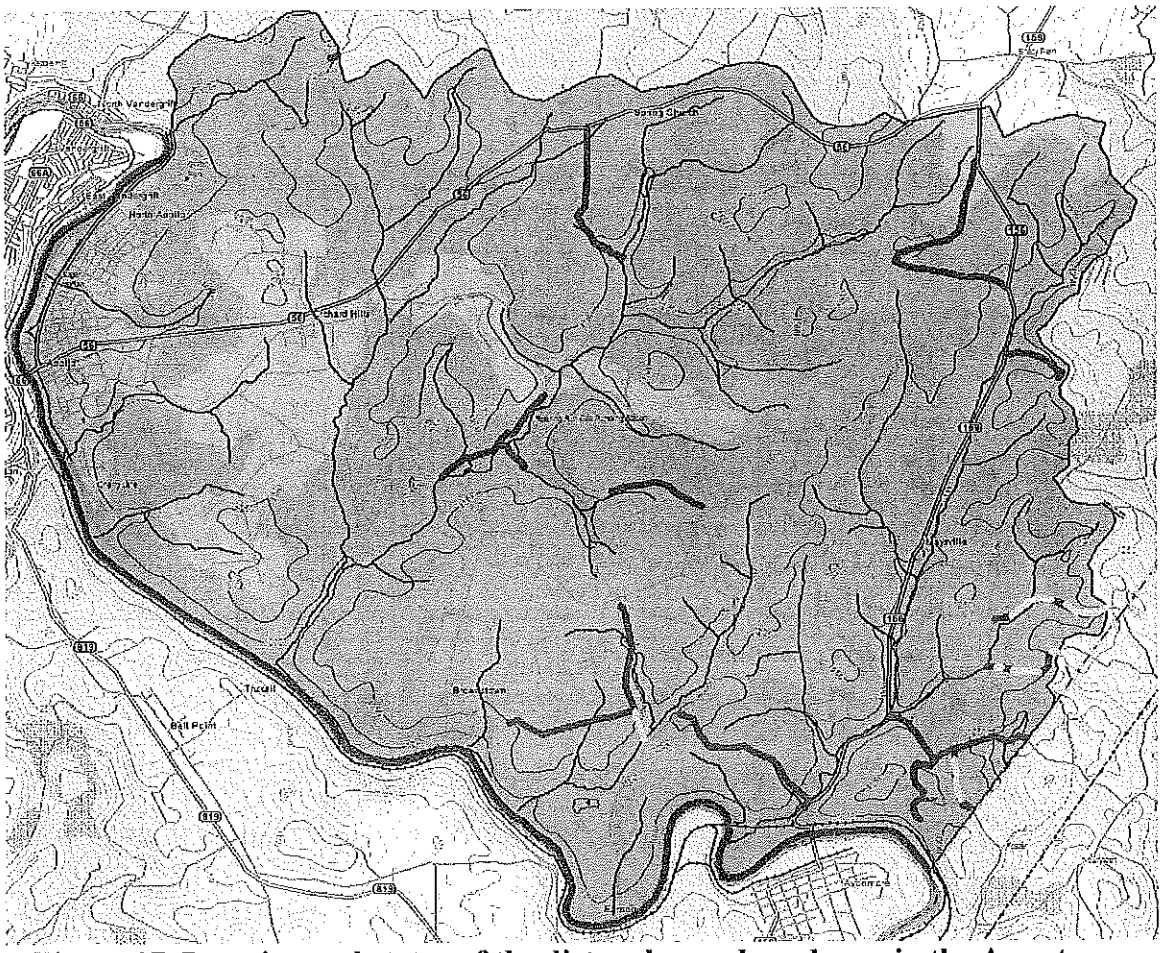

Figure 37. Location and status of the dirt and gravel roadways in the Armstrong County section of this HUC. Red = Not Inspected Green = Inspected

Currently, a PA CleanWays Chapter does not exist in Armstrong County (Figure 38). PA CleanWays can be used as a conduit of money and assistance for the removal and reclamation of illegal dumpsites and illegal dumpsite education. The Indiana County Chapter of PA CleanWays has been able to assist many watershed associations and municipalities with their dumpsite problems. They have even secured two Growing Greener Grants totaling $28,066 for the removal and reclamation of two large illegal dumps in Indiana County. One major recommendation of this reclamation plan will be to

organize an Armstrong County PA CleanWays Chapter to deal with the dumps that can plague a watershed such as the Kiskiminetas River.

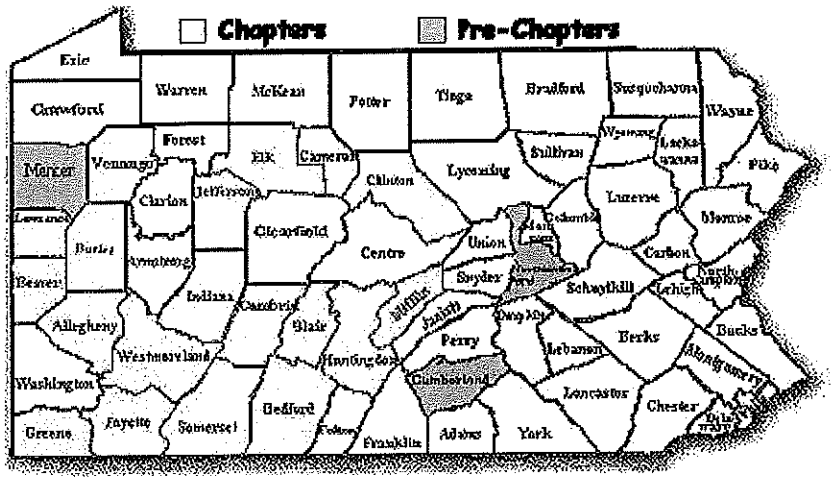

Figure 38. A map of PA CleanWays county chapters in Pennsylvania.

Scattered and remote population centers also have the potential of containing malfunctioning on-lot septic systems. Malfunctioning systems can input large amounts of sewage into the watershed increasing the amount of nutrients and possibly decreasing the oxygen concentration of the water. Malfunctioning on-lot septic systems were not investigated during this assessment, but should be, especially in areas that will not be tied to a municipal sewage service in the near future.

Overall Recommendations

1. Encourage the members of the Roaring Run Watershed Association (RRWA) and the Kiskiminetas Watershed Association (KWA) who also collect water samples for the Stream Team to alter their collection locations to the discharges that impact Roaring Run and the discharges along the Roaring Run Trail with little or no data.
2. Once enough water quality is collected, the RRWA should obtain money to design passive treatment systems for the discharges impacting Roaring Run, particularly KR35, KR36, KR37, KR38, and KR41 that originate in the Roaring Run Natural Area.
3. Obtain funding for the design and construction of a passive treatment system for the Burgundy Discharge. In conjunction with the construction, land reclamation should take place on the land surrounding the discharge.
4. As the Roaring Run Trail extends, treat the discharges that are capable of being treated passively and reclaim the land around these discharges. The target discharges include the Slick Hill Discharge and the Prudential Rock Discharge.
5. Encourage the KWA and/or the Indiana County Conservation District to obtain funding for an assessment of the discharges impacting the Sulphur Run Sub Watershed in Indiana County.
6. Because the preliminary assessment of the Roaring Run Sub watershed was completed during a drought year, a secondary assessment of the AMD discharges should be completed by either the RRWA or the Armstrong Conservation District (ACD).

7. If the Ninevah Borehole Alkaline Fly Ash Injection Pilot Project is successful, encourage the PA DEP to complete similar projects on the discharges that may not have enough available land for treatment. Target discharges include KR09, the Trux Discharge, the Discharge Upstream of Trux, the Discharge Downstream of Trux, and the Roaring Run Trail Discharge.
8. Obtain funding and complete stream bank fencing projects on the eight stream segments identified in the Agricultural Impacts section of this restoration plan. Use these projects as demonstration projects for other landowners where stream bank fencing is needed.
9. Update the agricultural BMPs needed on the farms in the Armstrong County section of the HUC. Once updated, survey the agricultural community's interest in installation of the conservation practices needed on each farm. This interest may be enhanced by a watershed wide cost-share grant proposal possibly partnering with the KWA and RRWA.
10. Work with producers, especially in the Flat Run Sub Watershed, to enhance riparian area vegetation on stream segments with cropland infringements.
11. Obtain funding for a possible mining and AMD education station at the Roaring Run Trail Discharge.
12. Encourage the continued treatment of the Canterbury Coal Company and Rosebud Coal Company mine discharges that enter Long Run and Roaring Run.
13. Encourage the KWA and Parks Township Sportsman's Club to stock trout in the lower sections of Long Run and Roaring Run, if successful, the Pennsylvania Fish

and Boat Commission may be approached for possible continued stocking measures.

14. Occasionally sample the Trux Discharge to determine if water exiting continues to improve.
15. As the Roaring Run Trail extends, seek removal assistance for the spoil piles surrounding the Flat Run mouth.
16. Investigate and encourage local landowners, especially large tract landowners, on the importance of ceasing lawn maintenance activities up to the stream bank so that riparian areas can be protected or reestablished. The ACD, the KWA, and RRWA may be able to educate through a brochure that can be mailed to watershed property owners explaining the importance of the riparian area on not only water quality, but also the health of their property. Funds to complete such a project can be secured from the League of Women Voters Watershed Restoration and Education Network Grants.
17. Locate malfunctioning on-lot sewage systems, particularly in areas that will not be tied to a municipal sewage service in the near future.
18. All unimproved roads that have not had a Dirt and Gravel Road project completed in the past need documented. Once this is complete, the Armstrong Conservation District needs to partner with South Bend, Kiskiminetas and Parks Townships and North Apollo and Apollo Boroughs to implement projects most likely funded through the Dirt and Gravel Road Program or the Growing Greener Initiative.
19. Establish the Armstrong County Chapter of PA CleanWays to deal with the illegal dumping in the watershed. After establishment, coordinate efforts with South

Bend, Kiskiminetas, and Parks Townships and North Apollo and Apollo Boroughs to locate and document illegal dumpsites.

Introduction

14 digit Hydrologic Unit Code (HUC) 05010008020300 encompasses an approximately 31.0 square mile portion of the Kiskiminetas River Watershed located in Armstrong County (Figure 39). Nine tributaries (Carnahan Run, Guffy Run, Brady Run, Elder Run and five unnamed) enter the Kiskiminetas River in this section (Figure 40 and Table 16). The Pennsylvania Department of Environmental Protection (PA DEP 2001) lists all these streams, as warm water fisheries (WWF).

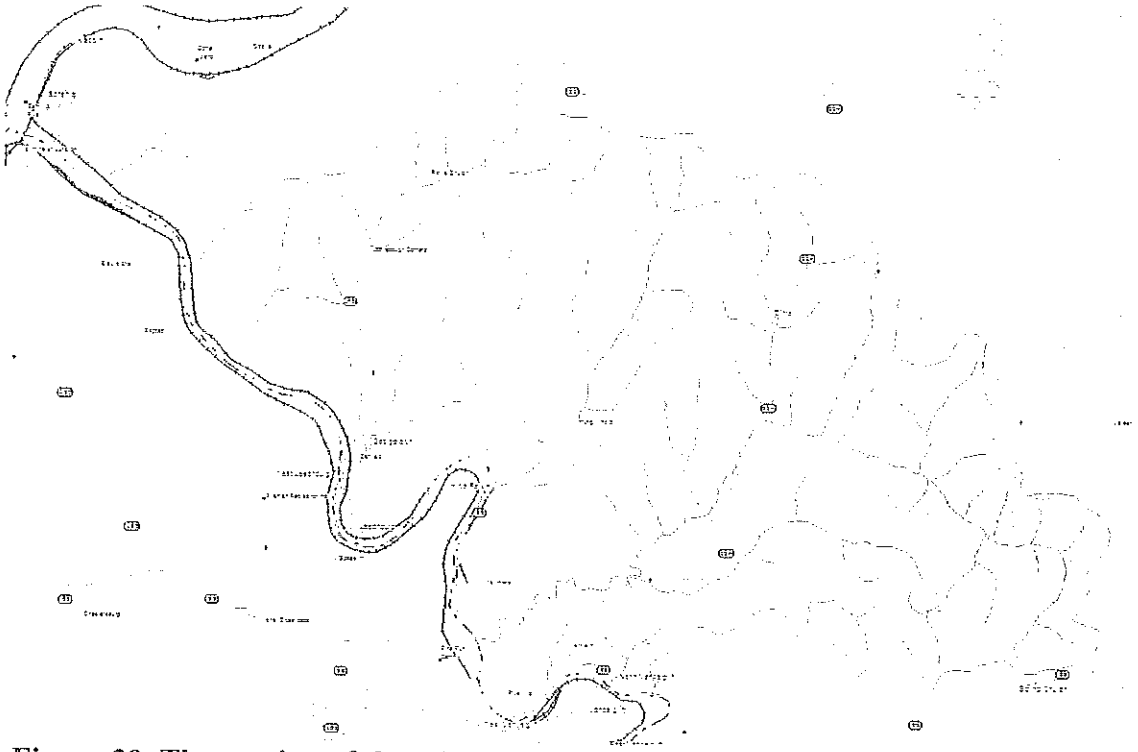

Figure 39. The portion of the 05010008020300 HUC located in Armstrong County.

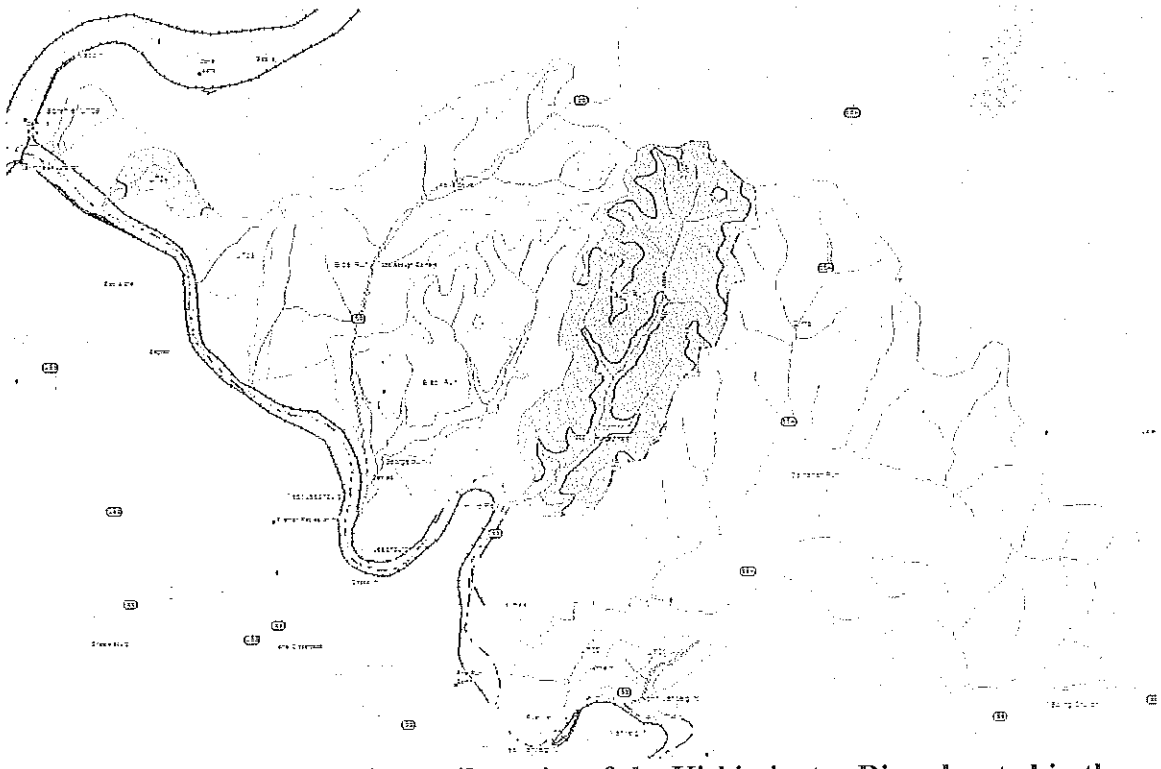

Figure 40. Major and minor tributaries of the Kiskiminetas River located in the Armstrong County section of HUC 05010008020300.

Table 16. Size and length of streams located in this HUC.

Stream	Area	Length
	Square Miles	Stream Miles
Kiskiminetas River	31.00	11.36
UT01	0.33	1.00
UT02	0.15	0.75
Carnahan Run	15.00	35.12
Guffy Run	3.94	9.90
Brady Run	3.72	8.73
Elder Run	4.31	10.40
UT03	0.40	0.82
UT04	0.33	0.96
UT05	0.19	0.58

The Kiskiminetas River has the distinction of being not only one of the most degraded rivers in Pennsylvania, but also one of the most improved in terms of water quality and fish abundance and diversity. The Kiskiminetas River Watershed has a long history of pollution from sewage, industrial effluents, and particularly abandoned mine drainage (AMD). In 1980, the Pennsylvania Department of Environmental Protection

(PA DEP) conducted an aquatic survey of the Kiskiminetas River and found only one frog and no fish. However, in 1990 the Pennsylvania Fish and Boat Commission (PF&BC) conducted a similar survey and found fish populating the river once again, but in low numbers. By the 2000 return of the PF&BC, 22 species of fish, including the threatened smallmouth buffalo (*Ictiobus bubalus*) and mooneye (*Hiodon tergisus*), were collected from the river and a substantial smallmouth bass (*Micropterus dolomieui*) fishery was discovered thriving (PF&BC 2002).

This improvement of the Kiskiminetas River is mainly the result of water quality improvements, particularly in the Conemaugh River, Stonycreek River, Blacklick Creek, and Loyalhanna Creek drainages. Continued work in these areas, as well as in the Kiskiminetas River Watershed proper, shall improve the water quality and, consequently, the fishery even more, with the ultimate goal of total restoration.

The Armstrong County portion of this HUC generally becomes less populated as you move from east to west. Located in the southern corner of this HUC are Vandergrift and Leechburg Boroughs. However, much of this watershed is forested and rural and has been extensively mined in the past suffering the consequences of that mining. Abandoned Mine Drainage is one of the top priorities for the Kiskiminetas Watershed Association (KWA), with offices in Leechburg. The KWA, being one of the younger watershed associations in Pennsylvania, just received a 2003 Pennsylvania Department of Environmental Protection (PA DEP) Growing Greener Grant funding their first AMD treatment project. The activities of the KWA will be described in more detail later.

Nutrient and sedimentation loading from agricultural practices, sedimentation from dirt and gravel roadways, illegal dumping, and urban runoff also impact this portion of

the Kiskiminetas Watershed. However, compared to the other two HUCs in this restoration plan, HUC 05010008020300 may have more impacts from urbanization that mining or agriculture.

Methods

Stream segments with the potential for non-point source (NPS) pollution problems were investigated. All points of NPS pollution were located utilizing a Garmin GPS 12MAP Unit. Field pH (Oakton Waterproof pHTestr 1), specific conductivity (Oakton Waterproof TDSTestr Low) and temperature (Taylor Model 9841) were taken at strategic locations to determine if the site caused impairment and if that site should be documented and sampled for lab analysis of water quality.

All NPS pollution sites documented were then organized into a GIS database that allows data to be organized spatially. Employees of CWM Environmental, with offices in Kittanning, Armstrong County, and Thomas J. Clark, the Indiana and Armstrong County Watershed Specialist with offices in Indiana, Indiana County, determined prioritization and restoration recommendations.

Mining Impacts

Carnahan Run

There are three main AMD discharges that impact Carnahan Run, the Clark Hollow Discharge, the Booker Discharge, and the Galaxy Drive-In Discharge. Two of these discharges (Clark Hollow and Booker) were selected for monthly sampling, while the Galaxy Drive-In Discharge was not selected due to limited land availability for treatment (Figure 41 and Table 17).

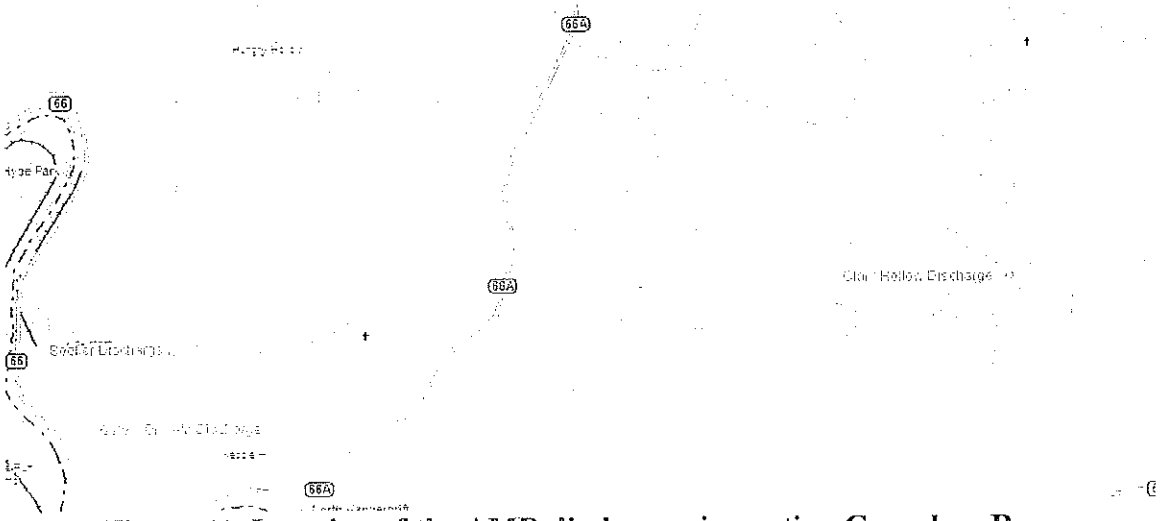

Figure 41. Location of the AMD discharges impacting Carnahan Run.

Table 17. Water quality of the discharges impacting Carnahan Run.

Location	Date	Flow	pH	Cond.	Acid.	Alk.	Fe	Mn	Al	SO_4	TSS
		GPM	Lab	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
CHD	Feb-02	4.70	2.56	2190	1000.00	0.00	343.95	3.41	39.95	1303.00	2.00
	Mar-02	34.60	2.95	758	128.00	0.00	14.26	0.70	4.46	192.00	2.00
	Apr-02	40.00	3.69	1794	747.00	0.00	223.40	2.09	24.44	560.00	33.00
	May-02	22.00	2.77	1094	290.00	0.00	56.20	1.10	9.34	497.00	1.00
	Jun-02	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd
	Jul-02	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd
	Aug-02	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd
	Sep-02	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd
	Oct-02	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd
	Nov-02	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd
	Dec-02	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd
	Jan-03	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd
	Average	**8.44**	**2.99**	**1459.00**	**541.25**	**0.00**	**159.45**	**1.82**	**19.55**	**638.00**	**9.50**
BD	Jan-02	54.00	6.30	1250	1.00	107.00	44.20	0.76	0.10	440.00	48.00
	Feb-02	74.00	6.63	1357	1.00	93.00	32.60	0.72	0.10	512.00	22.00
	Mar-02	58.00	6.70	1275	1.00	81.00	24.60	0.61	0.10	486.00	10.00
	Apr-02	97.00	6.40	1362	1.00	97.00	39.01	0.65	0.57	634.00	24.00
	May-02	36.00	6.60	1241	1.00	93.20	31.70	0.55	0.10	516.00	4.00
	Jun-02	38.00	6.62	1322	6.40	111.00	43.83	0.63	0.10	376.00	5.00
	Jul-02	78.00	6.38	1326	3.00	105.00	38.40	0.72	0.10	423.00	11.00
	Aug-02	nd	6.66	1281	3.00	86.40	31.26	0.75	0.10	423.00	43.00
	Sep-02	86.00	6.62	1256	3.00	88.40	27.70	0.58	0.10	478.00	10.00
	Oct-02	53.00	6.69	1263	3.00	82.40	25.90	0.60	0.10	417.00	12.00
	Dec-02	174.00	6.85	1115	3.00	85.60	29.80	0.83	0.10	431.00	14.00
	Average	**74.80**	**6.59**	**1277.09**	**2.40**	**93.64**	**33.55**	**0.67**	**0.14**	**466.91**	**18.45**

Location	Date	Flow	pH	Cond.	Acid.	Alk.	Fe	Mn	Al	SO_4	TSS
		GPM	Lab	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
GDID	na	175 (est.)	3.14	1150	144.00	0.00	12.10	1.30	16.80	435.00	4.00

The Armstrong Conservation District (ACD) was recently awarded a 2003 PA DEP Growing Greener Grant to design a treatment system for the Booker Discharge. A design should be completed by late 2004. The KWA then submitted a proposal to the United States Department of Interior Office of Surface Mining under their Appalachian Clean Streams Initiative (ACSI) for the construction funds needed. At the time of the completion of this restoration plan, the ACSI proposal was still being process and no word had been received. Once completed, this treatment system will eliminate over five tons/year of Fe from entering Carnahan Run.

The Clark Hollow Discharge broke out of an old mine complex in 2001 causing a fish kill in the headwaters (Figure 42). Consequently it was selected as a discharge that would be monitored monthly through this assessment. A study of this discharge concluded that flow was only present during high ground water periods, particularly late winter to late spring. Flow was only documented from February to May in 2002. However, during this time it was discovered that this discharge has a large impact to the water quality and, consequently, the biota of Carnahan Run (Table 18).

Table 18. The impact of the Clark Hollow Discharge on the water quality of Carnahan Run.

Location	Date	pH	Acid.	Alk.	Fe	Mn	Al	SO_4	TSS
		Lab	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
US of Clark Hollow Discharge	4/19/01	6.5	0.00	19.20	<0.30	<0.05	<0.50	25.90	12.00
DS of Clark Hollow Discharge	4/19/01	3.4	110.00	0.00	37.90	0.65	5.97	132.30	30.00

Figure 42. The Clark Hollow Discharge after discharge pipe installation.

In the summer of 2003, the PA DEP Bureau of Abandoned Mine Reclamation completed a project to better equalize flow exiting the mine. A large pipe was inserted in the hopes that the flow of the discharge would be stabilized throughout the year, thus reducing the impact on Carnahan Run during its typical high flow periods. This project seems to have been a minor success as water quality exiting the mine is of slightly better quality. However, during an investigation in December 2003 pH declined and conductivity increased from 6.4 and 80 uS/cm upstream of the discharge to 5.7 and 110 uS/cm downstream of the discharge.

The problem with this discharge is that there is very little available land for treatment as it originates very close to the stream in the vicinity of a gas line. Treatment may be completed if piping the discharge downstream is feasible.

In conversations with PA DEP personnel, a mining operation was just completed near by as this discharge occurred. The ACD and KWA should set a meeting up with the

same PA DEP personnel to discuss if there is the possibility of this mine as the cause of the Clark Hollow Discharge. If it is, the mining company may be responsible for the elimination/treatment of the discharge.

The Galaxy Drive-In Discharge is in the same predicament as the Clark Hollow Discharge. It originated on a steep cliff very near the Carnahan Run channel, leaving very little room for passive treatment possibilities. The only area were passive treatment could occur successfully is on land currently being used for the Galaxy Drive-In Movie Theater. The ACD and KWA should study this discharge in more detail as it does seem to have an impact on Carnahan Run near its confluence with the Kiskiminetas River (Table 19).

Table 19. Water quality at the mouth of Carnahan Run. www.kcstreamteam.org

Location	Date	pH	Acid.	Alk.	Fe	Mn	Al	SO4	TSS
		Lab	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Carnahan Run Mouth	8/1/01	6.2	32.00	6.80	0.38	0.45	0.30	363.00	2.00
	2/12/01	7.1	0.00	28.00	0.47	0.04	0.21	50.00	2.00
	2/17/02	6.8	0.00	26.00	0.60	0.05	0.34	47.60	2.00
	5/22/02	6.9	0.00	26.00	0.71	0.04	0.33	33.60	8.00
	7/21/02	5.4	38.00	2.60	1.02	0.58	0.84	518.00	8.00
	10/27/02	7.6	0.00	48.00	0.57	0.05	0.20	74.10	2.00
	2/23/03	7.1	0.00	46.80	1.97	0.12	0.50	72.80	12.00
	5/5/03	7.1	0.00	49.00	1.56	0.08	0.89	45.90	20.00
	8/10/03	7.5	0.00	50.40	0.55	0.05	0.20	53.10	2.00
	Average	**6.86**	**7.78**	**31.51**	**0.87**	**0.16**	**0.42**	**139.79**	**6.44**

Another problem currently being investigated by the ACD and members of the KWA is the apparent lose of stream flow underground, possibly into mine voids, in one section of Carnahan Run (Figure 43). The flows were investigated once with no clear evidence either way. Low flow conditions will most likely be the best time for analysis, consequently the study will likely begin again in the summer of 2004.

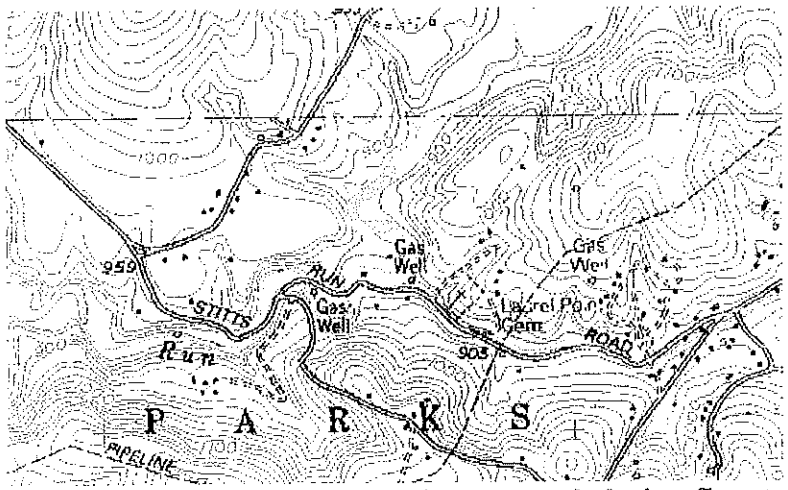

Figure 43. Location where Carnahan Run is apparently losing flow to mine voids.

Guffy Run

The Hungry Hollow Discharge is the only major AMD discharge impacting Guffy Run (Figure 44, 45 and 46). It is a large flow discharge, with only a moderately elevated Fe concentration (Table 20). It inputs on average approximately 3.1 tons/year of acidity and 1.6 tons/year of Fe. This discharge does not impact Guffy Run greatly as water quality at the mouth is as expected (Table 21).

Figure 44. Picture of the Hungry Hollow Discharge break out.

Figure 45. The Hungry Hollow Discharge before entering Guffy Run.

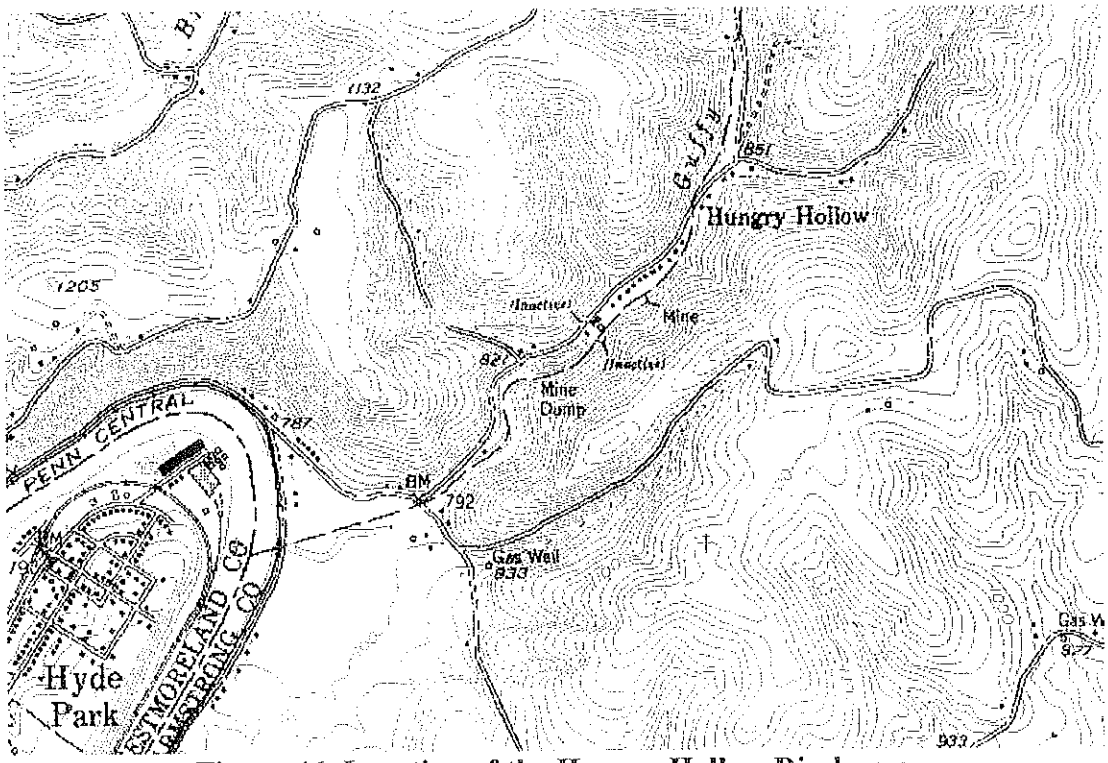

Figure 46. Location of the Hungry Hollow Discharge.

Table 20. Water quality of the Hungry Hollow Discharge.

Location	Date	Flow	pH	Cond.	Acid.	Alk.	Fe	Mn	Al	SO_4	TSS
		GPM	Lab	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
HHD	Sep-01	174.00	6.52	884	1.00	75.60	0.92	1.06	0.10	487.00	4.00
	Oct-01	172.00	6.10	1332	1.00	30.40	6.80	0.52	0.46	728.00	14.00
	Nov-01	153.00	6.80	1378	1.00	29.20	8.88	0.69	0.48	595.00	12.00
	Dec-01	120.60	5.98	1325	31.20	29.40	6.84	0.66	0.39	491.80	13.00
	Jan-02	168.90	6.11	1114	14.00	20.80	4.47	0.42	0.23	469.20	8.00
	Feb-02	203.00	6.60	1135	1.00	34.00	3.07	0.47	0.17	496.00	10.00
	Mar-02	268.40	6.05	1109	15.00	30.00	4.34	0.37	0.10	468.00	7.00
	Apr-02	188.00	6.52	1120	1.00	29.60	4.78	0.48	1.07	925.00	7.00
	May-02	242.00	5.91	1109	1.00	30.80	3.05	0.39	0.16	674.00	2.00
	Jun-02	157.00	5.93	1180	31.00	31.00	2.60	0.33	0.15	357.00	5.00
	Jul-02	162.00	6.01	1225	3.00	34.00	2.84	0.41	0.17	412.00	5.00
	Aug-02	105.58	6.47	1264	3.00	47.60	1.77	0.44	0.10	439.00	4.00
	Average	**176.21**	**6.25**	**1181.25**	**8.60**	**35.20**	**4.20**	**0.52**	**0.30**	**545.17**	**7.58**

Table 21. Water quality collected at the mouth of Guffy Run.

Location	Date	pH	Acid.	Alk.	Fe	Mn	Al	SO4	TSS
		Lab	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Guffy Run	5/11/1999	6.9	0.00	48.00	0.19	0.09	0.20	171.00	44.00
	1/23/2000	7.2	0.00	44.10	0.53	0.12	0.24	186.00	28.00
	4/23/2000	7.2	0.00	40.00	0.14	0.05	0.20	64.00	10.00
	7/24/2000	6.8	0.00	52.00	0.06	0.04	0.20	386.00	2.00
	10/16/2000	7.2	0.00	56.00	0.12	0.03	0.20	248.00	14.00
	2/7/2001	7.0	0.00	36.00	0.24	0.06	0.20	90.00	36.00
	8/1/2001	6.9	0.00	44.00	0.09	0.03	0.20	447.00	2.00
	2/17/2002	6.9	0.00	38.00	0.17	0.08	0.20	103.00	2.00
	5/22/2002	6.9	0.00	32.00	0.32	0.05	0.20	46.00	4.00
	7/21/2002	7.2	0.00	42.00	0.21	0.03	0.20	624.00	8.00
	10/27/2002	7.8	0.00	54.00	0.17	0.05	0.20	208.60	2.00
	2/23/03	7.6	0.00	54.60	0.32	0.06	0.50	120.80	3.00
	5/5/03	7.5	0.00	45.80	1.56	0.09	1.03	46.00	2.00
	8/10/03	7.7	0.00	58.80	0.11	0.05	0.20	108.60	2.00
	Average	**7.20**	**0.00**	**46.09**	**0.30**	**0.06**	**0.28**	**203.50**	**11.36**

As mentioned in the previous restoration plan, the KWA and Parks Township Sportsmen's Club sell support pins every year to purchase trout for stocking in the Kiskiminetas River. The success of the stockings has led some members of both organizations to look for possible sites for a trout nursery raceway. The Hungry Hollow

Discharge may fit that need perfectly. It has more than enough flow, maintains a fairly steady and circumneutral pH, contains only a small amount of Fe, and obviously holds a steady 50° F temperature throughout the year. Utilizing the discharge water for a trout nursery will also allow it to be treated by constructing a small wetland after the raceway to precipitate metals and trout manure (Figure 47). Because of the community interest and the potential success of such an endeavor, this project is a top priority for HUC 05010008020300.

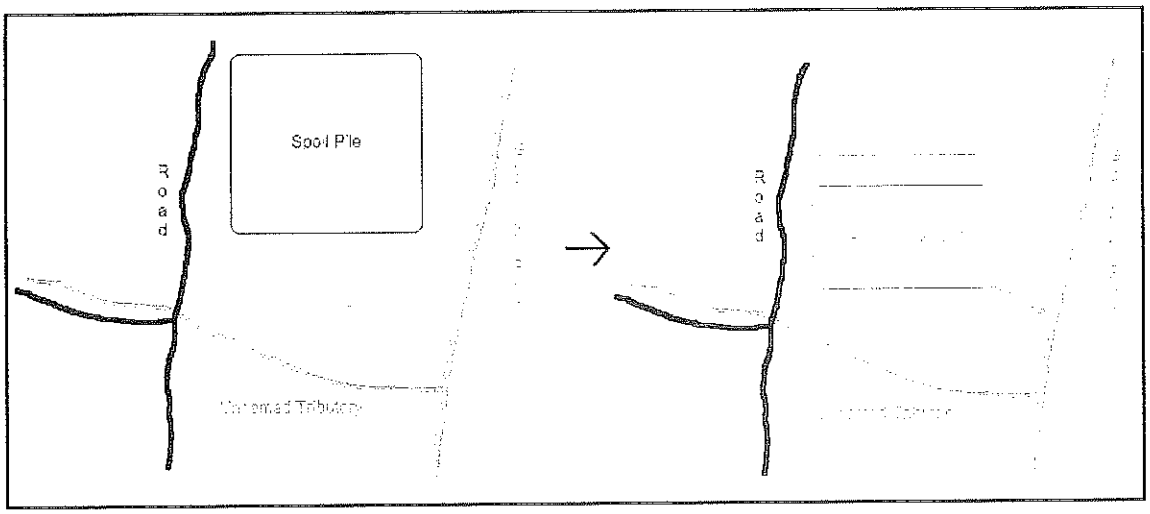

Figure 47. Proposed trout raceway/wetland project for the Hungry Hollow Discharge.

There has also been anecdotal evidence of flow being lost to mine voids in the Guffy Run Watershed. This was not investigated during this assessment due to a lack of time and funding, however, this should be studied in the future by the ACD and KWA.

Brady Run, Elder Run, and the Kiskiminetas River

No mining related problems were identified in the Brady Run Sub Watershed. Alkalinity at the mouth was the highest among all tributaries flowing into the Kiskiminetas River from Armstrong County (Table 22).

The last unnamed tributary to Elder Run contains an elevated concentration of Fe, but this only minimally impacts the water quality and biota at the mouth of Elder Run (Table 22 and Figure 47).

Table 22. Water quality at strategic points in the Brady Run and Elder Run Sub Watersheds.

Location	Flow	pH	Acid.	Alk.	Fe	Mn	Al	SO4	TSS
	GPM	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Brady Run Mouth	314.00	7.74	0.00	93.00	0.09	0.01	0.14	153.00	2.00
Elder Run	513.79	6.80	0.00	14.40	0.08	0.03	0.10	372.00	2.00
Unnamed Trib to Elder Run	20.00	6.29	0.00	112.00	6.50	1.83	0.10	243.00	14.00

Seven discharges and the AMD impacted UT03 enter the Kiskiminetas River before its confluence with the Kiskiminetas River (Table 23 and Figure 48). All of these impacts are relatively minor and it seems the Kiskiminetas River has enough dilution potential and is not greatly degraded. In addition, AMD related problems upstream should be renovated first before addressing these discharges low in the watershed.

Table 23. Water quality of the AMD impacted waters near the mouth of the Kiskiminetas River.

Location	Date	Flow	pH	Cond.	Acid.	Alk.	Fe	Mn	Al	SO_4	TSS
		GPM	Lab	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
KR20	na	180 (est.)	3.70	800.00	34.80	0.00	0.28	1.36	3.91	322.00	2.00
KR21	na	80 (est.)	4.62	950.00	26.00	1.00	0.12	1.53	3.86	438.00	3.00
GD	Feb-02	30.00	6.38	1035.00	40.00	10.40	21.83	1.81	0.10	357.40	7.00
	Mar-02	42.00	6.37	903.00	36.00	9.00	27.60	1.48	0.90	398.00	144.00
	Apr-02	63.00	6.46	1000.00	40.00	9.60	21.38	1.73	0.85	669.00	18.00
	May-02	32.00	6.74	968.00	48.00	32.00	20.70	1.40	0.21	416.00	16.00
	Jun-02	16.00	3.22	991.00	132.00	0.00	3.18	1.85	15.60	419.00	9.00
	Jul-02	27.00	6.28	1096.00	61.60	8.40	22.70	2.10	0.33	357.00	13.00
	Aug-02	5.00	2.77	2750.00	221.20	0.00	7.52	5.50	8.68	1133.00	<3.00
	Oct-02	5.00	2.91	2650.00	167.60	0.00	10.90	4.60	6.00	898.00	<3.00
	Dec-02	50.00	6.07	934.00	44.40	0.00	25.20	2.19	0.28	436.00	6.00
	Average	**30.00**	**5.24**	**1369.67**	**87.87**	**7.71**	**17.89**	**2.52**	**3.66**	**564.82**	**30.43**
UT03	na	100 (est.)	6.14	960.00	19.20	7.20	12.10	1.91	0.10	498.00	4.00
KR26	na	20 (est.)	2.53	2500.00	292.00	0.00	36.40	4.39	7.98	1110.00	5.00
KR28	na	5 (est.)	2.42	4000.00	968.00	0.00	119.00	14.20	89.70	2455.00	2.00
KR80	na	30 (est.)	5.36	573.00	16.40	3.20	1.87	0.30	1.64	110.80	15.00
KR81	na	20 (est.)	3.06	1264.00	237.60	0.00	32.70	2.19	15.10	536.00	23.00

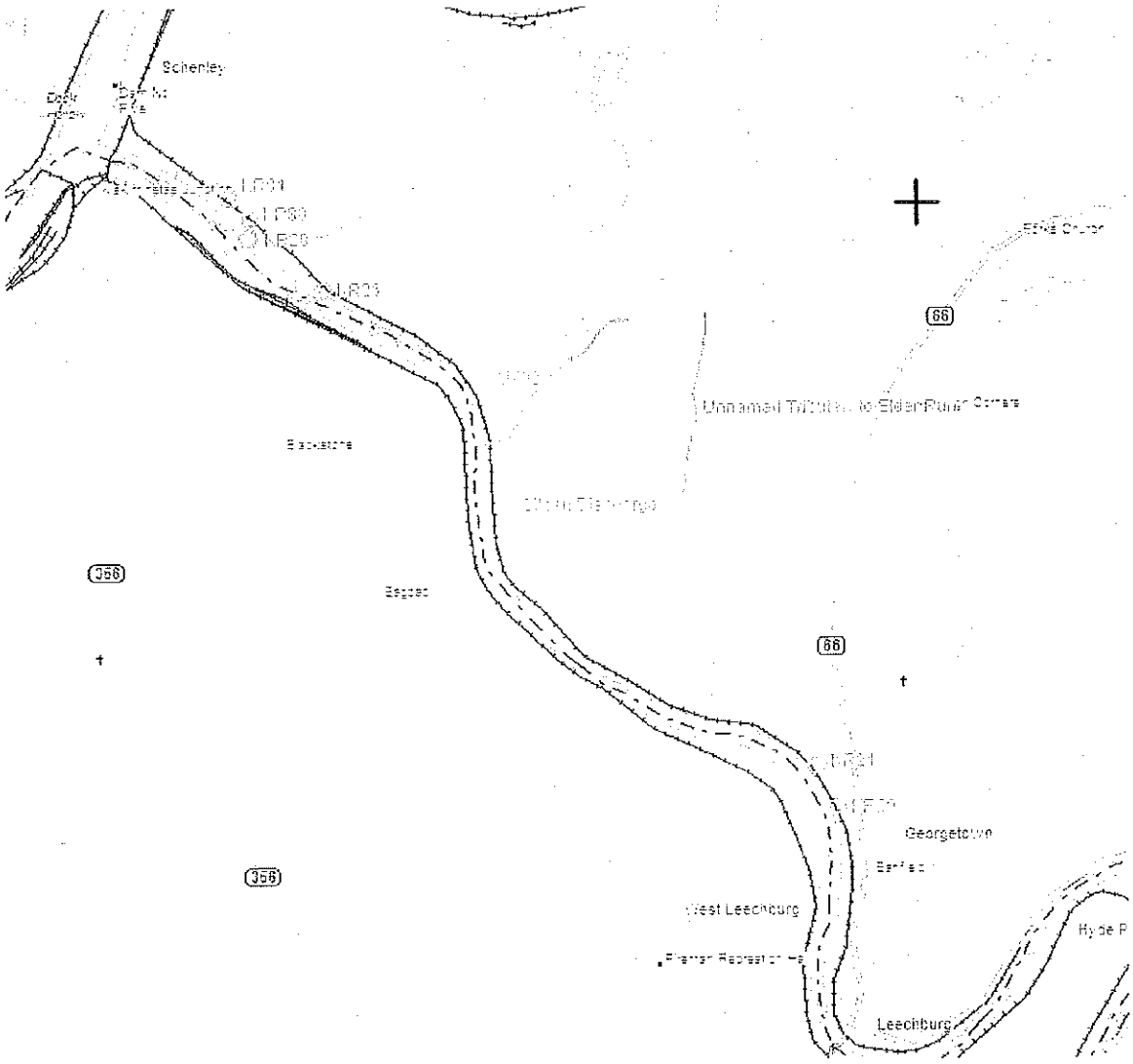

Figure 48. Location of the AMD impacted waters near the mouth of the Kiskiminetas River.

In addition to the AMD discharges impacting this area, there are many areas very similar to areas along the Roaring Run Trail described in the restoration plan for HUC 05010008020240. These mine refuse piles and "dead" areas are mainly found downstream of the Gilpen Discharge to the confluence with the Allegheny River. As these discharges are addressed in the future, these impacted land features need addressed as well, much like was completed at the Trux Discharge.

The water quality, although vastly improved, is characteristic of a large river system impacted throughout its length by acidity and metal laden discharges (Table 24). Even though the Kiskiminetas River holds a circumneutral pH, alkalinity concentrations are not indicative of a river of similar proportions. As these upstream discharges are treated, this alkalinity concentration should increase slightly, but steadily. The Stream Team sample point downstream of the town of Bagdad should be maintained as an indicator of the improving health of the river.

Table 24. Water quality near the mouth of the Kiskiminetas River.

Location	Date	pH	Acid.	Alk.	Fe	Mn	Al	SO4	TSS
		Lab	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Kiski below Bagdad	5/11/1999	6.3	10.80	8.00	0.67	0.84	0.33	152.00	10.00
	1/23/2000	6.6	0.00	17.60	0.90	1.00	0.20	177.00	2.00
	4/23/2000	6.7	0.00	16.60	1.77	0.50	0.34	74.00	16.00
	7/24/2000	6.3	0.00	17.80	0.25	0.28	0.20	210.00	2.00
	10/16/2000	7.0	0.00	22.00	0.28	0.57	0.20	212.00	28.00
	2/7/2001	6.7	0.00	18.40	1.04	0.44	0.32	67.00	40.00
	8/1/2001	6.6	0.00	15.00	0.24	0.11	0.44	259.00	2.00
	2/17/2002	6.6	0.00	18.60	1.06	0.51	0.23	94.00	8.00
	5/22/2002	6.6	0.00	17.20	0.78	0.32	0.28	72.50	2.00
	7/21/2002	6.8	0.00	16.00	0.21	0.21	0.20	514.00	8.00
	10/27/2002	7.0	0.00	26.00	0.32	0.90	0.20	222.70	2.00
	2/23/03	6.6	0.00	18.60	0.30	0.87	0.50	1,881.90	3.00
	5/5/03	7.2	0.00	33.00	1.18	0.45	0.53	117.70	10.00
	8/10/03	7.2	0.00	27.80	0.73	0.47	0.21	120.60	6.00
Average		**6.73**	**0.77**	**19.47**	**0.70**	**0.53**	**0.30**	**298.17**	**9.93**

Table 25. Macroinvertebrates collected at the mouths of the named tributaries.

	Carnahan Run	Guffy Run	Brady Run	Elders Run
Ephemeroptera (Mayfly)				
Heptageniidae	1		3	2
Oligoneuriidae			1	
Siphlonuridae	6			
Plecoptera (Stonefly)				
Chloroperlidae	20	3	4	
Leutridae	20			
Peltoperlidae	3			
Tricoptera (Caddisfly)				
Hydropsychidae	52	15	31	2
Philopotamidae			5	7
Polycentropodidae	1			
Coleoptera (Beetle)				
Amphizoidae				2
Carabidae			1	
Elmidae	1		1	
Gyrinidae		3		
Psephenidae			15	2
Diptera (True Flies)				
Empididae	1			
Tipulidae	19		4	1
Chironomidae	10		10	1
Megaloptera (Fishfly and Dobsonfly)				
Sialidae			1	
Corydalidae			4	2
Hemiptera (True Bugs)				
Veliidae	1			
Decapoda (Crayfish)				
Cambaridae	1		1	
Isopoda (Aquatic Pill Bug)		1		
Amphipods (Scuds)		1		1
Oiligochatea (Aquatic Worm)	5			6
TOTAL INSECTS	**141**	**23**	**81**	**26**
INSECTS PER SQUARE FOOT	**70.5**	**11.5**	**40.5**	**13**
# of Taxa	**14**	**5**	**13**	**10**
SCORE	**30**	**10**	**28**	**20**
RATING	**Excellent**	**Poor-Fair**	**V-good-Excellent**	**Good**

Agricultural Impacts

Information regarding the BMPs needed on all 32 farms in the Armstrong County section of this HUC are summarized in Table 26. A legend describing the abbreviated BMPs in Table 26 can be found in Table 27. The 32 farms are located in Figure 49.

Table 26. BMPs needed on farms in the Armstrong County section of this HUC.

Location	CP	NMP	MSA	PMS	SC	MT	Wtr	Div	Ter	CC	SBF	Con	Sprg
	needed	needed	needed	# of plans	acres	acres	acres	ft	ft	acres	ft	#	#
Carnahan Run													
T654										31			
T663					15								
T668					9		1						
T670				11									1
T672					12		2						
T673				20			1						3
T10299				4									
Guffy Run													
T541													
T545					8		1						
T555													
T560										11			
T563				7						14			
T570													
T642							7						
T2173	1												
T2204													
Brady Run													
T457													
T461													
T462										11			
T543													
Elder Run													
T436													
T440										31			
T447					7	7	1						
T448													
T450					13								
T452													
T453										6			
T454					40								
T538				8									1
UT03													
T10067													

Location	CP	NMP	MSA	PMS	SC	MT	Wtr	Div	Ter	CC	SBF	Con	Sprg
	needed	needed	needed	# of plans	acres	acres	acres	ft	ft	acres	ft	#	#
UT04													
T312					7		1						
UT05													
T309										6			
Total	1	0	0	50	111	7	14	0	0	110	0	0	5

Table 27. Legend describing the BMPs listed in Table 3.

Abbreviation	BMP
CP	Conservation Plan
MSA	Manure Storage Areas
PMS	Pasture Management System
SC	Strip Crop
MT	Minimum Tillage
Wtr	Waterways
Div	Diversions
Ter	Terraces
CC	Cover Crop
SBF	Stream Bank Fencing
Con	Contracts
Sprg	Spring Development

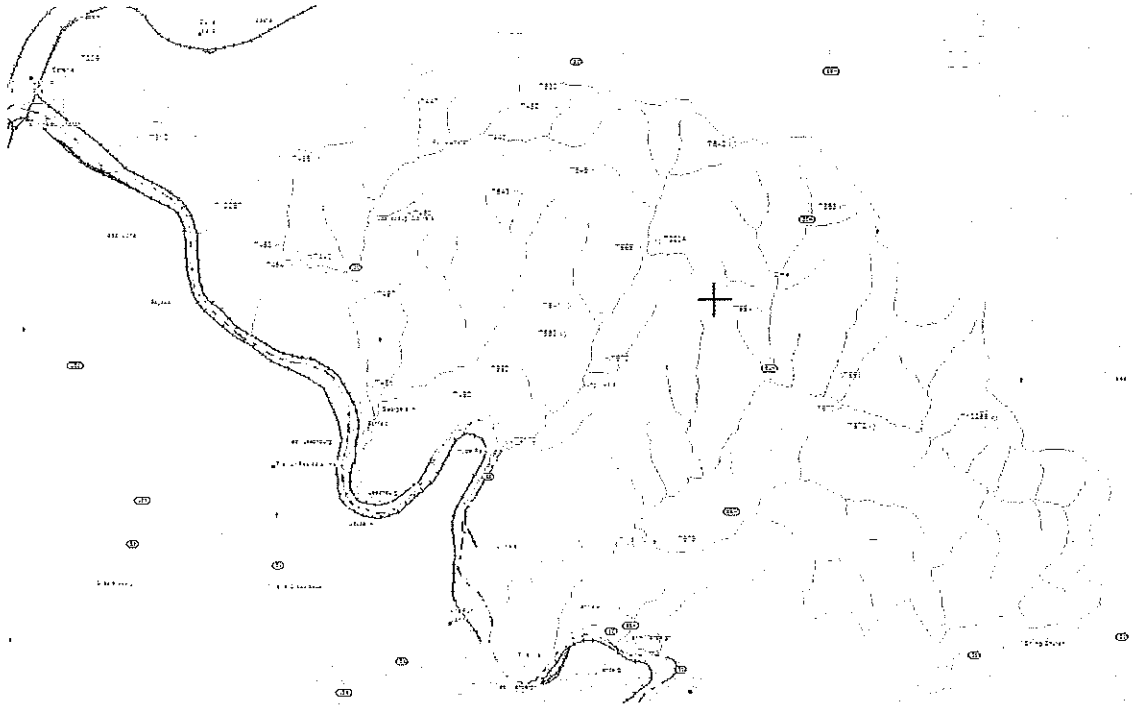

Figure 49. Location of the 32 farms located in the Arm strong County section of this HUC.

Even though Table 26 lists the BMPs needed on each farm in this HUC, much of this information is older than 10 years and does no reflect the changes in conservation practices over time.

The first thing that needs to occur is an update of this data to reflect these changes. For example, no stream bank fencing is needed in the entire Armstrong County section of this HUC according to this database, but upon closer examination, a farm along the banks of Carnahan Run that is not even listed in the database is in need of approximately 1500 ft of stream bank fencing and riparian corridor enhancement (Figure 50). Other farms have similar lacks in information.

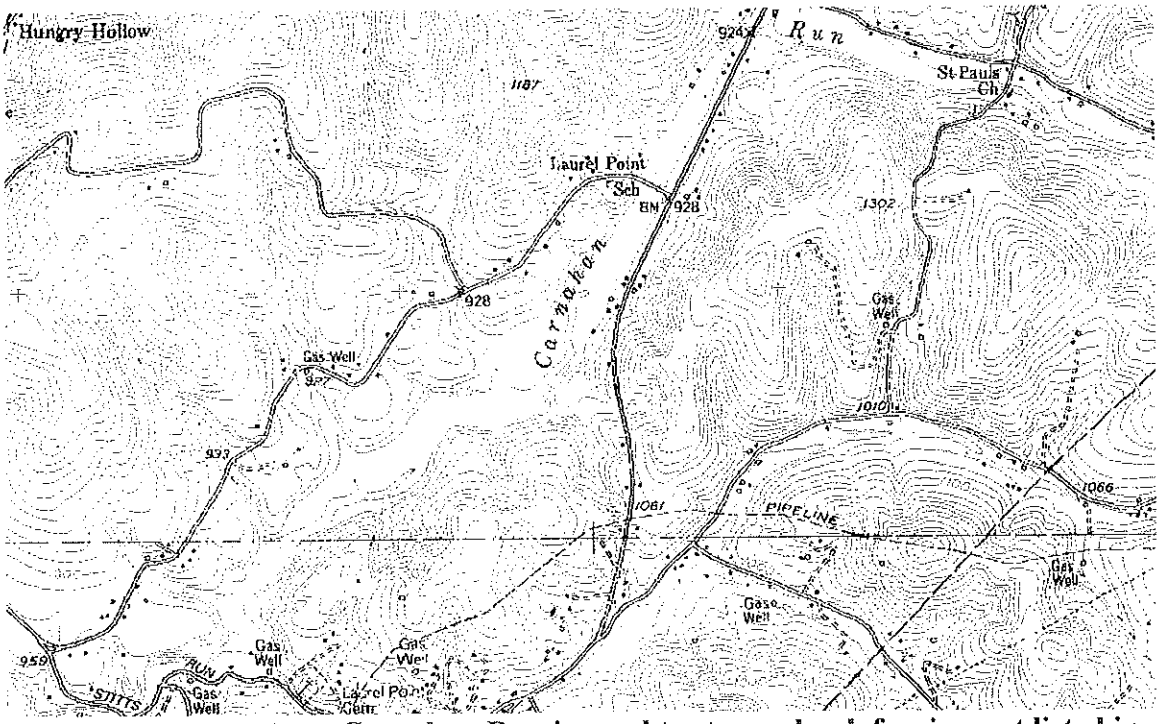

Figure 50. Farm along Carnahan Run in need to stream bank fencing not listed in the agricultural database supplied by the ACD.

Once this update is completed, producers should be contacted via a mailed or verbal survey to determine the interest in the installation of the conservation practices listed in the database. This interest may be enhanced by a watershed wide cost-share

grant program that will incorporate conservation practices on the producer's land, thus allowing the farmer to decrease the NPS pollution potential and increase the health of his/her farm. With the database updated and producers surveyed, a future Growing Greener Grant proposal could be constructed with assistance from the Indiana and Armstrong County Watershed Specialist. This cost-share BMP grant proposal may be more successful if completed in the entire Kiskiminetas River Watershed proper partnering with the KWA.

Urban Impacts

As said previously, the urban impacts in the Armstrong County section of this HUC may arguably be more of a non-point source impact than the impacts from mining and agriculture. This degradation has occurred mainly due to two major roadways, State Route 66 and State Route Alternate 66, traversing the watershed and the major population centers of Vandergrift and Leechburg Boroughs.

As in the other two HUCs, the main problem is residential development in the flood plain and riparian area infringement mainly from lawn maintenance up to and in the stream channel. These problems are generally centered in the upper Carnahan Run Sub Watershed, scattered throughout the Guffy Run Sub Watershed, in the lower reaches of the Brady Run Sub Watershed, and heavily throughout the Elder Run Sub Watershed (Figure 51).

The problem with completing a major stream channel restoration/riparian corridor enhancement project in any of these areas is getting the support of all the property owners over a stretch of stream. The best course of action would be to complete a demonstration project in an area that is highly traveled, utilizing it as a community educational project in

urban NPS pollution reduction. Landowners, possibly seeing a stretch a stream not unlike their own flowing through their property may then be more approachable for possible projects along their stretch. The perfect site for such a demonstration project is in the lower Guffy Run Sub Watershed along a heavily utilized stretch of road on what appears to be Armstrong County property (Figure 52 and 53). This project could also be completed in conjunction with the AMD treatment/trout nursery project just upstream of this site. After completion, the KWA could take prospective landowners with similar problems along their property down to tour this site. A sign could also be obtained for permanent educational measures for passers by.

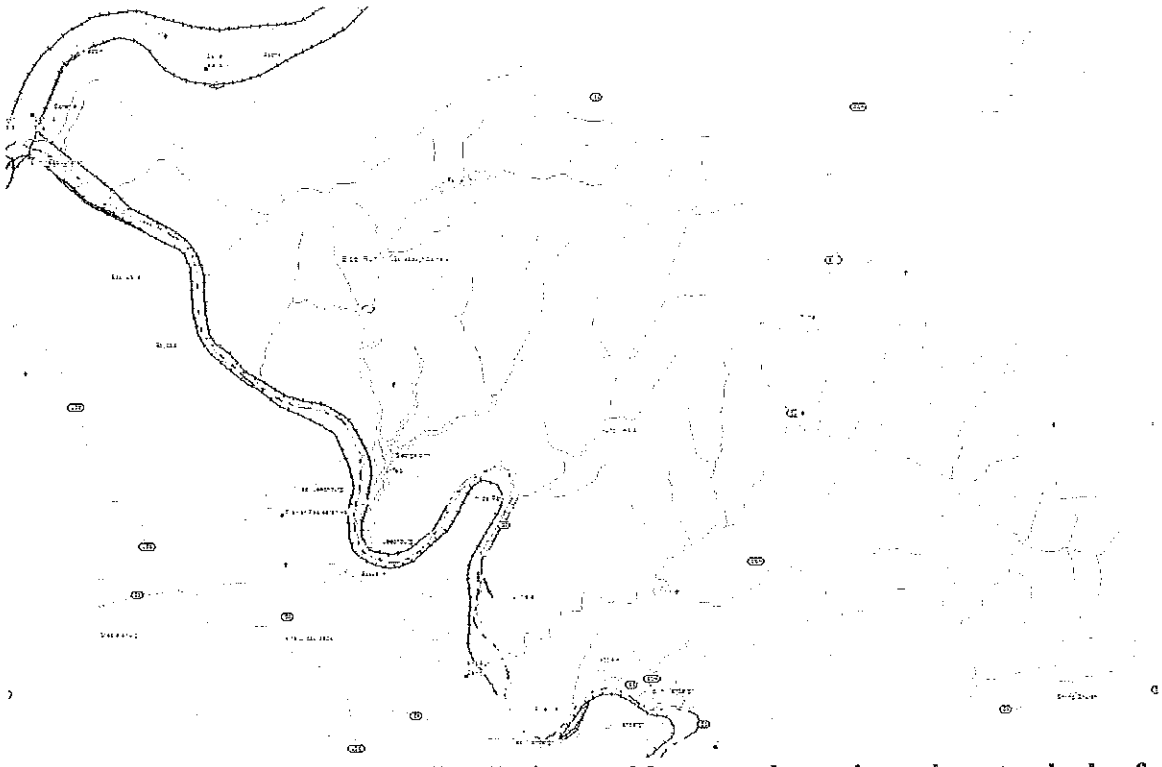

Figure 51. Areas of urban NPS pollution problems on the major sub watersheds of this HUC.

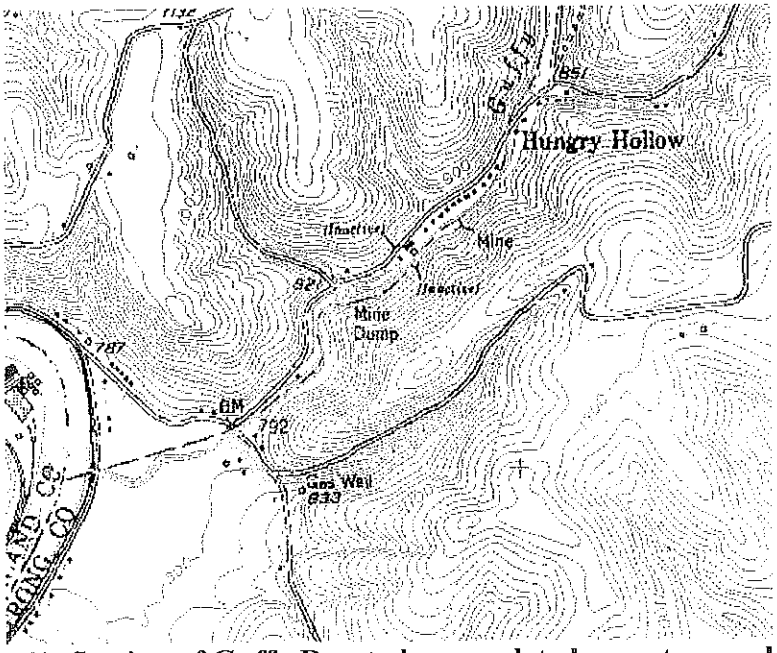

Figure 52. Section of Guffy Run to be completed as a stream channel restoration/riparian corridor enhancement demonstration project.

Figure 53. Picture of urban NPS pollution along unnamed tributary of Guffy Run.

With areas of only small pockets of population, a few of the roadways in the Armstrong County section of this HUC are unimproved township roads that can input large amount of sediments into streams during runoff events (Figure 54). All unimproved roadways that have not had a Dirt and Gravel Road Project completed in the past need documented and inspected, especially the roads that intersect with stream crossings. Once this is completed, the ACD needs to partner with Parks, Gilpen, and Bethel Townships and Leechburg Borough to implement projects, most likely funded through either the Dirt and Gravel Roads program or the PA DEP Growing Greener Initiative, to reduce the sedimentation problems occurring on their roadways.

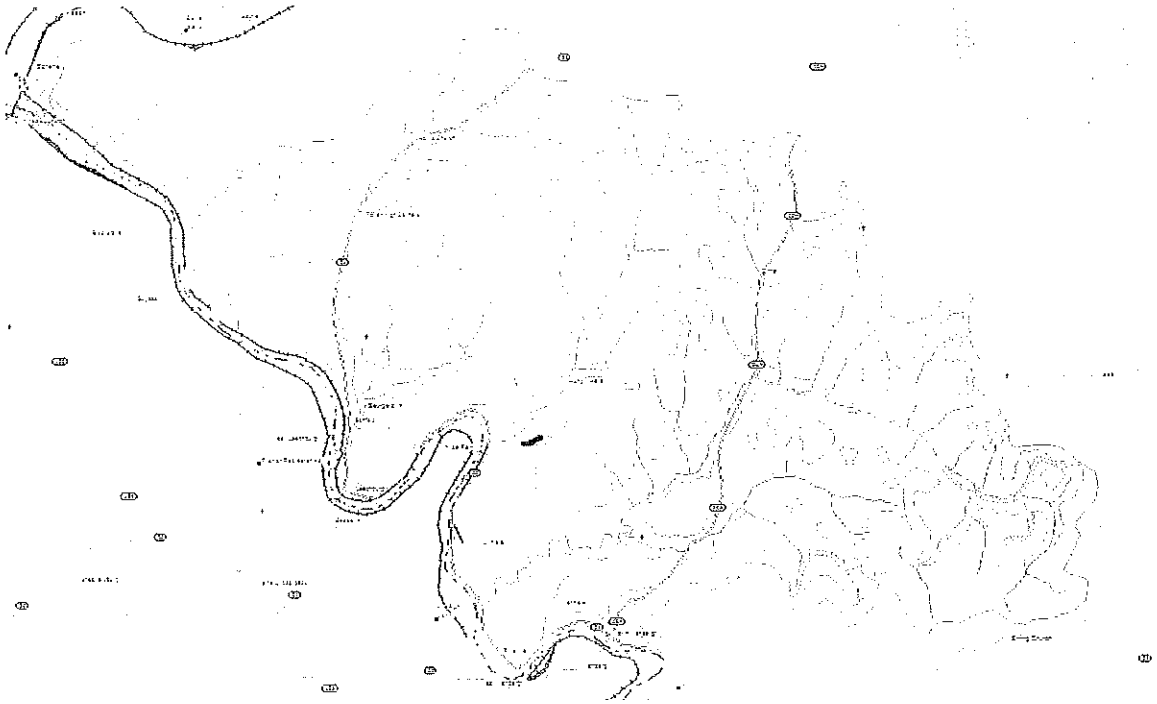

Figure 54. Location and status of the dirt and gravel roadways in the Armstrong County section of this HUC. Red = Not Inspected Green = Inspected Black = Contracted.

Because of the remoteness of sections of the watershed and the lack of traffic along the many townships roads, illegal dumping proliferates as well. Many township roads have un-gated roads and trails that attract illegal dumpers due to their seclusion. Property

owners of these roads and trails and the townships need to be encouraged to gate such roads to reduce/eliminate the ease of dumping at certain locations.

Currently, a PA CleanWays Chapter does not exist in Armstrong County (Figure 55). PA CleanWays can be used as a conduit of money and assistance for the removal and reclamation of illegal dumpsites and illegal dumpsite education. The Indiana County Chapter of PA CleanWays has been able to assist many watershed associations and municipalities with their dumpsite problems. They have even secured two Growing Greener Grants totaling $28,066 for the removal and reclamation of two large illegal dumps in Indiana County. One major recommendation of this reclamation plan will be to organize an Armstrong County PA CleanWays Chapter to deal with the dumps that can plague a watershed such as the Kiskiminetas River.

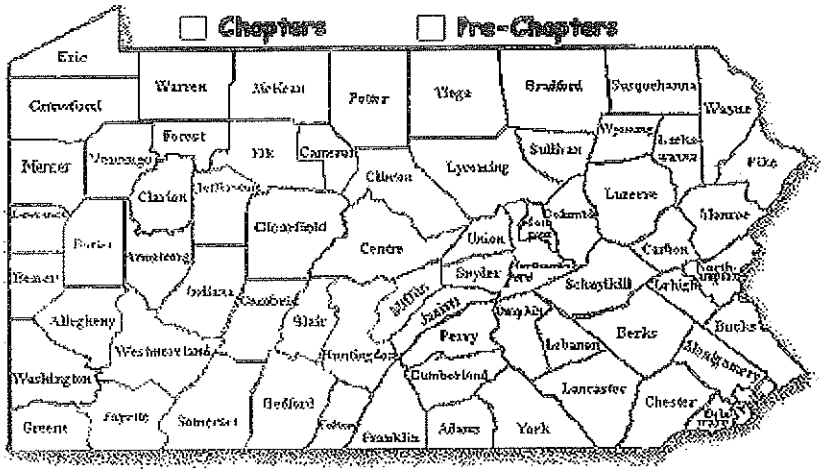

Figure 55. A map of county PA CleanWays Chapters in Pennsylvania.

Scattered and remote population centers also have the potential of containing malfunctioning on-lot septic systems. Malfunctioning systems can input large amounts of sewage into the watershed increasing the amount of nutrients and possibly decreasing the oxygen concentration of the water. Malfunctioning on-lot septic systems were not

investigated during this assessment, but should be, especially in areas that will not be tied to a municipal sewage service in the near future.

A sewage outfall was also identified in Leechburg Borough that inputs what looks to be a fair amount of gray water into the Kiskiminetas River (Figure 56). The ACD or KWA should contact the Armstrong County Sewage Authority to inform them of the problem.

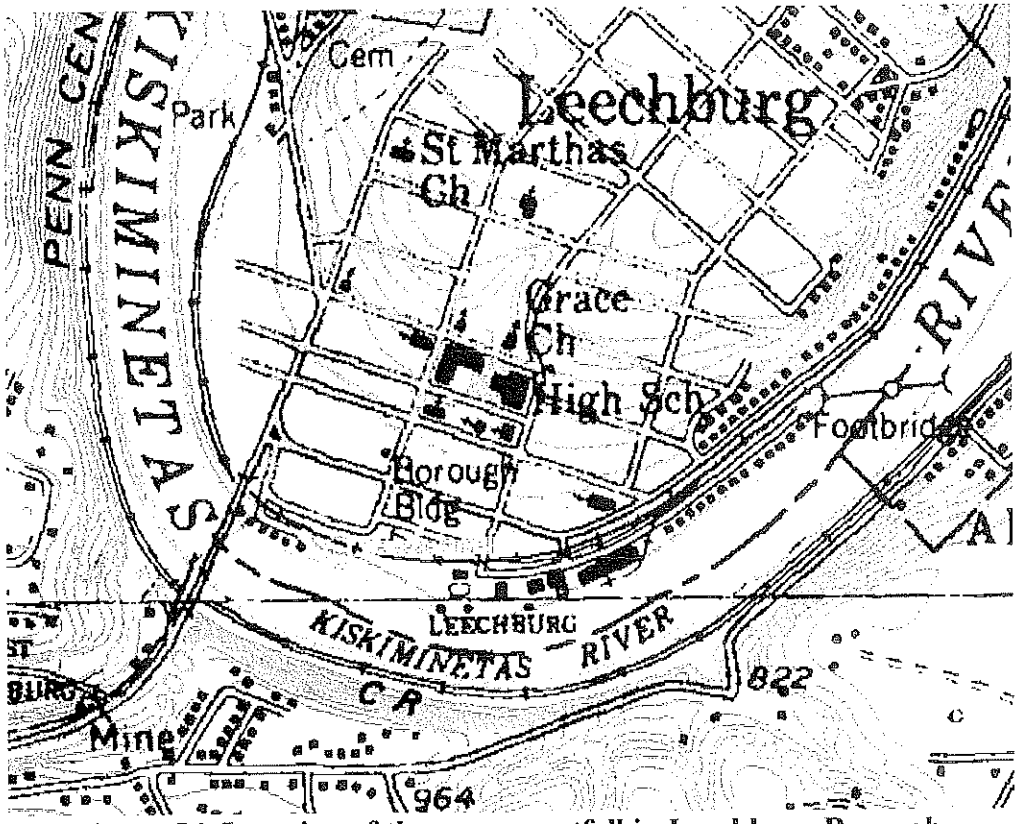

Figure 56. Location of the sewage outfall in Leechburg Borough.

Overall Recommendations

1. Construct the Booker Discharge Passive Treatment System (design is being completed and construction funding is being obtained). Once completed coordinate community outreach day at the site, inputting the discharge into the treatment system and coordinating the trout stocking of Carnahan Run with the Parks Township Sportsmen's Club.
2. Remove mine refuse pile and obtain funding to design and construct the Hungry Hollow Discharge Treatment System/Trout Nursery Project. The ACD and KWA need to approach the landowner for either permission to use land or interest in selling or donating land for the project.
3. Complete the Urban Stream Channel Restoration/Riparian Corridor Enhancement Project on the unnamed tributary of Guffy Run. Use the site as demonstration and education for the community who may have similar problems on their stretch of stream through their property. Obtain educational sign for continued education.
4. Contact the PA DEP about possible active mining causing the Clark Hollow Discharge. If it is not being caused by active mining, study area for possible site to treat passively.
5. Study area around Galaxy Drive-In Discharge for possible site to treat passively. If so, obtain funding to design and construct treatment system.
6. Continue studying the section of Carnahan Run that seems to be losing surface flow to mine voids. If evidence is collected leading to that conclusion, contact the PA DEP Bureau of Abandoned Mine Reclamation for action.

7. Identify area in Guffy Run Sub Watershed that seems to be losing surface flow to mine voids. If identified and evidence is collected, contact the PA DEP Bureau of Abandoned Mine Reclamation.
8. Add the area of Carnahan Run in need of stream bank fencing to the other eight farms in the previous HUC with similar needs for an all encompassing stream bank fencing cost share grant proposal. Use these projects as demonstration projects for other landowners where stream bank fencing is needed.
9. Identify discharges impacting the last unnamed tributary of Elder Run and UT03. Once identified, study for treatment system feasibility.
10. Continue to monitor the water quality of the Kiskiminetas River at Bagdad. Use site as an indicator of the health of the entire drainage.
11. Contact the Armstrong County Sewage Authority about the sewage outfall in Leechburg Borough.
12. Update the agricultural BMPs needed on the farms in the Armstrong County section of the HUC. Once updated, survey the agricultural community's interest in installation of the conservation practices needed on each farm. This interest may be enhanced by a watershed wide cost-share grant proposal possibly partnering with the KWA.
13. Encourage the KWA and Parks Township Sportsman's Club to stock trout in the lower sections of Carnahan, if successful, the Pennsylvania Fish and Boat Commission may be approached for possible continued stocking measures.
14. Investigate and encourage local landowners, especially large tract landowners, on the importance of ceasing lawn maintenance activities up to the stream bank so

that riparian areas can be protected or reestablished. The ACD and the KWA and RRWA may be able to educate through a brochure that can be mailed to watershed property owners explaining the importance of the riparian area on not only water quality, but also the health of their property. Funds to complete such a project can be secured from the League of Women Voters Watershed Restoration and Education Network Grants.

15. Once upstream AMD pollution sources are treated. Begin to collect needed data and obtain funding for the KR20, 21, 26, 28, 80, 81 and the Gilpen Discharges near the mouth of the Kiskiminetas River.
16. Locate malfunctioning on-lot sewage systems, particularly in areas that will not be tied to a municipal sewage service in the near future.
17. All unimproved roads that have not had a Dirt and Gravel Road project completed in the past need documented. Once this is complete, the Armstrong Conservation District needs to partner with Parks, Gilpen, and Bethel Townships and Leechburg Borough to implement projects most likely funded through the Dirt and Gravel Road Program or the Growing Greener Initiative.
18. Establish the Armstrong County Chapter of PA CleanWays to deal with the illegal dumping in the watershed. After establishment, coordinate efforts with Parks, Gilpen, and Bethel Townships and Leechburg Borough to locate and document illegal dumpsites.