

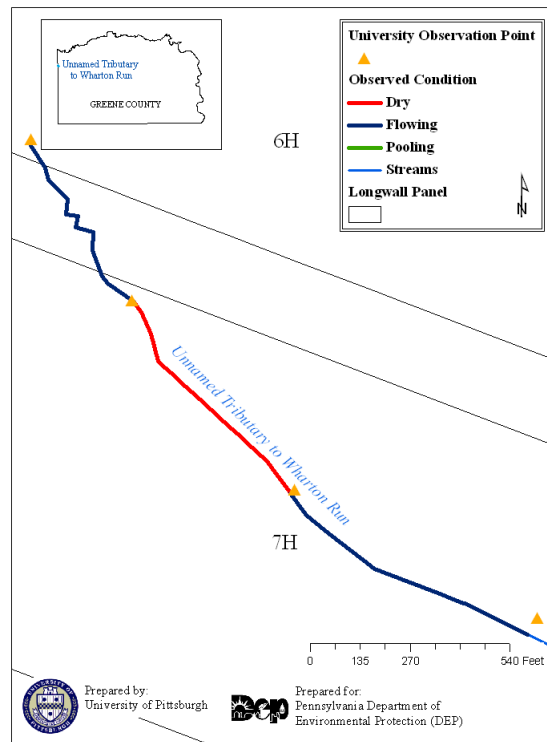
APPENDIX D1: *Bailey Mine* -- Information on Streams Undermined by Longwall Mines during the 3rd Assessment Period and Surveyed by the University of Pittsburgh

D1.A - Unnamed Tributary to Wharton Run / 32507

D1.A.1 - General Information

Mine Name	Bailey
Stream Name	UNT to Wharton Run
PA 5-digit Stream Code	32507
Perennial or Intermittent	Intermittent
Stream Order	1 st
Township/County	Greene County
Stream Use Classification	Warm Water Fishery
Panels Undermining Stream	7H
Reported Effects	Flow Loss, Fractures
Date of Reported Effects	August 24, 2005

D1.A.2 – Location



D1.A.3 - Surrounding Land Use

- Land surrounding 32507 is largely deciduous forest with some mixed forest shrublands.

D1.A.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **May 16, 2005:** Trib. 32507 was flowing. (This was a pre-mining observation because mining a week earlier was ~ 1,900-ft. away).
- **August 24, 2005:** the stream had no surface flow and large *compression heaves* (ruptures) had formed.
- **November 1, 2005:** some of the *compression heaves* were removed manually, but the stream still had no flow on.
- **March 22, 2006:** there were stretches of flow and no-flow sections. No-flow sections of importance where compression heaves were manually removed earlier at the confluence with Wharton Run.
- **March 21, 2007:** there was more of the same except the stream was now flowing at its confluence with Wharton Run.
- **March 24, 2008:** a grouting crew was working on the lower half of the stream.
- **April 2, 2008:** grouting occurred on the upper third of the stream; over half of the stream was dry.
- **June 2, 2008:** the upper reaches of the stream were dry; flow was observed close to where the grouting was completed and continued all the way to the confluence with Wharton Run.
- **June 5, 2008:** grouting operations continued; continuous flow was reported over most of the stream.



Figure D-1 - Compression ruptures observed by PA DEP during post-mining survey of the 7H panel in Bailey Mine (Photograph from PA DEP files).

D1.A.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

Post-mining:

- **August 25, 2005:** 0-ft flowing out of 974-ft observed. The entire length of stream observed was dry.
- **December 19, 2006:** 653-ft flowing out of 2,018-ft observed. 125-ft were found to be intermittent while 1,240 ft were dry.

D1.A.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** April 26, 2009

Total Rainfall in April 2009	3.1-in
Normal Total Rainfall in April	3.3-in
Total 2009 Rainfall	37.1-in
Total Rainfall 1 Week Prior to Survey	0.7-in
Previous Day Rainfall	0.1-in

D1.A.7 – Biological Survey Data

- **Length of stream that was observed:** 2,007-ft
- **Length of stream that was pooled/dry:** 685-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	15	49.2
Trichoptera Richness	4	38.1
Percent EPT Richness	67	100.0
Intolerant Taxa Richness	9	56.3
FC+PR Taxa Richness	5	37.0

- **Total Biological Score:** 56.1
- **3 Dominant Taxa Present:**
 1. *Chironomidae* (30-pct)
 2. *Isoperla sp.* (19-pct)
 3. *Amphinemura sp.* (14-pct)

D1.A.8 - Stream Habitat Assessment

- **Sediment Deposition:** Little or no enlargement of islands or point bars and less than 5-pct of the bottom affected by sediment deposition.
- **Channel Flow Status:** Water fills ~50-pct of the available channel, and/or riffle substrates are mostly exposed.
- **Velocity/Depth Regime:** Only 3 of the 4 regimes present.
- **Frequency of Riffles (or Bends):** No data.

D1.A.9 – Status of Reported Effect

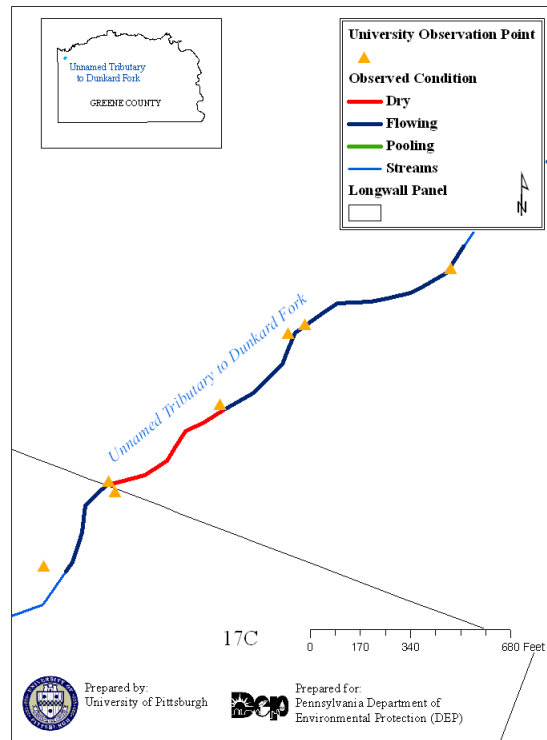
- The reported effects on 32507 were not resolved as of August 20, 2008.

D1.B. - Unnamed Tributary to Dunkard Fork / 32511

D1.B.1 - General Information

Mine Name	Bailey
Stream Name	Unnamed Tributary to Dunkard Fork
Stream Number	32511
Perennial or Intermittent	Intermittent
Stream Order	1 st
Township/County	Greene County
Stream Use Classification	Warm Water Fishes/Wildlife Water Supply
Panels Undermining Stream	13C, 14C, 15C, 16C, 17C, 18C
Reported Effects	Flow Loss, Heaves
Date of Reported Effects	September, 2005

D1.B.2 - Location



D1.B.3 - Surrounding Land Use

- Land surrounding 32511 is mostly deciduous forest, with limited mixed forest shrubland and pasture/hay areas.

D1.B.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **September 12, 2003:** the tributary was observed to be dry over panels 15C and 16C.
- **October 2, 2003:** revealed that a contractor had removed a heave over panel 16C.
- **June 30, 2004:** revealed that there were still dry sections of the stream over panels 15C-17C.
- **December 6, 2004:** the DEP mandated augmentation of the stream no later than January 7, 2004.
- **September 9, 2005:** no work had been done on restoring flow to the tributary due to land access issues.
- **October 27, 2005:** the tributary was still dry on properties.
- **March 15, 2006:** flow was observed in the usually dry area over panel 16C. Attempted remediation efforts using bentonite clay apparently were the cause of the flow after rainfall.
- **August 2, 2006:** dryness except around a spring. Grouting and augmentation could not start because of land access issues.
- **August 26, 2006:** water was not flowing in the stream, only sitting on top of the rocks in the stream bed.

D1.B.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

- **March 15, 2006:** post-mining, 85-ft flowing out of 394-ft observed. 309-ft were found to be dry.

D1.B.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** May 5, 2009

• Total Rainfall in May 2009	5.6-in
• Normal Total Rainfall in May	4.2-in
• Total 2009 Rainfall	37.1-in
• Total Rainfall 1 Week Prior to Survey	3.0-in
• Previous Day Rainfall	0.4-in

D1.B.7 – Biological Survey Data

- **Length observed:** 1,804-ft
- **Length dry:** 495-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	23	75.4
Trichoptera Richness	2	19.1
Percent EPT Richness	39	63.3
Intolerant Taxa Richness	10	62.5
FC+PR Taxa Richness	10	74.1

- **Total Biological Score:** 58.9
- **3 Dominant Taxa Present:**
 1. *Chironomidae* (40.5-pct)
 2. *Isoperla* (26-pct)
 3. *Oligochaeta* (6-pct)

D1.B.8 – Stream Habitat Assessment

- **Sediment Deposition:** Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20 to 50-pct of the bottom affected; slight deposition in pools (larger amounts of sediment found in 32511 over panels 14C and 15C).
- **Channel Flow Status:** Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.
- **Velocity/Depth Regime:** No data.
- **Frequency of Riffles (or Bends):** No data.

D1.B.9 - Status of Reported Effects

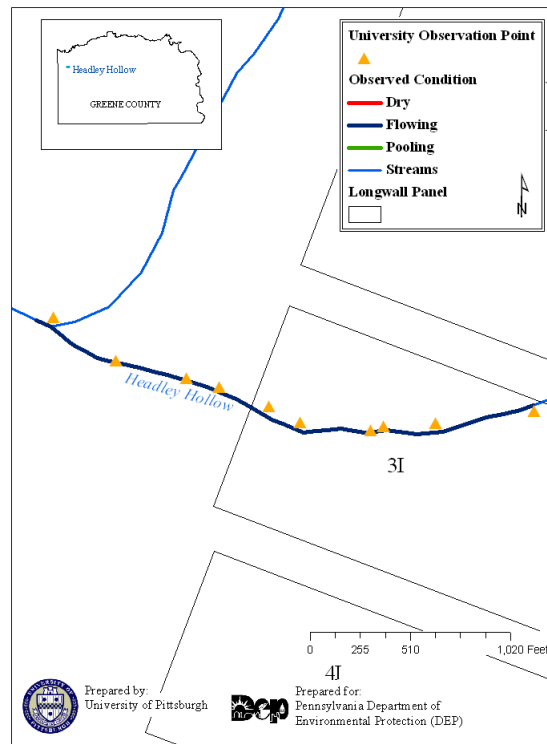
- The PA DEP determined on May 17, 2006 that reported flow loss effects over panels 14C and 15C were resolved; flow had been sufficiently restored. As of August 20, 2008, land access issues prevented resolution of reported effects over panel 16C.

D1.C - Headley Hollow / 32530

D1.C.1 - General Information

Mine Name	Bailey
Stream Name	Headley Hollow
Stream Number	32530
Perennial or Intermittent	
Stream Order	2 nd
Township/County	Greene County
Stream Use Classification	Warm Water Fishes
Panels Undermining Stream	2I, 3I
Problem	Flow Loss, Pooling
Date Problem Occurred	June, 2005

D1.C.2 - Location



D1.C.3 - Surrounding Land Use

- The land surrounding 32530 is mostly deciduous forest with very little mixed forest shrubland.

D1.C.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **April 23, 2005:** Flow was observed throughout the tributary
- **August 18, 2004:** about 2 months before expected mining, flow was seen throughout the tributary
- **November 10, 2004:** no post-mining diminishment had occurred over the 2I panel.
- **November 17, 2004:** the stream was observed and still appeared to be fine, flow was good, no compression ridges were observed.
- **January 27, 2005:** the stream was again observed and no pooling or flow loss was seen.
- **March 10, 2005:** flow in the stream still appeared to be good over panels 2I and 3I.
- **July 31, 2006:** dry stretches totaling nearly 2,000-ft were observed - there was a pooling area about 65 feet in length and total flowing length of about 465-ft.
- **November 30, 2006:** 1,780-ft of dry stream were observed with some pooling in a total of 1,070-ft of flowing stream.
- **June 4, 2007:** pooling and flow loss over panel 2I.



Figure D-2 – A main stem waterfall (left) and a ‘no flow’ tributary (right – corrugated pipe) observed by PA DEP during post-mining survey over 32530 in Bailey Mine (Photograph from PA DEP files).

D1.C.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

Post-mining:

- **November 30, 2006:** 925-ft flowing out of 2,992-ft observed. 371-ft of stream length was pooled, while 1,696-ft were dry.

D1.C.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** May 19, 2009

Total Rainfall in May 2009	5.6-in
Normal Total Rainfall in May	4.2-in
Total 2009 Rainfall	37.1-in
Total Rainfall 1 Week Prior to Survey	0.7-in
Previous Day Rainfall	0-in

D1.C.7 - Biological Survey Data

- **Length of stream that was observed:** 2,605-ft
- **Length of stream that was pooled/dry:** 0-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	21	68.9
Trichoptera Richness	5	47.6
Percent EPT Richness	62	100
Intolerant Taxa Richness	11	68.8
FC+PR Taxa Richness	6	44.4

- **Total Biological Score:** 65.9
- **3 Dominant Taxa Present:**
 1. *Acerpenna* (32-pct)
 2. *Chironomidae* (26-pct)
 3. *Amphinemura* (11-pct)

D1.C.8 - Stream Habitat Assessment

- **Sediment Deposition:** No data.
- **Channel Flow Status:** No data.
- **Velocity/Depth Regime:** No data.
- **Frequency of Riffles (or Bends):** No data.

D1.C.9 - Status of Reported Effect

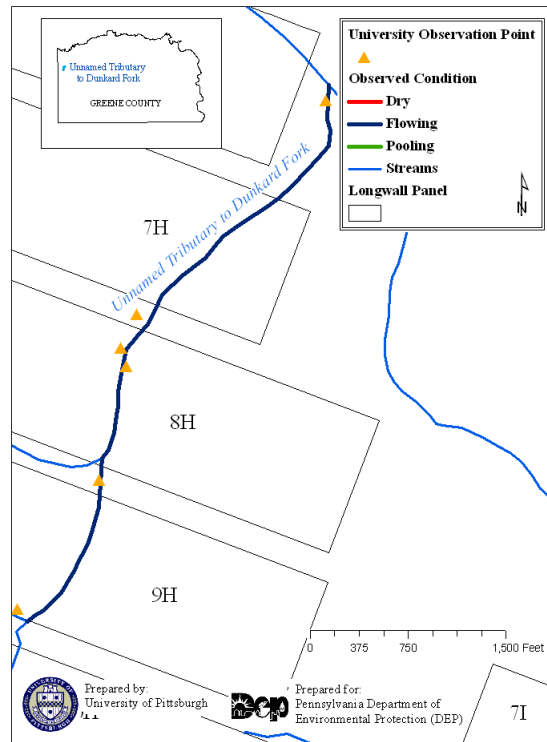
- The reported effects on 32530 were deemed resolved by the PA DEP on June 13, 2008.

D1.D - Unnamed Tributary to Dunkard Fork / 32532

D1.D.1 - General Information

Mine Name	Bailey
Stream Name	UNT to Dunkard Fork
Stream Number	32532
Perennial or Intermittent	Intermittent
Stream Order	2 nd
Township/County	Greene County
Stream Use Classification	Warm Water Fishes
Panels Undermining Stream	7H, 8H, 9H, 10H, and 11H
Reported Effects	Flow Loss, Fractures
Date of Reported Effects	June, 2006

D1.D.2 - Location



D1.D.3 - Surrounding Land Use

- The land surrounding 32532 is mostly deciduous forest, with some pasture/hay and mixed forest shrubland. There is also a small area of evergreen forest and row crops.

D1.D.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **June 26, 2006:** a large compression heave (rupture) over the 8H panel to the mouth of the stream (stream dry).
- **July 17, 2006:** the stream was still dry from 8H to the mouth, approximately 3150-ft.
- **July 18, 2006:** heave removal started (by hand).
- **July 25, 2006:** heave was removed, but the 3150-ft. stretch was still dry.
- **August 28, 2006:** stretch from the mouth to 8H was still dry and the stretch over the 9H and 10H panels, which had not been mined yet, was also dry.
- **October 30, 2006:** flow augmentation begun.
- **December 12, 2006:** augmentation was on and the stream was flowing for 20-ft. before it went dry again to the mouth.
- **January 3, 2007:** the stream was flowing all the way to the mouth, and grouting had begun on the heave area.
- **February 21, 2007:** Methane was noticed bubbling up in the stream.
- **July 31, 2007:** grouting was being done in the middle of a 1,000-ft. dry stretch over 7H, grouting was also being done over 8H in another 1,000-ft. dry stretch. There was flow for 1,850-ft on this date over the 10H panel.
- **September 25, 2007:** flow was intermittent over the 7H and 8H panels and dry over both the 9H and 10H panels, and grouting was being done in the stream area over 9H.
- **January 28, 2008:** the entire stream was flowing, and augmentation was on in the area over the 11H panel.
- **June 3, 2008:** there was continuous flow over the 6H to 11H panels without augmentation turned on.
- **July 11, 2008:** flow was observed in the stream over the 6H and 9H panels, but was dry over the 7H, 8H, 10H and 11H panels, grouting was being done in the 10H and 11H areas.



Figure D-3 - Compression rupture observed by PA DEP during a post-mining survey of the 8H panel in Bailey Mine (Photograph from PA DEP files).

D1.D.5 - Flow observations Conducted by PA DEP Subsidence Agents / Biologists

Post-mining:

- **July 17, 2006:** 59-ft flowing out of 3,300-ft observed.

- **October 2, 2007:** 1,417-ft flowing out of 8,018-ft observed.
- **October 22, 2007:** 7,992-ft flowing out of 16,512-ft observed.

D1.D.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** May 5, 2009

Total Rainfall in May 2009	5.6-in
Normal Total Rainfall in May	4.2-in
Total 2009 Rainfall	37.1-in
Total Rainfall 1 Week Prior to Survey	3.0-in
Previous Day Rainfall	0.4in

D1.D.7 - Biological Survey Data

- **Length of stream that was observed:** ~ 5,000-ft
- **Length of stream that was pooled/dry:** 0-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	24	78.7
Trichoptera Richness	5	47.6
Percent EPT Richness	67	100
Intolerant Taxa Richness	14	87.5
FC+PR Taxa Richness	7	51.9

- **Total Biological Score:** 73.1
- **3 Dominant Taxa Present:**
 1. *Isoperla* (33.5-pct)
 2. *Amphinemura* (30-pct)
 3. *Ephemerella* (6-pct)
 3. *Chironomidae* (6-pct)

D1.D.8 - Stream Habitat Assessment

- **Sediment Deposition:** Some new increase in bar formation, mostly from gravel, sand, or fine sediment; ~ 35-pct of the bottom affected; slight deposition in pools.
- **Channel Flow Status:** Water reaches base of both lower banks, and minimal amount of channel substrate is exposed (but it rained recently).
- **Velocity/Depth Regime:** No data.
- **Frequency of Riffles (or Bends):** No data.

D1.D.9 - Status of Reported Effect

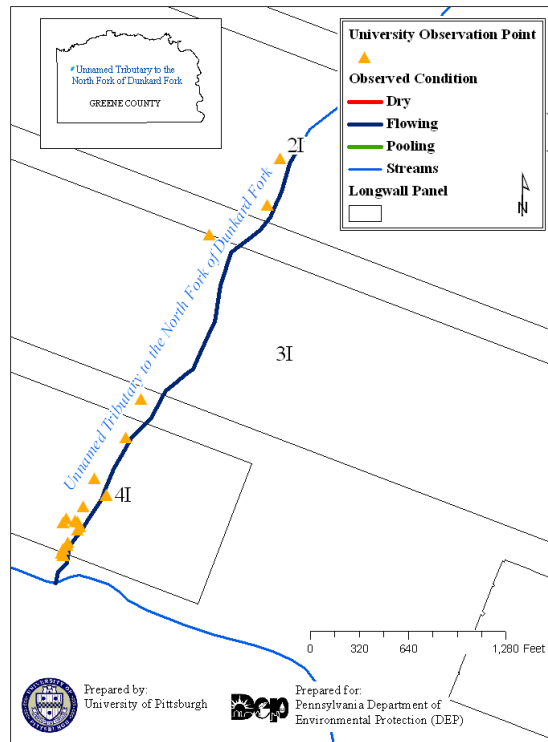
- The reported effects on 32532 were not resolved as of August 20, 2008.

D1.E - Unnamed Tributary to the North Fork of Dunkard Fork / 32596

D1.E.1 - General Information

Mine Name	Bailey
Stream Name	Unnamed Tributary to the North Fork of Dunkard Fork
Stream Number	32596
Perennial or Intermittent	Intermittent
Stream Order	1 st
Township/County	Greene County
Stream Use Classification	Trout Stocking
Panels Undermining Stream	1I, 2I, 3I, 4I
Reported Effects	Flow Loss, Fractures
Date of Reported Effects	February 17, 2004

D1.E.2 - Location



D1.E.3 - Surrounding Land Use

- The surrounding 32596 is mostly deciduous forest with some evergreen forest. There are a few patches of mixed forest shrubland and pasture/hay in the area as well.

D1.E.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **February 17, 2004:** during a post-mining survey, two dry stretches of the stream were noted.
- **July 14, 2004:** the stream was dry over the 1I panel from the middle of its tailgate to the middle of its headgate. Pooling was also noticed in three 200-ft sections over the proposed 4I panel on this date.

- **October 22, 2004:** the stream was dry over the mined 1I and 2I panels and had very little flow over the unmined 3I and 4I panels.
- **February 15, 2005:** the stream had flow its entire length, but recent precipitation events may have covered up the effects of mining.
- **March 10, 2005:** the 3I panel passed under the stream and the stream was flowing its entire length on this date, but there had also been a lot of recent precipitation.
- **April 14, 2005:** the stream was dry over the entire 3I panel.
- **August 23, 2005:** the 4I panel passed under the stream and the entire length of stream over this panel was dry and had cracks and compression heaves in it.
- **December 1, 2005:** the area of stream over the 3I and 4I panels was dry.
- **January 4, 2006:** the stream was flowing.
- **February 17, 2006:** the majority of the stream over both the 1I and 2I panels was flowing, the stream was dry over the 3I panel and the upper half of the 4I panel.
- **December 12, 2006:** augmentation wells were installed in the 3I and 2I panels and were running but most of the stream was still dry.
- **December 19, 2006:** the augmentation wells were discharging colored water and a sulfurous smell.
- **January 3, 2007:** grouting was being done on the stream over the 3I panel and the stream was flowing over the 1I, 2I, and 3I panels, but still dry over the 4I panel.
- **January 30, 2007:** the sulfurous discharge from the augmentation wells was taken care of.
- **February 12, 2007:** more grouting was performed.
- **October 23, 2007:** 5,596-ft of stream was dry out of 6,388-ft observed.
- **December 13, 2007:** an oil leak was reported in the stream.
- **December 17, 2007:** more grouting was being done over the 1I panel, the stream was flowing from its headwaters through the area over the 4I panel.
- **March 12, 2008:** all grouting had been completed and the stream was naturally flowing (without augmentation on) through its entire length.
- **May 28, 2008:** augmentation was off and most of the stream was flowing except for two areas measuring 60 ft and 670 ft over the 4I tailgate and panel.
- **August 18, 2008:** augmentation was turned off and the stream was dry across all four longwall panels.



Figure D-4 – Photograph of the post-mining condition of stream 32596. PA DEP agents noted compression ruptures (Photograph from PA DEP files).

D1.E.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

Pre-mining:

- **February 17, 2004:** 6,506-ft flowing out of 8,031-ft observed. 1,521-ft were found to be dry, largely over the II panel. No other panels had been mined at this time.
- **August 24, 2005:** 0-ft flowing out of 1,545-ft observed in the 4I panel.

Post-mining:

- **March 8, 2006:** 2,635-ft flowing out of 7,520-ft observed. The rest of the stream length was found to be dry.
- **March 28, 2006:** 2,221-ft flowing out of 5,712-ft observed. The rest of the stream length was found to be dry.
- **October 23, 2007:** 781-ft flowing out of 6,312-ft observed. The rest of the stream length was found to be dry.
- **November 6, 2007:** 384-ft flowing out of 712-ft observed. The rest of the stream length was found to be dry.
- **November 24, 2008:** 5,617-ft flowing out of 6,230-ft observed. The rest of the stream length was found to be dry.
- **April 17, 2008:** 5,866-ft flowing out 6,211-ft observed. The rest of the stream length was found to be dry.
- **May 28, 2008:** 5,233-ft flowing out of 5,968-ft observed. The rest of the stream length was found to be dry.

D1.E.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** April 24, 2009

Total Rainfall in April 2009	3.1-in
Normal Total Rainfall in April	3.3-in
Total 2009 Rainfall	37.1-in
Total Rainfall 1 Week Prior to Survey	0.7-in
Previous Day Rainfall	0.1-in

D1.E.7 - Biological Survey Data

- **Length of stream that was observed:** 3,363-ft
- **Length of stream that was pooled/dry:** 0-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	7	23.0
Trichoptera Richness	1	9.5
Percent EPT Richness	43	69.8
Intolerant Taxa Richness	3	18.8
FC+PR Taxa Richness	2	14.8

- **Total Biological Score:** 27.2
- **3 Dominant Taxa Present:**
 1. Chironomidae (90-pct)
 2. *Amphinemura* (5-pct)
 3. *Oligochaeta* (2-pct)

D1.E.8 - Stream Habitat Assessment

- **Sediment Deposition:** No data.
- **Channel Flow Status:** No data.
- **Velocity/Depth Regime:** No data.
- **Frequency of Riffles (or Bends):** No data.

D1.E.9 - Status of Reported Effect

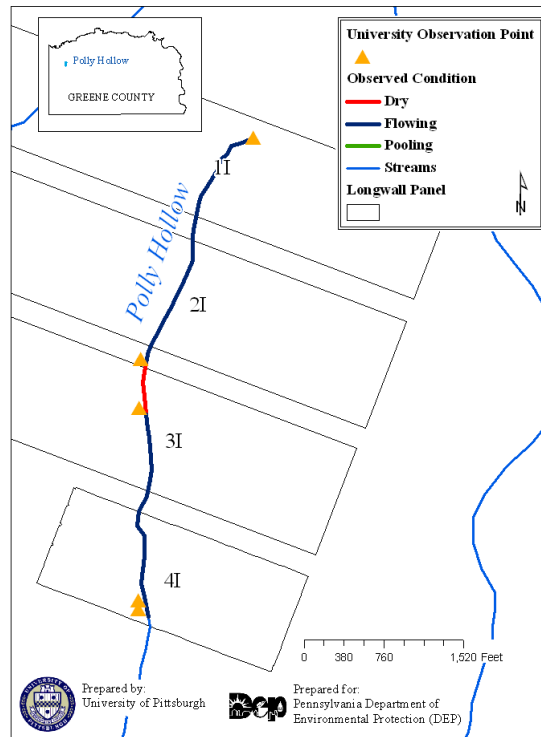
- The reported effects on 32596, filed as four separate stream investigations with the PA DEP, were not resolved as of August 20, 2008.

D1.F - Polly Hollow / 32598

D1.F.1 - General Information

Mine Name	Bailey
Stream Name	Polly Hollow
Stream Number	32598
Perennial or Intermittent	Intermittent
Stream Order	1 st
Township/County	Greene County
Stream Use Classification	Trout Stocking/Wildlife Water Supply
Panels Undermining Stream	1I, 2I, 3I, 4I
Average Annual Flow	170 gallons per minute
Reported Effects	Flow Loss, Compression Ridges
Date of Reported Effects	February 10, 2004

D1.F.2 - Location



D1.F.3 - Surrounding Land Use

- The land surrounding 32598 is largely deciduous forest with some pasture/hay and mixed forest shrubland.

D1.F.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **November 6, 2003:** pre-mining survey showed flow in all sections of the stream.
- **February 10, 2004:** post-mining survey over panel 1I showed a compression ridge and loss of flow thereafter.
- **June 23, 2004:** the length of the stream undermined by panel 1I was dry and panel 2I was set to be mined in the coming weeks.
- **July 7, 2004:** showed a forming compression ridge over panel 2I and loss of flow in that area.
- **July 9, 2004:** compression ridges as high as 3.5-ft caused flow loss over the second half of panel 2I and through the 3I panel.
- **February 2, 2005:** no flow in panels 1I, 2I or 3I. Panel 4I was pre-mining and had flow and some macroinvertebrate life.
- **July 7, 2005:** the mouth of stream over panel 4I was observed (pre-mining). Water was still flowing here, but the rest of the stream which had been undermined (except for 200-ft) was completely dry. It was noted that plant life was growing where water usually flowed.
- **December 1, 2005:** a stream investigation into lengthy dry stretches was in progress.
- **February 17, 2006:** some iron staining was seen and hydrogen sulfide odor was present.
- **March 2, 2006:** the stream was observed and long dry stretches over panels 1I, 3I and 4I were seen despite significant amounts of recent rain.
- **May 15, 2006:** nearly 2000-ft of dry stretches were observed.
- **October 30, 2006:** after a significant amount of rainfall, alternating stretches of flow and no flow were observed.
- **December 12, 2006:** augmentation was being constructed.
- **February 1, 2007:** 7,591-ft of stream were walked and 2,153-ft were dry. Some heaving and compression ridges were seen and iron staining was still present.
- **February 7, 2007:** augmentation for the stream was turned on.
- **February 12, 2007:** augmentation was only increasing flow by 9-ft downstream.
- **August 1, 2007:** no flow stretches of 1,300-ft and 2,800-ft were observed over panels 1I, 2I and 4I. Augmentation did not appear to be substantially helping flow.
- **August 24, 2007:** augmentation was turned off for a natural flow survey after recent heavy rains (3.5-in). A 450-ft no flow stretch was seen over panel 3I, but otherwise flow was pretty good.
- **October 30, 2007:** 70.4-pct of the stream was observed to be dry (over 8,000-ft of the 11,718-ft observed) and this was after significant recent rainfall (one inch a week before observation).
- **November 14, 2007:** the augmentation was turned back on.
- **November 29, 2007:** no flow stretches were observed in all panels.
- **March 12, 2008:** with the exceptions of a 100-ft dry stretch over 1I and a 400-ft dry stretch over 4I, flow was observed everywhere.
- **May 2, 2008:** observations of panels 1I-4I were conducted and flow was observed in 71-pct of the stream. Augmentation in the 1I panel was off.
- **June 5, 2008:** after heavy rains, flow was observed in all but a 50-ft no flow stretch over panel 3I. Mitigation work was complete over panel 1I.
- **June 19, 2008:** 40-pct of the observed stream was dry including a 1500-ft stretch in panel 2I and a 400-ft stretch over panel 1I.



Figure D-5 - Iron staining observed by PA DEP after mining of the 4I panel (from PA DEP files).

D1.F.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

Pre-mining:

- **February 11, 2004:** 394-ft flowing out of 804-ft observed. The rest of the stream over the 1I panel was found to be dry.
- **July 30, 2004:** 5,213-ft flowing out of 6,693-ft observed. The rest of the stream over the 2I, 3I, and 4I panels was found to be dry.
- **February 7, 2005:** 2,385-ft flowing out of 4,078-ft observed. The rest of the stream over the 3I and 4I panels was found to be dry.
- **July 28, 2005:** 1,178-ft flowing out of 2,599-ft observed. The rest of the stream over the 4I panel was found to be dry.

Post-mining:

- **January 7, 2008:** 4,032-ft flowing out of 6,066-ft observed. The rest of the stream length was found to be dry.
- **January 24, 2008:** 5,167-ft flowing out of 6,631-ft observed. The rest of the stream length was found to be dry.
- **April 17, 2008:** 4,432-ft flowing out of 6,424-ft observed. The rest of the stream length was found to be dry.
- **May 28, 2008:** 4,314-ft flowing out of 6,079-ft observed. The rest of the stream length was found to be dry.

D1.F.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** April 28, 2009

Total Rainfall in April 2009	3.1-in
Normal Total Rainfall in April	3.3-in
Total 2009 Rainfall	37.1-in
Total Rainfall 1 Week Prior to Survey	0.6-in
Previous Day Rainfall	0-in

D1.F.7 - Biological Survey Data

- **Length of stream that was observed:** 4,895-ft
- **Length of stream that was dry:** 502-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	6	19.7
Trichoptera Richness	2	19.1
Percent EPT Richness	50	81.2
Intolerant Taxa Richness	2	12.5
FC+PR Taxa Richness	2	14.8

- **Total Biological Score:** 29.4
- **3 Dominant Taxa Present:**
 1. *Chironomidae* (88-pct)
 2. *Oligochaeta* (7-pct)
 3. *Pedicia* (1.5-pct)
 3. *Ironoquia* (1.5-pct)
 3. *Acerpenna* (1.5-pct)

D1.F.8 - Habitat Assessment

- **Sediment Deposition:** Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50 to 80-pct of the bottom affected; sediment deposits at obstructions, constrictions and bends; moderate deposition of pools present.
- **Channel Flow Status:** Water fills 35 to 75-pct of the available channel, and/or riffle substrates are mostly exposed.
- **Velocity/Depth Regime:** No data.
- **Frequency of Riffles (or Bends):** No data.

D1.F.9 - Status of Reported Effect

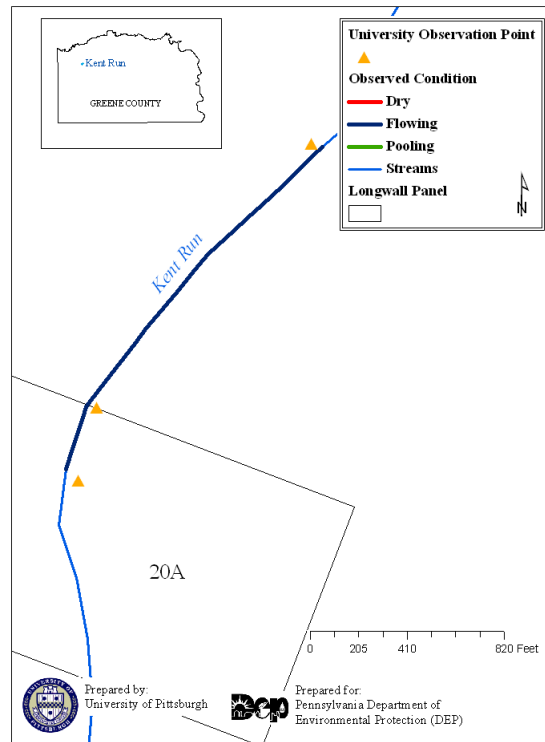
- The reported effects on 32598, filed as four separate stream investigations with the PA DEP, were largely unresolved as of August 20, 2008. However, one of the four investigations was deemed resolved on August 17, 2007 after approval of an appropriate mitigation plan for the II panel.

D1.G - Kent Run / 32600

D1.G.1 - General Information - Kent Run was determined to have been impacted by mining during the 2nd assessment period, from 1998-2003.

Mine Name	Bailey
Stream Name	Kent Run
Stream Number	32600
Perennial or Intermittent	
Stream Order	2 nd
Township/County	Greene County
Stream Use Classification	Trout Stocking Fishes
Panels Undermining Stream	19A, 20A
Reported Effects	Flow Loss, Fractures
Date of Reported Effects	September 2003

D1.G.2 - Location



D1.G.3 - Surrounding Land Use

- The land surrounding 32600 is mostly pasture/hay and deciduous forest, with some row crops.

D1.G.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **September 4, 2003:** the stream was flowing over both the 19A and 20A panels, but very little, only 2-3 gallons per minute in some spots.
- **September 18, 2003:** there was no flow in the stream from the gates between 19A and 20A to halfway into 20A.
- **October 29, 2003:** flow had returned to the stream over both panels.
- **November 1, 2007:** there was no flow in the stream over the entire 19A panel and the first quarter of the 20A panel. A 10-ft long heave and a few small cracks were noticed in the stream over the 19A panel.

D1.G.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

- No quantitative data exists for this stream during the 3rd assessment period.

D1.G.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** April 28, 2009

Total Rainfall in April 2009	3.1-in
Normal Total Rainfall in April	3.3-in
Total 2009 Rainfall	37.1-in
Total Rainfall 1 Week Prior to Survey	0.6-in
Previous Day Rainfall	0-in

D1.G.7 - Biological Survey Data

- **Length of stream that was observed:** 1,759-ft
- **Length of stream that was pooled/dry:** 0-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	17	55.7
Trichoptera Richness	4	38.1
Percent EPT Richness	59	95.8
Intolerant Taxa Richness	8	50.0
FC+PR Taxa Richness	7	51.9

- **Total Biological Score:** 58.3
- **3 Dominant Taxa Present:**
 1. *Chironomidae* (36-pct)
 2. *Acerpenna* (20-pct)
 3. *Amphinemura* (18-pct)

D1.G.8 - Stream Habitat Assessment

- **Sediment Deposition:** Moderate deposition of new gravel, sand or fine sediment on old and new bars; ~ 50-pct of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.
- **Channel Flow Status:** Water fills >50-pct of the available channel, and/or riffle substrates are mostly exposed.
- **Velocity/Depth Regime:** No data exists.
- **Frequency of Riffles (or Bends):** No data exists.

D1.G.9 - Status of Reported Effect

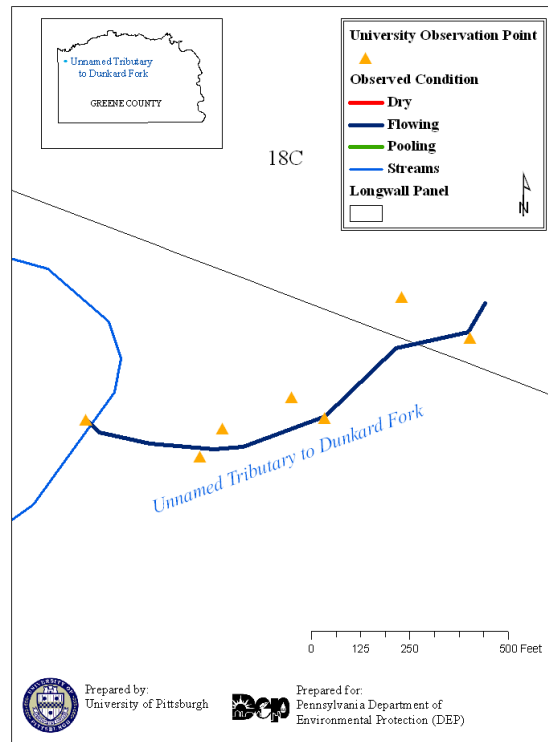
- The reported effects on 32600 were deemed resolved by the PA DEP during November 2003.

D1.H - Unnamed Tributary to Dunkard Fork

D1.H.1 - General Information

Mine Name	Bailey
Stream Name	Unnamed Tributary to Dunkard Fork
Stream Number	N/A
Perennial or Intermittent	Intermittent
Stream Order	1 st
Township/County	Richhill Township/Greene County
Stream Use Classification	Trout Stocking Fishes/Wildlife Water Supply
Panels Undermining Stream	18C
Reported Effects	Flow Loss
Date of Reported Effects	January 18, 2007

D1.H.2 - Location



D1.H.3 - Surrounding Land Use

- The land surrounding this unnamed tributary to Dunkard Fork is deciduous forest.

D1.H.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **January 18, 2007:** the left and right forks of the headwaters were dry for 152 and 137-ft respectively. After 173-ft of flow, another 105-ft dry stretch occurred. The stream then flowed to its confluence with Dunkard Fork. Agents noted that since the tributary (and surrounding ones) was not cut very deep into the earth, it was possible that flow had always been intermittent. Macroinvertebrate life was not seen until 376-ft downstream from the headwater fork confluence.



Figure D-6 - Dry waterfall from right headwater tributary (Photograph from PA DEP files).

D1.H.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

Post-mining:

- **January 18, 2007:** 1,654-ft flowing out of 2,051-ft observed. The rest of the stream length was found to be dry.

D1.H.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** May 19, 2009

Total Rainfall in May 2009	5.6-in
Normal Total Rainfall in May	4.2-in
Total 2009 Rainfall	37.1-in
Total Rainfall 1 Week Prior to Survey	0.7-in
Previous Day Rainfall	0-in

D1.H.7 - Biological Survey Data

- **Length of stream that was observed:** 1,273-ft
- **Length of stream that was pooled/dry:** 0-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	15	49.2
Trichoptera Richness	2	19.1
Percent EPT Richness	53	86.0
Intolerant Taxa Richness	8	50.00
FC+PR Taxa Richness	5	37.0

- **Total Biological Score:** 48.3
- **3 Dominant Taxa Present:**

1. *Acerpenna* (39-pct)
2. *Chironomidae* (36-pct)
3. *Amphinemura* (11-pct)

D1.H.8 - Stream Habitat Assessment

- **Sediment Deposition:** Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5 to 30-pct of the bottom affected; slight deposition on the pools.
- **Channel Flow Status:** Water fills 25 to 75-pct of the available channel, and/or riffle substrates are mostly exposed.
- **Velocity/Depth Regime:** Only 3 of the 4 regimes present.
- **Frequency of Riffles (or Bends):** Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream < 7:1.

D1.H.9 - Status of Reported Effect

- The reported effects on this unnamed tributary to Dunkard Fork were deemed resolved by the PA DEP on May 20, 2008.

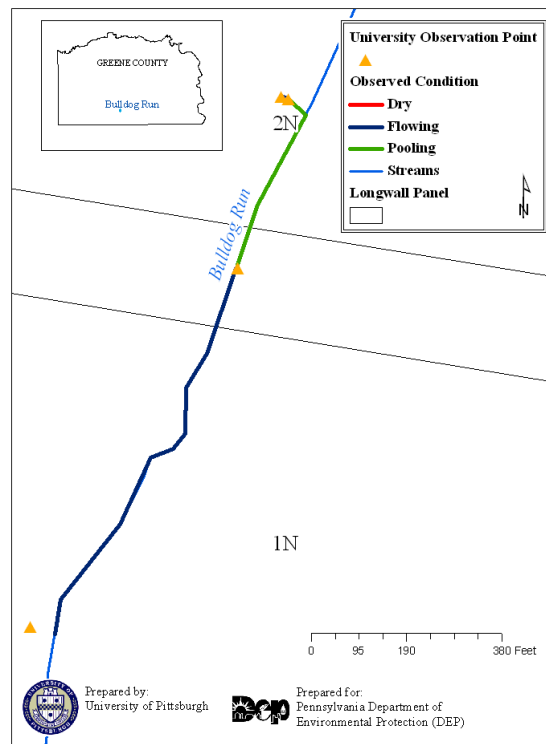
APPENDIX D2: Blacksville No.2 Mine -- Information on Streams Undermined by Longwall Mines during the 3rd Assessment Period and Surveyed by the University of Pittsburgh

D2.A - Bulldog Run / 41728

D2.A.1 - General Information

Mine Name	Blacksville No.2
Stream Name	Bulldog Run
Stream Number	41728
Perennial or Intermittent	Perennial
Stream Order	2 nd
Township/County	Greene County
Stream Use Classification	Warm Water Fishes
Panels Undermining Stream	1N, 2N, 3N, 4N, 5N, and 9S
Reported Effects	Flow Loss, Pooling
Date of Reported Effects	September 1, 2004

D2.A.2 - Location



D2.A.3 - Surrounding Land Use

- The land surrounding 41728 is largely deciduous forest. There are some patches of mixed forest shrubland and pasture/hay also.

D2.A.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **November 3, 2003:** a pre-mining survey was conducted over the 2N panel. The stream has a combination of riffling and small pools over the entire length of the stream on 2N panel.
- **November 10, 2003:** mining is approximately 100-ft beyond the 2N panel of Bull Dog Run. To date, there have been no subsidence observations or damages to the stream. The pre-mining conditions still exist.
- **April 24, 2004:** a pre-mining survey was conducted over the 3N panel. The substrate in this panel was clay with a fine to mid-size cobble. Macroinvertebrate organisms noted in the main streams were cased caddisflies, stonefly and mayfly nymphs.
- **June 15, 2004:** during a post-mining survey of the 3N panel, the stream is running the full length. The stream did go dry for a period of time, but reestablished flow once the panel passed the stream by about 800-ft, at which time flow resumed and continues to flow at this time.
- **June 25, 2004:** the area where the 3N panel went through was inspected. At this time, the stream and the tributary across the road from it is dry. The area where the 4N & 5N panels will be passing is a pre-mining area, and in those sections the water in the stream is pooled with no defined flow.
- **July 26, 2004:** the stream remains dry. The dry sector begins about 200-ft above the head gate for the 3N panel and flows resume near the center of the 2N panel.
- **August 25, 2004:** the stream was still dry even though there had been more than 5-in of rain this month according to the Waynesburg Sewage Treatment Weather Station.
- **September 21, 2004:** a pre-mining survey found flow throughout the 4N panel, although there were heavy rains prior to the survey.
- **October 12, 2004:** the mining was 1,000-ft. past the stream. The stream was dry its whole length through the 4N panel. Also the 3N panel section of the stream is dry. Pre-mining 5N panel was flowing.
- **November 15, 2004:** both of the 3N and 4N sections of the stream are flowing although in the center of 4N still seeing a dry section.
- **June 21, 2005:** the stream was dry and didn't have any flow in the 5N panel and a pre-mining survey of the 6N panel on the same date found the stream to be dry across this proposed panel.
- **August 22, 2005:** three panels, 3N, 4N, and 5N inspected and it was found that 5N completely dry, 4N from what could be seen from the road was dry, and the 3N panel at the confluence of stream 41729 was dry.
- **October 24, 2005:** there had been some rain over the weekend, so Bull Dog Run was checked to see if any flow in the stream and there wasn't any. The 3, 4, 5N panels were checked and they were all dry.
- **December 14, 2006:** the stream was observed from the 6N panel thru the 3N panel. 4,100-ft were walked, of which, 1,430-ft flow, 1,870-ft was dry, and 800-ft had intermittent flow or pooling. Minnows and stone fly were observed.
- **June 4, 2007:** Bull Dog Run was walked from the 6N panel to the 3N panel. Observed 2,360-ft of no flow. Overnight Morgantown reported ~ 0.25-in of rain.
- **July 9, 2008:** stream was observed in the 6N through 4N panel areas. Stream was flowing in these areas.
- **August 6, 2008:** Bulldog Run was observed from near headwaters to confluence with Hoovers Run. The stream was flowing 100-pct throughout this area.



Figure D-7 - Small compression ridge observed in the 3N panel post-mining (Photograph from PA DEP files).

D2.A.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

Pre-mining:

- **July 23, 2004:** 4,705-ft flowing out of 10,056-ft observed. The tributary 41729 was found to be dry and the remainder of 41728 over panels 1N and 2N was also dry.
- **November 4, 2004:** 1,161-ft flowing out of 1,365-ft observed. Only 203-ft were dry over the 3N panel.
- **June 21, 2005:** 0-ft flowing out of 1,552-ft observed. The entire length of the stream over the 4N panel was dry.

Post-mining:

- **December 14, 2006:** 4,692-ft flowing out of 13,451-ft observed over the 3N-6N panels. 2,625-ft was found to be intermittent while 6,135-ft were dry.

D2.A.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** April 13, 2010

Total Rainfall in April 2010	1.5-in
Normal Total Rainfall in April	3.3-in
Total 2010 Rainfall	N/A
Total Rainfall 1 Week Prior to Survey	0.3-in
Previous Day Rainfall	0-in

D2.A.7 - Biological Survey Data

- **Length of stream that was observed:** 1,236-ft
- **Length of stream that was pooled/dry:** 377-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	18	59.0
Trichoptera Richness	4	38.1
Percent EPT Richness	56	90.9
Intolerant Taxa Richness	8	50.0
FC+PR Taxa Richness	7	51.9

- **Total Biological Score:** 58.0
- **3 Dominant Taxa Present:**
 1. *Chironomidae* (27-pct)
 2. *Barbaetis* (14-pct)
 3. *Oligochaeta* (13-pct)

D2.A.8 - Stream Habitat Assessment

- **Sediment Deposition:** Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5 to 30-pct of the bottom affected; slight deposition in pools.
- **Channel Flow Status:** Water fills > 75-pct of the available channel; or < 25-pct of channel substrate is exposed.
- **Velocity/Depth Regime:** Only 3 of the 4 regimes present (fast-deep missing).
- **Frequency of Riffles (or Bends):** Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.

D2.A.9 - Status of Reported Effect

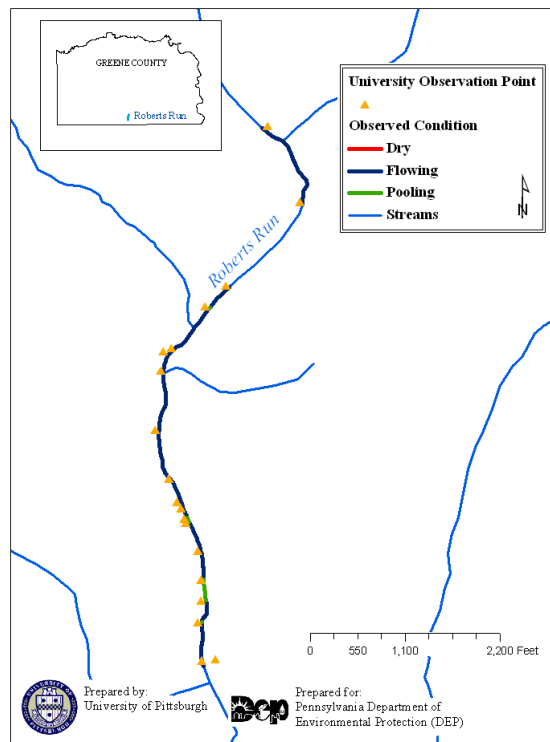
- The reported effects on 41728, filed as two separate stream investigations with the PA DEP, were in part resolved as of August 20, 2008. The investigation over the 3N and 4N panel was deemed resolved as of May 18, 2005; however, the investigation over the 5N panel remains open.

D2.B - Roberts Run / 41813

D2.B.1 - General Information - Roberts Run was determined to have been impacted by mining during the 2nd assessment period, from 1998-2003.

Mine Name	Blacksville No.2
Stream Name	Roberts Run
Stream Number	41813
Perennial or Intermittent	Perennial
Stream Order	3 rd
Township/County	Greene County
Stream Use Classification	Warm Water Fishes
Panels Undermining Stream	1R, 2R, 3R, 4R, 5R, 6R, 7R, 8R
Reported Effects	Flooding
Date of Reported Effects	Effects occurred well before current reporting period; restoration work, however, began in 2003

D2.B.2 - Location



D2.B.3 - Surrounding Land Use

- The land surrounding 41813 is a mixture of pasture/hay, deciduous forest, and evergreen forest. There are also patches of mixed forest shrubland and low intensity residential.

D2.B.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **September 3, 2003:** conducted a follow-up monitoring of the flooding in Robert's Run. Due to the heavy rains, Panels 1R through 8R in the center is over its banks and is causing some flooding in a property owner's yard.
- **October 2, 2003:** construction begins on the restoration project of Roberts Run. The project consists of cutting three gates 1) South gate at 8R, 2) South gate at 7R, and 3) South gate at 4R. The initial phase of the project calls for a 1-pct grading of the section below Panel 8R. The anticipated timeframe for completion of this project is approximately 4 to 6 weeks.
- **October 6, 2003:** the company is in the bottom South portion below Gate 8R. They are presently removing material by way of a backhoe and onto a front end loader, and the front end loader was delivering the material to a truck that is hauling it away. There was a lot of sedimentation in the stream and more sediment mats maybe needed. The stream was monitored below and found the sediment to be at least 1 mile downstream and flowing towards Dunkard Creek.
- **October 8, 2003:** a new sedimentation plan is developed. The agreed upon E&S control plan is to pump the fresh water up above the construction site down to a rock lying trench into the area below the construction site to attempt to reduce the amount of sedimentation.
- **October 9, 2003:** a 6-ft pump was installed into the pool above the affected area pumping the water down to a ditch that is rock-lined with aggregate and then into the stream. Below this area, there is a serious of filter siltation fences from bank to bank in the stream. This new plan appears to be much more effective than just the filter fence across the stream banks.
- **October 14, 2003:** all the work has been completed below the panel 8R. The pump is being moved and the staging area is being changed.

- **October 17, 2003:** the Southern gate of 8R has been cut down, and the pool in Panel 8R has dewatered. Approximately 1 more foot of streambed has to be removed to get the elevation necessary to eliminate the pooling in 8R.
- **October 22, 2003:** work moved to the 7R panel and cutting of the Southern gate of Panel 7R appears to be successful in releasing the pool in Panel 7R.
- **October 24, 2003:** Gate 7R and Gate 8R have been cut and completed. Both pools in Panel 7R and Panel 8R have receded, and there was flow in the panel centers.
- **November 3, 2003:** the mining company is cutting Gate 4R. The progress is slow due to bends in the stream and the stream needs to be widened.
- **November 12, 2003:** a stream survey is conducted to document the stream conditions after 1 full day of rain on November 11, 2003. Panels 3R, 2R, 1R, 5R, and 6R were all flooded in the center of the panel. Panel 8R and 7R had flow and no ponding in the panel due to the cutting of the gates. In gate 4R, a partial removal of the gate has occurred. This in turn has moved the water from 4R and caused it not to pond and flood over its banks.
- **November 17, 2003:** the project is almost complete. The company has jack-hammered the rock formation and are now scooping it out of Roberts Run. The pool in Panel 4R has dropped considerably, ~ 5-ft in depth.
- **December 2, 2003:** the project was highly successful and has eliminated the pooling in Panel 4R, 7R, and 8R. Presently, there is still pooling in Panel 5R, 6R, 1R, 2R, and 3R.
- **October 12, 2004:** 6 North gate cutting was being conducted. The approved erosion controls listed in Chapter 105 had not been implemented correctly. Within and downstream of the work area, excessive siltation was noted within Roberts Run for over 1 mile. Dead fish, almost exclusively suckers, were observed below the active work area.
- **October 13, 2004:** visual observations and samples indicate heavy siltation has occurred to Roberts Run from the gate cutting operation. Aquatic life has been impacted as well as the physical perimeters of the stream. Samples were collected this day.
- **July 16, 2007:** Waynesburg Sewage Plant recorded 1.63-in of rain overnight. Roberts Run was flowing normally across all the longwall gate areas. No evidence of flooding.
- **August 21, 2007:** after 0.79 -in of rain on August 20, 2007 and 2.81-in of rain overnight, Roberts Run was partially over its banks at a nearby property (based upon debris deposited in a field), but not extensive in nature. Even with this evidence, Roberts Run was not even close to flooding any roadways.
- **July 9, 2008:** no flooding evidence observed in this area.



Figure D-8 - Sedimentation observed by PA DEP south of the 8R panel during mitigation work to relieve pooling in the panel (Photograph from PA DEP files).

D2.B.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

- No quantitative data exists for this stream during the 3rd assessment period.

D2.B.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** April 13, 2010

Total Rainfall in April 2010	1.5-in
Normal Total Rainfall in April	3.3-in
Total 2010 Rainfall	N/A
Total Rainfall 1 Week Prior to Survey	0.3-in
Previous Day Rainfall	0-in

D2.B.7 - Biological Survey Data

- **Length of stream that was observed:** 1,115-ft
- **Length of stream that was pooled/dry:** 0-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	16	52.5
Trichoptera Richness	2	19.1
Percent EPT Richness	25	40.6
Intolerant Taxa Richness	4	25.0
FC+PR Taxa Richness	8	59.3

- **Total Biological Score:** 39.3
- **3 Dominant Taxa Present:**
 1. *Chironomidae* (69-pct)
 2. *Sphaeriidae* (10-pct)
 3. *Caenis* (4-pct)

D2.B.8 - Stream Habitat Assessment

- **Sediment Deposition:** Little or no enlargement of islands or point bars and less than 5-pct of the bottom affected by sediment deposition.
- **Channel Flow Status:** Water reaches base of both lower banks and minimal amount of channel substrate is exposed.
- **Velocity/Depth Regime:** All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).
- **Frequency of Riffles (or Bends):** Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream < 7:1; variety of habitat is key.

D2.B.9 - Status of Reported Effect

- The reported effects on 41813 were deemed resolved in September 2003 by the PA DEP; however, mitigation work continued after this date.

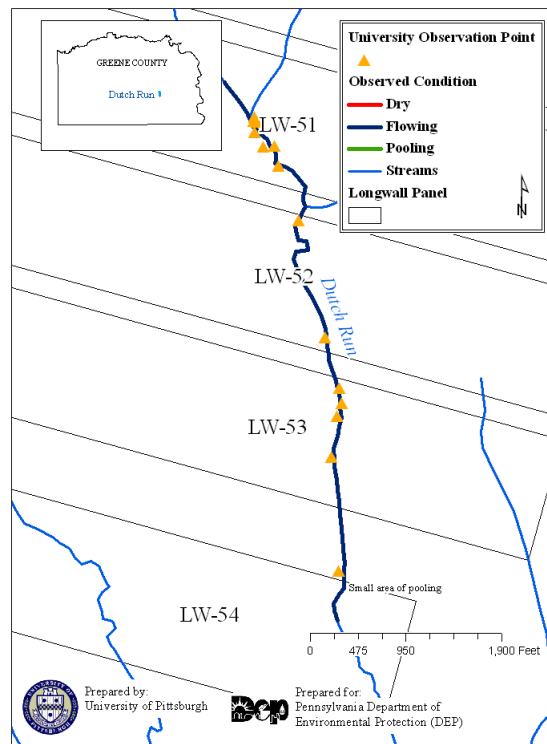
APPENDIX D3: *Cumberland Mine* -- Information on Streams Undermined by Longwall Mines during the 3rd Assessment Period and Surveyed by the University of Pittsburgh

D3.A - Dutch Run / 41246

D3.A.1 - General Information

Mine Name	Cumberland
Stream Name	Dutch Run
Stream Number	41246
Perennial or Intermittent	Intermittent
Stream Order	2 nd
Township/County	Greene County
Stream Use Classification	Trout Stocking Fishes/Wildlife Water Supply
Panels Undermining Stream	49, 50, 51, 52, 53, 54
Reported Effects	Flow Loss, Pooling, Heaves
Date of Reported Effects	August 12, 2004

D3.A.2 - Location



D3.A.3 - Surrounding Land Use

- The land surrounding 41246 is mostly deciduous forest and pasture/hay. There is also some mixed forest shrubland and very small patches of evergreen forest.

D3.A.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **November 4, 2003:** a pre-mining survey was taken over panel 49 with mining expected to begin in about 6 months.
- **July 6, 2004:** after mining began, a visit to the stream revealed no flow loss.
- **July 21, 2004:** a dry stretch over panels LW49 and LW50 was observed. Landowners said they never remembered the stream having been dry before.
- **July 26, 2004:** an augmentation plan was to be put in place to pump water into the stream.
- **July 28, 2004:** after 2 days of rain, the observed dry stretch was still lacking flow. Again, immediate augmentation plans were laid out as well as preemptive augmentation plans for points further down the stream as mining continues.
- **August 17, 2004:** the section over panel LW49 was flowing again. Augmentation wells had also been drilled on a property over panel LW50. Flow was seen in the entire length of Dutch Run.
- **April 12, 2005:** flow was seen over the entire length of the stream.
- **April 21, 2005:** slight pooling was observed over LW50.
- **May 2, 2005:** more pooling was observed over panel LW50. Gate cutting procedures were planned for the coming summer.
- **June 15, 2005:** flow loss and pooling was seen over panel LW50.
- **September 1, 2005:** gate cutting was being done on the LW50 headgate area.
- **January 10, 2006:** the stream was being undermined by panel LW51. No pooling or flow loss was observed at this time.
- **January 18, 2006:** pooling was observed over panel LW51 and some flooding was occurring into a hay field.
- **January 23, 2006:** gate cuts were performed during the fall of 2005 on the LW49 head gate and the LW50 head gate.
- **March 1, 2006:** pooling was still observed over panel LW51 and LW50. Flow loss was not observed.
- **July 3, 2006:** gate cutting work was being done in the LW50 headgate and LW51 tailgate area.
- **August 9, 2006:** pre-mining flow over panels LW52 and LW53 was good and lots of fish and crayfish were observed.
- **October 16, 2006:** more pre-mining surveys were taken. This time pooling and no flow sections were observed over panels LW53 and LW52. Most of the post-mined LW51 area lacked surface flow.
- **October 30, 2006:** the recently mined LW52 panel area was observed and pooling was seen. Flow was very fast and occurring throughout the panel length.
- **November 16, 2006:** flooding was observed over panels LW49-LW52. There had been significant rain the previous night (at least 0.84-in).
- **March 26, 2007:** less flooding was observed and a blockage over panel LW51 had been partially alleviated.
- **April 23, 2007:** a pre-mining survey of panel LW53 showed flow, abundant fish, and macroinvertebrate life.
- **August 15, 2007:** areas of no flow were seen over the pre-mined LW53 area.
- **August 16, 2007:** 0.99 -in of rain had resulted in flow through this dry stretch.
- **August 21, 2007:** a visit was made to look for heaves, but nearly 4-in of rain over the last 2 days had resulted in high flow and muddy water, obscuring the bed.
- **August 23, 2007:** *three large heaves* were observed. Water was flowing over and through them but some pooling was observed, as was a whitish discoloration to the water near the headgate of panel LW53
- **September 19, 2007:** flow was not seen in the *heaved up* portion of the stream over LW53. Pooling was seen to the headgate.
- **September 25, 2007:** it was decided that if flow loss occurred during the wet season then action must be taken.
- **November 15, 2007:** pooling, flow loss and *heaving* was observed over panels LW52 and LW53. Pre-mining survey of LW54 showed some pooling.
- **December 4, 2007:** recent rainfall resulted in flow over the LW53 panel.
- **May 19, 2008:** pooling was seen over panel LW54.
- **June 17, 2008:** restoration efforts over panel LW51 looked very good.

- **July 15, 2008:** pooling was seen over panel LW54 for about 400-ft.



Figure D-9 - Pooling observed by PA DEP during a post-mining survey of stream 41246 (Photograph from PA DEP files).

D3.A.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

Pre-mining:

- **July 22, 2004:** 1,647-ft flowing out of 7,690-ft observed. Tributary 41249 and the rest of the 41246 over panels 49 and 50 were found to be dry.
- **June 15, 2005:** 725-ft flowing out of 2,736-ft observed. The rest of the stream length was found to be dry over panel 50.

D3.A.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** May 12, 2009

Total Rainfall in May 2009	5.6-in
Normal Total Rainfall in May	4.2-in
Total 2009 Rainfall	37.1-in
Total Rainfall 1 Week Prior to Survey	1.1-in
Previous Day Rainfall	0-in

D3.A.7 - Biological Survey Data

- **Length of stream that was observed:** 6,030-ft
- **Length of stream that was pooled:** 10-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	23	75.4
Trichoptera Richness	1	9.5
Percent EPT Richness	26	42.2
Intolerant Taxa Richness	7	43.8
FC+PR Taxa Richness	11	81.5

- **Total Biological Score:** 50.5
- **3 Dominant Taxa Present:**

1. *Chironomidae* (51-pct)
2. *Perlesta* (8-pct)
3. *Hydroporus* (8-pct)

D3.A.8 - Stream Habitat Assessment

- **Sediment Deposition:** No data.
- **Channel Flow Status:** No data.
- **Velocity/Depth Regime:** No data.
- **Frequency of Riffles (or Bends):** No data.

D3.A.9 - Status of Reported Effect

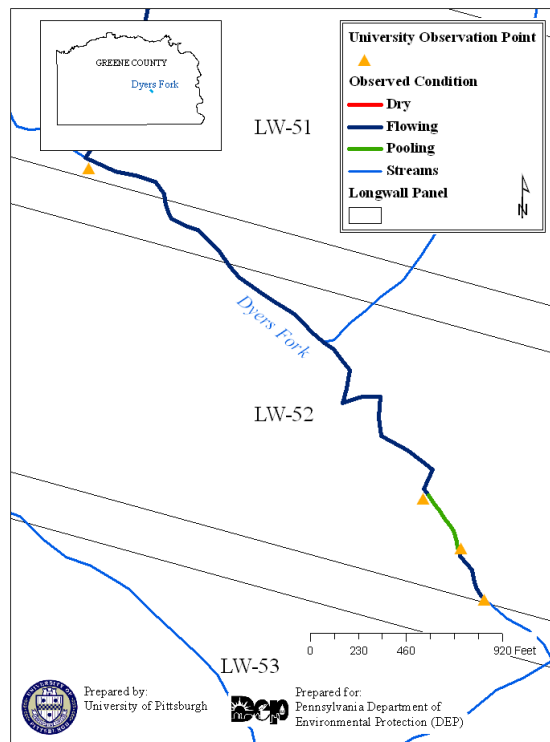
- The reported effects on 41246 were not resolved as of August 20, 2008. A single stream investigation regarding flow loss over this stream was located and this claim has not yet been deemed resolved by the PA DEP. Because the mining company did not dispute the pooling claims, no stream investigations were filed regarding these reported effects.

D3.B - Dyers Fork / 41261

D3.B.1 - General Information

Mine Name	Cumberland
Stream Name	Dyers Fork
Stream Number	41261
Perennial or Intermittent	Perennial
Stream Order	3 rd
Township/County	Greene County
Stream Use Classification	Trout Stocking Fishes/Wildlife Water Supply
Panels Undermining Stream	46, 47, 51, 52, 53, 54
Reported Effects	Flow Loss, Pooling
Date of Reported Effects	August 25, 2003

D3.B.2 - Location



D3.B.3 - Surrounding Land Use

- The land use surrounding 41261 is mostly pasture/hay and deciduous forest. There are a few patches of mixed forest shrubland and some fields of row crops as well.

D3.B.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **August 25, 2003 and September 8, 2003:** 2 post-mining surveys were taken over panels 46 and 47 and there was good flow in the entire segment with pooling behind the 46/47 gate entries.
- **August 27, 2004:** observations were made of the gate cutting procedure over panels 46 and 47.
- **September 1, 2004:** the cutting of a v-notch ditch was observed. It was cut to help drain the swamp area on the property so that the gate cutting procedure may be completed.
- **September 7, 2004:** it was learned that the property owner requested additional stream cutting. However, the requests fell outside of the permit area and thus were not met.
- **September 10, 2004:** all three areas on Dyers Fork where gates have been cut were inspected. All of the sections appear to be functioning properly. No pooled areas were observed.
- **December 2, 2004:** a meeting took place with mining company representatives to discuss some oxbow left on a property near the recent gate cut that the property owner wanted removed. This took additional permit through the Corps of Engineers to accomplish this request. This meeting was to discuss what type of permits would be needed through the Corps so that this work can be accomplished. Hopefully this work will be done during the spring of 2005.
- **October 30, 2006:** flow was observed through the entire stream in panel 51 (may be in part due to high levels of recent precipitation).
- **April 24, 2007:** stream flowing over panel 53 and observed lots of fish and turtles. Pooling was observed on the west side of the Rt. 19 bridge.
- **April 30, 2007:** a *heave* was observed as was the previously noted pooling by the bridge.

- **May 21, 2007:** flow was observed over the recently mined panel 52, however, pooling by the Rt. 19 bridge was still seen.
- **July 9, 2007:** flow loss was observed around the stream's mouth.
- **August 20, 2007:** nearly 3-in of rain
- August 21, 2007: some flooding.
- **August 23, 2007:** flooding was observed to be receding.
- **December 5, 2007:** pooling was still observed around the bridge (after heavy rains). The permit for new gate cuts was approved but work won't begin until the following spring.
- **January 23, 2008:** flow was observed over panels 46 and 47 – areas where flow loss was once observed.
- **February 5, 2008:** pooling and flooding was seen by panels 51, 52 and 53.
- **February 11, 2008:** small *heaves* were observed by panel 53 but the water was easily flowing over them.
- **May 20, 2008:** pooling at several areas (including Rt. 19 bridge).
- **June 17, 2008:** pooling at several areas (including Rt. 19 bridge).
- **July 22, 2008:** there was a discussion with Foundation representatives and they were informed that 105 permit restoration efforts needed to be made downstream of the current restoration efforts.
- **August 18, 2008:** restoration efforts were being made.
- **August 19, 2008:** reshaping of banks was observed.
- **August 20, 2008:** work was in progress.

D3.B.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

- No quantitative data exists for this stream during the 3rd assessment period.

D3.B.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** May 12, 2009

Total Rainfall in May 2009	5.6-in
Normal Total Rainfall in May	4.2-in
Total 2009 Rainfall	37.1-in
Total Rainfall 1 Week Prior to Survey	1.1-in
Previous Day Rainfall	0-in

D3.B.7 - Biological Survey Data

- **Length of stream that was observed:** 3,245-ft
- **Length of stream that was pooled:** 308-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	23	75.4
Trichoptera Richness	2	19.1
Percent EPT Richness	26	42.2
Intolerant Taxa Richness	9	56.3
FC+PR Taxa Richness	9	66.7

- **Total Biological Score:** 51.9
- **3 Dominant Taxa Present:**
 1. *Chironomidae* (31.5-pct)
 2. *Isoperla* (22-pct)
 3. *Oligochaeta* (13-pct)

D3.B.8 - Stream Habitat Assessment

- **Sediment Deposition:** No data.
- **Channel Flow Status:** No data.
- **Velocity/Depth Regime:** No data.

- **Frequency of Riffles (or Bends):** No data.

D3.B.9 - Status of Reported Effect

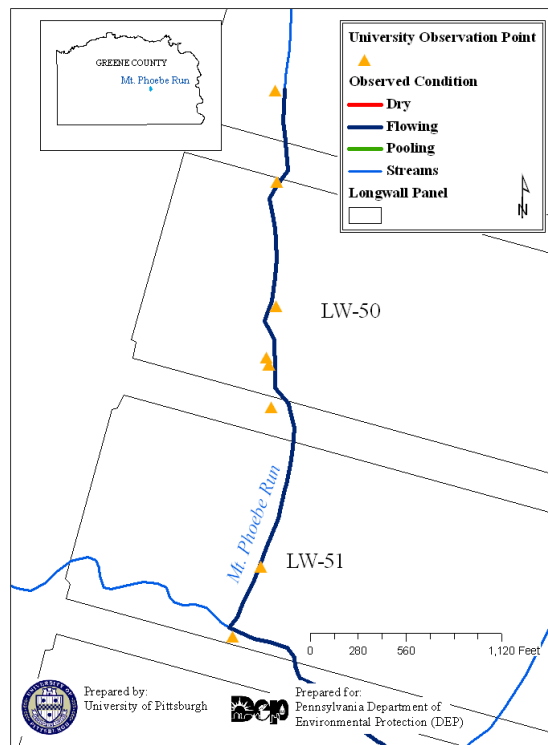
- The reported flow loss issues over panels 46 and 47 were deemed resolved by the PA DEP on January 8, 2004. Again, because the mining company did not dispute the pooling claims, no stream investigations were filed regarding these reported effects.

D3.C - Mount Phoebe Run / 41268

D3.C.1 - General Information

Mine Name	Cumberland
Stream Name	Mt. Phoebe Run
Stream Number	41268
Perennial or Intermittent	Intermittent/Perennial
Stream Order	2 nd
Township/County	Greene County
Stream Use Classification	Trout Stocking Fishes/Wildlife Water Supply
Panels Undermining Stream	49, 50, 51
Reported Effects	Flow Loss, Pooling
Date of Reported Effects	August 22, 2005

D3.C.2 - Location



D3.C.3 - Surrounding Land Use

- The land surrounding 41268 is mostly pasture/hay, with some deciduous forest. There are a few fields of row crops and patches of mixed forest shrubland.

D3.C.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **December 9, 2004:** stream observed during mining and no diminishment of flow was seen.
- **December 16, 2004:** mining was almost complete on LW49 and still there was no diminishment of flow observed.
- **July 27, 2005:** the section of the stream that is undermined by LW49 and LW50 was observed. There was no loss of flow, though it was noted that the flow over some of LW50 was low. Pre-mining video showed that the stream suffered dry stretches over LW50.
- **October 26, 2005:** flow in the stretches of no flow in the pre-mining video. There were also signs of pooling near the head gates of panel LW50.
- **November 14, 2005:** there was a no flow area observed upstream from the head gate of panel LW49 stretching downstream to the LW50 panel. Pooling behind the headgate of LW50 was still occurring.
- **December 8, 2005:** showed flow over panels LW49 and LW50.
- **March 13, 2006:** the stream was observed and flowing well. Some pooling was seen near the head gates for LW49 and LW50.
- **August 14, 2006:** a post mining survey was done for the recently mined LW51 panel. Lack of surface flow was observed in several areas as well as heaving.
- **October 30, 2006:** flow was seen through the entire undermined portion of the stream.
- **March 8, 2007:** pooling was seen at panel LW51 with water level up 1 to 2-ft.
- **May 28, 2007:** flow was seen through panel LW51, as was pooling.

D3.C.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

Post-mining:

- **November 4, 2005:** 1,024-ft flowing out of 2,982-ft observed. The remainder of the stream length was found to be dry.
- **August 14, 2006:** 420-ft pooled out of 1,407-ft observed. The remainder of the stream length was found to be dry.
- Extensive flow data recorded in gallons/minute at multiple monitoring stations can also be found in the stream investigation ST0517.

D3.C.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** May 12, 2009

Total Rainfall in May 2009	5.6-in
Normal Total Rainfall in May	4.2-in
Total 2009 Rainfall	37.1-in
Total Rainfall 1 Week Prior to Survey	1.1-in
Previous Day Rainfall	0-in

D3.C.7 - Biological Survey Data

- **Length of the stream that was observed:** 3,310-ft
- **Length of the stream that was pooled/dry:** 0-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	18	59.0
Trichoptera Richness	2	19.1
Percent EPT Richness	56	90.9
Intolerant Taxa Richness	8	50.0
FC+PR Taxa Richness	7	51.9

- **Total Biological Score:** 54.2

- **3 Dominant Taxa Present:**
 1. *Oligochaeta* (38-pct)
 2. *Isoperla* (21-pct)
 3. *Amphinemura* (9-pct)

D3.C.8 - Stream Habitat Assessment

- **Sediment Deposition:** Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50 to 80-pct of the bottom is affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.
- **Channel Flow Status:** Water fills 25 to 75-pct of the available channel, and/or riffle substrates are mostly exposed.
- **Velocity/Depth Regime:** No data exists.
- **Frequency of Riffles (or Bends):** No data exists.

D3.C.9 - Status of Reported Effect

- The reported flow loss effects on 41268 were deemed resolved - and largely not due to mining, but rather a result of drought - by the PA DEP on April 26, 2006. Again, because the mining company did not dispute the pooling claims, no stream investigations were filed regarding these reported effects.

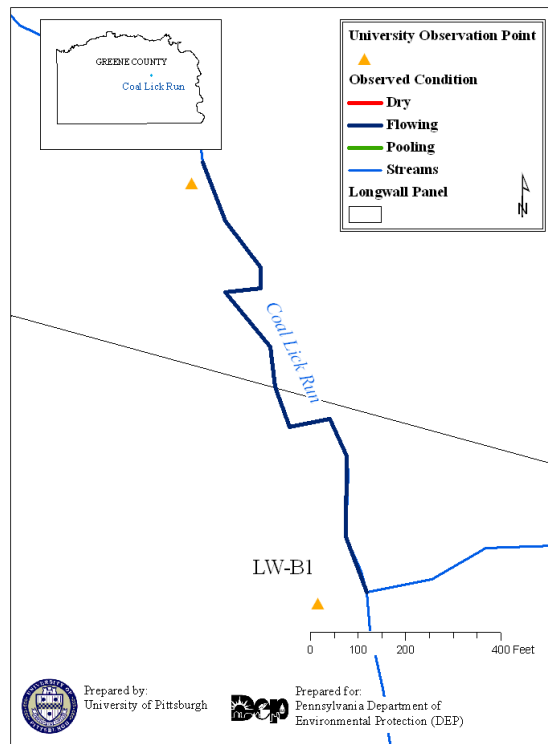
APPENDIX D4: *Emerald Mine* -- Information on Streams Undermined by Longwall Mines during the 3rd Assessment Period and Surveyed by the University of Pittsburgh

D4. A - Coal Lick Run / 40407

D4.A.1 - General Information

Mine Name	Emerald
Stream Name	Coal Lick Run
Stream Number	40407
Perennial or Intermittent	Intermittent
Stream Order	2 nd
Township/County	Greene County
Stream Use Classification	Warm Water Fishes
Panels Undermining Stream	B1, B2, B3
Reported Effects	Flow Loss
Date of Reported Effects	June 27, 2005

D4.A.2 - Location



D4.A.3 - Surrounding Land Use

- The land surrounding 40407 is largely pasture/hay and row crops. There is a large patch of land nearby that is designated as a commercial/industrial/transportation barren as well.

D4.A.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **September 9, September 12, and October 21, 2003:** Pre-mining surveys all noted the stream as flowing well. At this time, DEP agents picked up 3 different species of fish, those being black nosed dazed, black nosed minnow, and creek chubs, and also found a variety of macroinvertebrate organisms.
- **March 10, 2004:** cows were noted and grazing in the upper reaches of the valley.
- **June 27, 2005:** mining had taken place in the B1 and B2 panels and the stream was dry over these panels. Gate cuts were performed around October/November of 2005 to prevent pooling over the B1 panel onto nearby properties.
- **December 8, 2005:** the stream was flowing over the B1 and B2 panels and no pooling was noted either.
- **January 25, 2006:** the stream was flowing over the B1, B2, and B3 panels and minimal pooling was noted.
- **January 3, 2007:** the stream was still in good condition.

D4.A.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

Post-mining:

- **June 29, 2005:** 3,704-ft flowing out of 7,995-ft observed. The remainder of the stream length was found to be dry.

D4.A.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** March 23, 2010

Total Rainfall in March 2010	2.5-in
Normal Total Rainfall in March	3.5-in
Total 2010 Rainfall	N/A
Total Rainfall 1 Week Prior to Survey	0.1-in
Previous Day Rainfall	0.1-in

D4.A.7 - Biological Survey Data

- **Length of stream that was observed:** 1,158-ft
- **Length of stream that was pooled/dry:** 0-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	9	29.5
Trichoptera Richness	0	0.0
Percent EPT Richness	11	17.9
Intolerant Taxa Richness	1	6.3
FC+PR Taxa Richness	5	37.0

- **Total Biological Score:** 18.1
- **3 Dominant Taxa Present:**
 1. *Chironomidae* (47.5-pct)
 2. *Simulium* (31-pct)
 3. *Hemerodromia* (12.5-pct)

D4.A.8 - Stream Habitat Assessment

- **Sediment Deposition:** Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30 to 50-pct of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.
- **Channel Flow Status:** Water reaches base of both lower banks and minimal amount of channel substrate is exposed.
- **Velocity/Depth Regime:** Only 3 of the 4 regimes present (fast-deep missing).
- **Frequency of Riffles (or Bends):** Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.

D4.A.9 - Status of Reported Effect with PA DEP

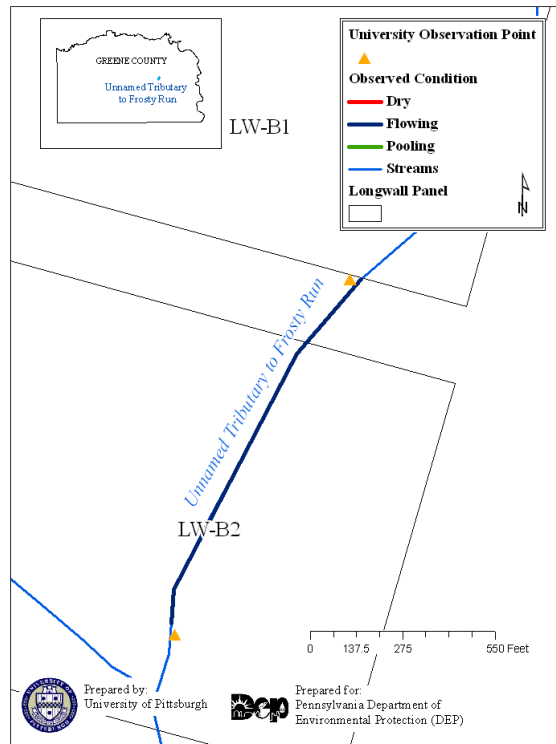
- The reported flow loss effects on 40407 were resolved (repaired) as of January 13, 2007.

D4.B - Unnamed Tributary to Frosty Run / 41239

D4.B.1 - General Information

Mine Name	Emerald
Stream Name	UNT to Frosty Run
Stream Number	41239
Perennial or Intermittent	
Stream Order	1 st
Township/County	Greene County
Stream Use Classification	Trout Stocking Fishes
Panels Undermining Stream	B1, B2
Reported Effects	Flow Loss
Date of Reported Effects	June 1, 2005

D4.B.2 - Location



D4.B.3 - Surrounding Land Use

- The land surrounding 41239 is mostly pasture/hay. There is some deciduous forest and mixed forest shrubland nearby as well.

D4.B.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **December 12, 2006:** during a post-mining survey, flow was seen in two short sections in the headwaters in the B1 panel. A long stretch of no flow was seen down to below a barn, and then flow was seen from that point to the confluence with Frosty Run.
- **April 10, 2007:** flow was seen in the headwaters and through most of the stream channels. Two no flow sections were observed. The first was seen near the headwaters in a heavy alluvial area in the B1 panel. The second was seen in the B2 panel in a pasture field. This flow disruption may have been caused by cattle traffic. Flow was seen then by the barn near Garards Fort Road, under the road, and into Frosty Run.

D4.B.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

- No quantitative data exists for this stream during the 3rd assessment period.

D4.B.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** March 23, 2010

Total Rainfall in March 2010	2.5-in
Normal Total Rainfall in March	3.5-in
Total 2010 Rainfall	N/A
Total Rainfall 1 Week Prior to Survey	0.1-in
Previous Day Rainfall	0.1-in

D4.B.7 - Biological Survey Data

- **Length of stream that was observed:** 1,187-ft
- **Length of stream that was pooled/dry:** 0-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	7	23.0
Trichoptera Richness	0	0.0
Percent EPT Richness	0	0.0
Intolerant Taxa Richness	1	6.3
FC+PR Taxa Richness	5	37.0

- **Total Biological Score:** 13.3
- **3 Dominant Taxa Present:**
 1. *Ceratopogonidae* (70-pct)
 2. *Chironomidae* (21-pct)
 3. *Hemerodromia* (4-pct)

D4.B.8 - Stream Habitat Assessment

- **Sediment Deposition:** Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30 to 50-pct of the bottom affected; sediment deposits at obstructions, constructions, and bends; moderate deposition of pools prevalent.
- **Channel Flow Status:** Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.
- **Velocity/Depth Regime:** Only 2 of the 4 habitat regimes present (slow shallow and fast deep missing).
- **Frequency of Riffles (or Bends):** Occurrence of riffles relatively frequent; ration of distance between riffles divided by width of the stream < 7:1; variety of habitat is key.

D4.B.9 - Status of Reported Effect

- The reported flow loss effects on 41239 were not resolved as of August 20, 2008.

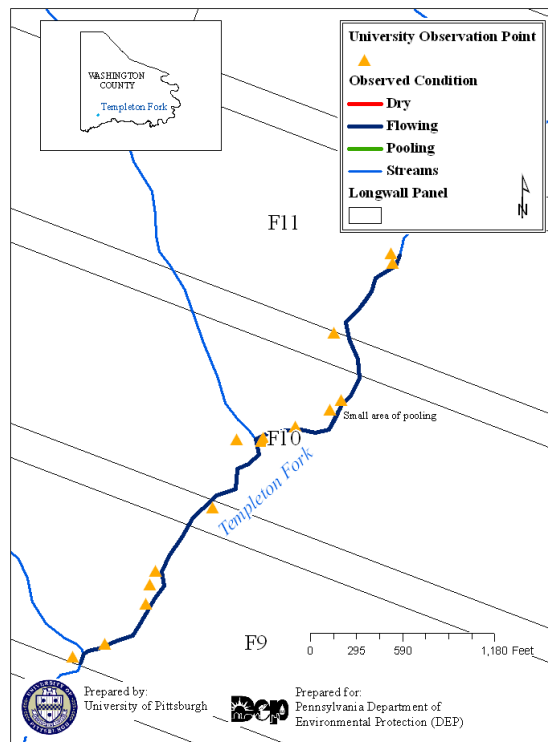
APPENDIX D5: Enlow Fork Mine -- Information on Streams Undermined by Longwall Mines during the 3rd Assessment Period and Surveyed by the University of Pittsburgh

D5.A - Templeton Fork / 32708

D5.A.1 - General Information - Templeton Fork was determined to have been impacted by mining during the 2nd assessment period, from 1998-2003.

Mine Name	Enlow Fork
Stream Name	Templeton Fork
Stream Number	32708
Perennial or Intermittent	Perennial
Stream Order	3 rd
Township/County	East Finely Township/Washington County
Stream Use Classification	Trout Stocking Fishes
Panels Undermining Stream	F1, F2, F3, F4, F5, F6, F7, F8, F9, F10, F11, F12, F13, F14, F15
Reported Effects	Flow Loss, Pooling, Flooding
Date of Reported Effects	Effects occurred well before current reporting period; restoration work, however, began in 2003.

D5.A.2 - Location



D5.A.3 - Surrounding Land Use

- The land surrounding 32708 is mostly pasture/hay and deciduous forest. There is also some mixed forest shrubland and a few areas of evergreen forest and low intensity residential housing.

D5.A.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **November 2004:** post-mining surveys noted major flooding of the East Finley Township Park after heavy rains.
- **February 23, 2005:** PA DEP agents summarize a number of improvements that need to be made to Templeton Fork inside East Finley Township Park: 1) lay back the stream banks to at least 2:1 as outlined in the issued permit, 2) remove the bridge, contour the stream bank, and reconstruct the bridge, 3) straighten the bend where the bridge is located and place a log weir upstream of the bridge location to direct flow toward the center of the channel and protect the bridge supports from erosion, 4) install a J-hook or log vane on the outside of the bends showing indications of erosion to protect the stream bank.
- **May 10, 2005:** a pre-mining survey noted that Templeton Fork was farmed right up to its banks in many places.
- **October 4, 2005:** a post-mining survey over the F11 panel noted that the stream in this area was dry.
- **October 18, 2005:** both flow loss and pooling issues were noted over the F11 panel.
- **January 15, 2006:** gate cuts started over the F10, F11, and F12 panels to alleviate pooling.
- **May 24, 2006:** the remediation was working as the stream was flowing over these panels and no pooling was noted.
- **March 1, 2007:** a pre-mining survey over the proposed F15 panel was performed and the stream was flowing over this area.
- **June 25, 2007:** a during-mining survey over the F14 panel was performed. Pooling was noted over the F13 tailgate and the stream was flowing over F13, F14, and F15 panels except for a 40-ft section near the F14/F15 gate entry.
- **July 9, 2007:** 1,160 ft. of the stream was pooled, mostly over the F14 panel.
- **February 7, 2008:** pooling was noted over the F13, F14, and F15 panels, pooling was worst over the F13 and F14 panels.
- **August, 2008:** pooling persisted over the F13, F14, and F15 panels.

D5.A.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

- No quantitative data exists for this stream during the 3rd assessment period.

D5.A.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** March 25, 2010

Total Rainfall in March 2010	2.5-in
Normal Total Rainfall in March	3.5-in
Total 2010 Rainfall	N/A
Total Rainfall 1 Week Prior to Survey	0.2-in
Previous Day Rainfall	0.1-in

D5.A.7 - Biological Survey Data

- **Length of stream that was observed:** 1,811-ft
- **Length of stream that was pooled/dry:** 0-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	26	85.3
Trichoptera Richness	3	28.6
Percent EPT Richness	27	43.8
Intolerant Taxa Richness	11	68.8
FC+PR Taxa Richness	12	88.9

- **Total Biological Score:** 63.1
- **3 Dominant Taxa Present:**
 1. *Chironomidae* (39-pct)

- 2. *Sphaeriidae* (15-pct)
- 3. *Helicopsyche* (6-pct)
- 3. *Lacophilus* (6-pct)

D5.A.8 - Stream Habitat Assessment

- **Sediment Deposition:** Little or no enlargement of islands or point bars and less than 5-pct of the bottom affected by sediment deposition.
- **Channel Flow Status:** Water reaches base of both lower banks and minimal amount of channel substrate is exposed.
- **Velocity/Depth Regime:** All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).
- **Frequency of Riffles (or Bends):** Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of stream <7:1: variety of habitat is key.

D5.A.9 - Status of Reported Effect

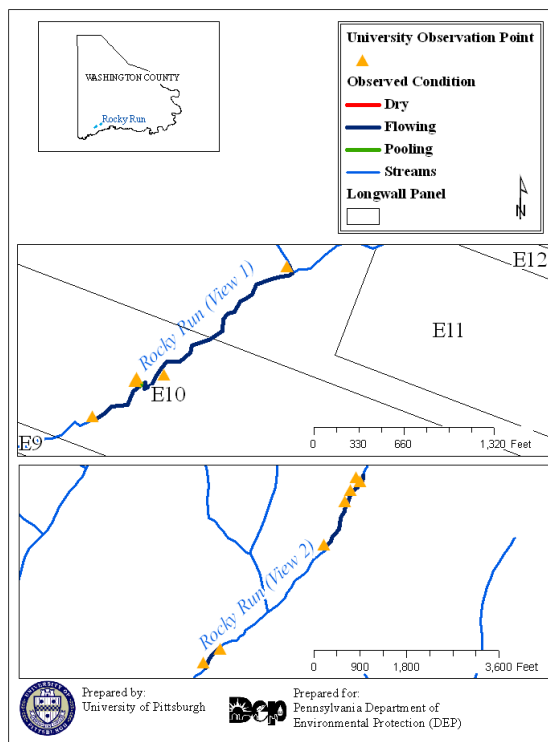
- Because the mining company did not dispute the pooling claims, no stream investigations were filed regarding these reported effects.

D5.B - Rocky Run / 32712

D5.B.1 - General Information

Mine Name	Enlow Fork
Stream Name	Rocky Run
Stream Number	32712
Perennial or Intermittent	
Stream Order	Second
Township/County	Washington County
Stream Use Classification	Trout Stocking Fishes
Panels Undermining Stream	F1, F2, F3, F4, F5, F6, F7, F8, E9, E10, E11, E12, E13, E14, E15
Reported Effects	Flow Loss, Flooding, Pooling
Date of Reported Effects	Effects occurred well before current reporting period; restoration work, however, began in 2003.

D5.B.2 - Location



D5.B.3 - Surrounding Land Use

- The land surrounding 32712 is largely pasture/hay. There is also some mixed forest shrubland and deciduous forest.

D5.B.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **November 20, 2003:** during a post-mining survey, heavy flow of water was observed to erode the far side of the stream. It was pushing the pillar that holds up the bridge on that side of the stream out into the stream channel over the F4 panel.
- **December 18, 2003:** gate cutting and bank stabilization began
- **January 6, 2004:** gate cutting and bank stabilization mostly finished. They added stream bank stabilization in a form of heavy grade rock, which was sprayed in with a mortar to hold them in place to prevent further erosion of the stream banks. The greatest amount of pooling was noted by the East Finley Horse Shoe Club over the F5 and F6 panels. Restoration work in these areas covered ~2000-ft of stream length.
- **February 2, and February 3, 2004:** heavy rains, which would have made Rocky Run flood in the past, but the remediation worked well, and there was no flooding.
- **November 8, 2004:** some pooling over the E10 panel was noticed.
- **February 16, 2005:** erosion downstream of the remediation area was thought to be caused by the stream bank grouting, because the water flow over this area was at a much higher velocity.
- **May 10, 2005:** pre-mining survey over the E11, E12, and E13 panels noted that Rocky Run was flowing well, but was farmed and pastured right up to the stream banks.
- **October 18, 2005:** the stream was dry for several hundred feet, over the E11 panel and into the E12 panel.
- **October 31, 2005:** the E11 and recently mined E12 longwall panels were inspected again. The stream was flowing the entire distances of the stream channel and seemed to have a significant amount of flow in it.
- **August 16, 2006:** the stream was flowing across both the E14 and E15 panels and also across the recently mined E13 panel. Flow was very minimal but flow was noted in the stream channel the entire length across

the three panels at this time.

- **August 8, 2007:** a post-mining survey over the E14 and E15 panels noted that the stream was flowing across both panels with no noted mining induced changes in the stream channel.

D5.B.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

- No quantitative data exists for this stream during the 3rd assessment period.

D5.B.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** March 25, 2010

Total Rainfall in March 2010	2.5-in
Normal Total Rainfall in March	3.5-in
Total 2010 Rainfall	N/A
Total Rainfall 1 Week Prior to Survey	0.2-in
Previous Day Rainfall	0.1-in

D5.B.7 - Biological Survey Data

- **Length of stream that was observed:** 2,103-ft
- **Length of stream that was pooled/dry:** 39-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	11	36.1
Trichoptera Richness	2	19.1
Percent EPT Richness	18	29.2
Intolerant Taxa Richness	0	0.0
FC+PR Taxa Richness	5	37.0

- **Total Biological Score:** 24.3
- **3 Dominant Taxa Present:**
 1. *Chironomidae* (79-pct)
 2. *Oligochaeta* (8-pct)
 3. *Sphaeriidae* (5-pct)

D5.B.8 - Stream Habitat Assessment

- **Sediment Deposition:** Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5 to 30-pct of the bottom affected; slight deposition in pools.
- **Channel Flow Status:** Water reaches base of both lower banks and minimal amount of channel substrate is exposed.
- **Velocity/Depth Regime:** All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).
- **Frequency of Riffles (or Bends):** Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream < 7:1; variety of habitat is key.

D5.B.9 - Status of Reported Effect

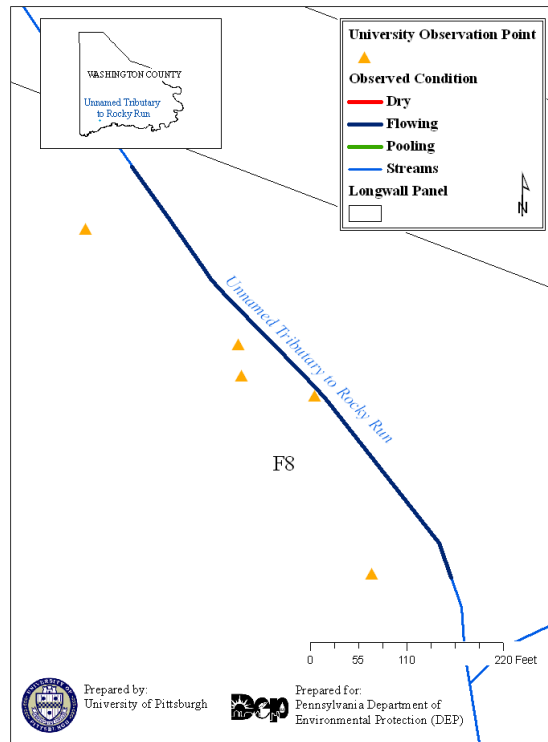
- Because the mining company did not dispute the pooling claims, no stream investigations were filed regarding these reported effects.

D5.C Unnamed Tributary to Rocky Run / 32721

D5.C.1 - General Information

Mine Name	Enlow Fork
Stream Name	UNT to Rocky Run
Stream Number	32721
Perennial or Intermittent	
Stream Order	1 st
Township/County	Washington County
Stream Use Classification	Trout Stocking Fishes
Panels Undermining Stream	F8, F9, F10
Reported Effects	Flow Loss, Heaves
Date of Reported Effects	August 30, 2004

D5.C.2 - Location



D5.C.3 - Surrounding Land Use

- The land surrounding 32721 is mostly deciduous forest, with some mixed forest shrubland and pasture/hay.

D5.C.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **October 13, 2004:** during a post-mining survey, a 500-ft section of dry streambed was observed over the F8 panel with some rocky *heaves*.
- **December 16, 2004:** DEP approved the mining company’s suggested action plan of comparing the flow in the stream to two control streams: 1) Crafts Creek tributary 40946 and 2) Templeton Fork tributary 32740.

- **June 7, 2005:** another survey observed water flowing through the previously dry stretch. 1.5-in of rain had come down less than two days prior to this survey. *Compression ridges* previously noted still existed but water was flowing over or through them.
- **December 6, 2005:** revealed that the previously dry stretch was dry again and compression ridges still remained.
- **February 27, 2006:** showed that water was running through the stream’s entire length.
- **February 13, 2008:** observations of flowing water.



Figure D-10 – Compression ruptures observed by PA DEP in the F8 panel during a post-mining survey (Photograph from PA DEP files).

D5.C.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

Post-mining:

- **July 28, 2004:** 8,675-ft flowing out of 9,157-ft observed. The other 482-ft of stream length was found to be dry.

D5.C.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** May 29, 2009

Total Rainfall in May 2009	5.6-in
Normal Total Rainfall in May	4.2-in
Total 2009 Rainfall	37.1-in
Total Rainfall 1 Week Prior to Survey	0.9-in
Previous Day Rainfall	0.03-in

D5.C.7 - Biological Survey Data

- **Length of stream that was observed:** 597-ft
- **Length of stream that was pooled/dry:** 0-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	21	68.9
Trichoptera Richness	4	38.1
Percent EPT Richness	48	77.9
Intolerant Taxa Richness	11	68.8

FC+PR Taxa Richness	8	59.3
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- **Total Biological Score:** 62.6
- **3 Dominant Taxa Present:**
 1. *Chironomidae* (45-pct)
 2. *Stenonema* (10-pct)
 3. *Amphinemura* (9-pct)

D5.C.8 - Stream Habitat Assessment

- **Sediment Deposition:** Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5 to 30-pct of the bottom affected; slight deposition in pools.
- **Channel Flow Status:** Water fills 25 to 75-pct of the available channel, and/or riffle substrates are mostly exposed.
- **Velocity/Depth Regime:** Only 2 of the 4 habitat regimes present.
- **Frequency of Riffles (or Bends):** Occurrence of riffles relatively frequent, ratio of distance between riffles divided by width of the stream < 7:1 (generally 5 to 7).

D5.C.9 - Status of Reported Effect

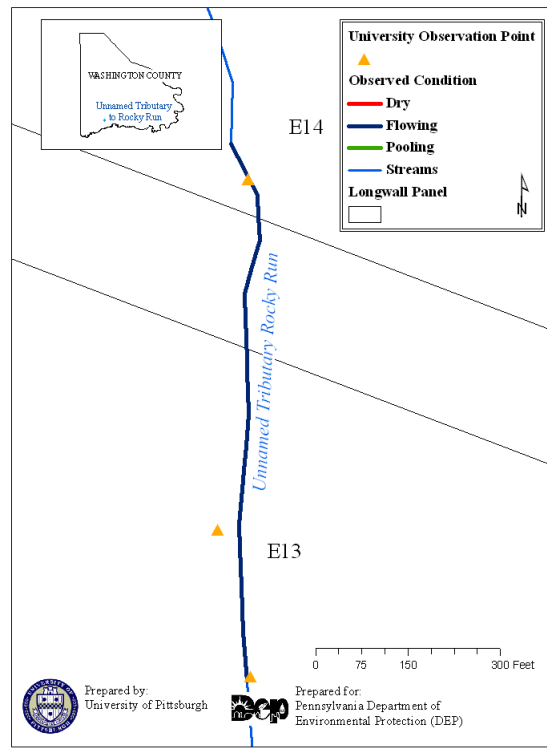
- The reported effects on 32721 were deemed resolved as of March 15, 2006 after comparison of flow with control streams.

D5.D - Unnamed Tributary to Rocky Run / 32724

D5.D.1 - General Information

Mine Name	Enlow Fork
Stream Name	UNT to Rocky Run
Stream Number	32724
Perennial or Intermittent	
Stream Order	1 st
Township/County	Washington County
Stream Use Classification	Trout Stocking Fishes
Panels Undermining Stream	E12, E13, E14
Reported Effects	Flow Loss
Date of Reported Effects	May 2007

D5.D.2 - Location



D5.D.3 - Surrounding Land Use

- The land surrounding 32724 is largely pasture/hay. There are some row crops in the area, but very little deciduous or evergreen forest.

D5.D.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **June 21, 2007:** the stream was dry across the E12 panel for approximately 400-ft. Flow resumed in the stream due to decanting from a pond.
- **November 1, 2007:** no flow was observed in the headwaters over E12 or downstream of the pond because it was not decanting.
- **November 28, 2007:** the stream was flowing its entire length and pond was decanting, but there had been 2-in of precipitation two days earlier. A wetland area developed on a nearby property post-mining, the property owner believed that this area could be redirected to the stream to help flow downstream of his pond.
- **March 19, 2008:** meeting between the PA DEP, mining company, and property owner to discuss redirecting the spring into the stream and doing work on the pond so it could constantly decant.
- **July 16, 2008:** the stream was flowing its entire length and the pond was decanting.
- **August 4, 2008:** mitigation had been completed and the stream was flowing its entire length. The mitigation included installing drains in the wetland area to feed the stream, diverting the spring into the stream channel, and placing stabilization stone in the stream channel to stabilize the banks.
- **August 19, 2008:** the stream had intermittent flow downstream of the pond and minimal flow upstream of it.



Figure D-11 - Mitigation work observed by PA DEP during a post-mining survey (Photograph from PA DEP files).

D5.D.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

Post-mining:

- **August 21, 2006:** 4,461-ft flowing out of 4,980-ft observed. The remainder of the stream length was found to be dry.
- **June 21, 2007:** 59-ft out of 925-ft observed. The remainder of the stream length was found to be dry.

D5.D.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** May 29, 2009

Total Rainfall in May 2009	5.6-in
Normal Total Rainfall in May	4.2-in
Total 2009 Rainfall	37.1-in
Total Rainfall 1 Week Prior to Survey	0 -in
Previous Day Rainfall	0 -in

D5.D.7 - Biological Survey Data

- **Length of stream that was observed:** 1,253-ft
- **Length of stream that was pooled/dry:** 0-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	13	42.6
Trichoptera Richness	0	0.0
Percent EPT Richness	15	24.4
Intolerant Taxa Richness	3	18.8
FC+PR Taxa Richness	3	22.2

- **Total Biological Score:** 21.6
- **3 Dominant Taxa Present:**
 1. *Chironomidae* (60.5-pct)
 2. *Physidae* (16-pct)
 3. *Chrysops* (9-pct)

D5.D.8 - Stream Habitat Assessment

- **Sediment Deposition:** Moderate deposition of new gravel, sand, or fine sediment on old and new bars; ~45-pct of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.
- **Channel Flow Status:** Water fills > 75-pct of the available channel; or < 25-pct of channel substrate is exposed.
- **Velocity/Depth Regime:** Only 2 of the 4 habitat regimes present.
- **Frequency of Riffles (or Bends):** Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream < 7:1; variety of habitat is key.

D5.D.9 - Status of Reported Effect

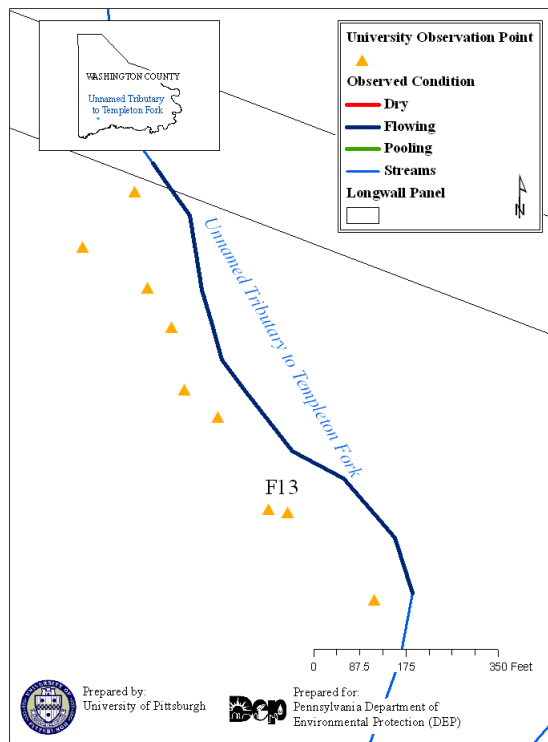
- The reported flow loss effects on 32724 were not resolved as of August 20, 2008.

D5.E - Unnamed Tributary to Templeton Fork / 32740

D5.E.1 - General Information

Mine Name	Enlow Fork
Stream Name	UNT to Templeton Fork
Stream Number	32740
Perennial or Intermittent	
Stream Order	1 st
Township/County	Washington County
Stream Use Classification	Trout Stocking Fishes
Panels Undermining Stream	F13, F14, F15, F16
Reported Effects	Flow Loss, Fractures
Date of Reported Effects	September 2006

D5.E.2 - Location



D5.E.3 - Surrounding Land Use

- The land surrounding 32740 is deciduous forest with some pasture/hay. There are a few small patches of mixed forest shrubland in the area as well.

D5.E.4 - Details of Stream Observations Conducted by PA DEP Subsidence Agents / Biologists

- **September 20, 2006:** observed a dry section of stream over the F13 panel approximately 650-ft in length with *compression heaves* and subsidence cracks.
- **January 29, 2007:** 400-ft of the stream was dry and only one of the three augmentation sites was turned on.
- **February 20, 2007:** the 400-ft stretch was still dry, so grouting was begun in this area.
- **March 29, 2007:** the entire length of stream was flowing, but mostly due to the snow melt.
- **April 27, 2007:** a pre-mining observation of 32740 over the F14 panel was performed and the stream was flowing over the entire length without any mining induced changes.
- **May 7, 2007:** the stream flowed over F14, but was reduced significantly over F13, augmentation was not turned on.
- **May 30, 2007:** *compression heaves* were observed in a 400-ft. dry section over the F14 panel, and 150-ft was dry over the F13 panel while augmentation was turned off in this area.
- **June 26, 2007:** three more augmentation points were added to the stream over the F14 panel, six augmentation points are now active and the stream was flowing the entire length.
- **September 19, 2007:** four augmentation pumps were turned off because they were draining water from Templeton Fork and causing it to go dry for 500-ft., as a result 32740 was dry in many places, mostly concentrated over the F13 panel. The mining company planned to drill a well for augmentation as an alternative to Templeton Fork. They also planned to re-grout the area previously grouted over the F13 panel.

- **February 28, 2008:** the stream was flowing over its entire length, however, there had recently been 2.5-in. of precipitation.
- **June 16, 2008:** a during-mining observation was performed over the F16 panel and a post-mining observation was performed over the F15 – F13 panels, the entire stream was flowing except in the area over F13 where the grouting was going on. The re-grouting seems to be largely successful, but there are occasionally dry sections from 100 to 300-ft. over the F13 panel.



Figure D-12 - Stream channel after grouting as observed by PA DEP during a post-mining survey (Photograph from PA DEP files).

D5.E.5 - Flow Observations Conducted by PA DEP Subsidence Agents / Biologists

Post-mining:

- **December 18, 2006:** 0-ft flowing out of 722-ft observed. The entire stream length that was observed was dry.

D5.E.6 - Weather Conditions Prior to Biological Survey

- Weather data obtained from Waynesburg Sewage Plant
- **Date of survey:** May 29, 2009

Total Rainfall in May 2009	5.6-in
Normal Total Rainfall in May	4.2-in
Total 2009 Rainfall	37.1-in
Total Rainfall 1 Week Prior to Survey	0.9-in
Previous Day Rainfall	0.03-in

D5.E.7 - Biological Survey Data

- **Length of stream that was observed:** 1,017-ft
- **Length of stream that was pooled/dry:** 0-ft

Metric	Observed Value	Adjusted Value
Taxa Richness	16	52.5
Trichoptera Richness	4	38.1
Percent EPT Richness	69	100.0
Intolerant Taxa Richness	12	75.0
FC+PR Taxa Richness	4	29.6

- **Total Biological Score:** 59.0
- **3 Dominant Taxa Present:**
 1. *Acerpenna* (20-pct)
 2. *Chironomidae* (20-pct)
 3. *Stenonema* (16-pct)

D5.E.8 - Stream Habitat Assessment

- **Sediment Deposition:** Some new increase in bar formation, mostly from gravel, sand, or fine sediment; > 15-pct of the bottom affected; slight deposition
- **Channel Flow Status:** Water fills 50-pct of the available channel, and/or riffle substrates are mostly exposed.
- **Velocity/Depth Regime:** All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, and fast-shallow).
- **Frequency of Riffles (or Bends):** Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream < 7:1; variety of habitat is key.

D5.E.9 - Status of Reported Effect

- The reported flow loss effects on 32740 were not resolved as of August 20, 2008.