Bear Run Restoration Plan

Banks Township, Indiana County
Bell Township, Clearfield County
Gaskill Township, Jefferson County

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Growing Greener Grant Program

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Acknowledgements

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Much appreciation goes out to the Susquehanna River Basin Commission, particularly Beth Dillon, who offered their knowledge, data and pictures of Bear Run. Without their help, we could not have completed this project at the funding level that we obtained.

Knowledge of the watershed was also offered by Art Hamley of the Pennsylvania Game Commission who knew of exact mine drainage discharge locations and other possible problem areas.

Three main people assisted with the collection of field data, Dan Heggenstaller, Chris Henry and Michelle Henry. A thanks goes out to them for not only helping me with data collection, but also for keeping me company up in the wilds of the Bear Run watershed.

A thanks also goes out to the Evergreen Conservancy and the Ken Sink Chapter of Trout Unlimited who have become interested in the restoration of the Bear Run watershed. They both will be leading the future charge to a watershed wide sustainable trout fishery.

And finally, a special thanks goes out to the Pennsylvania Department of Environmental Protection who are taking a grant funding interest in the Bear Run watershed and to Joe Allison, our PA DEP Grant Advisor, who has remained patient for this product.

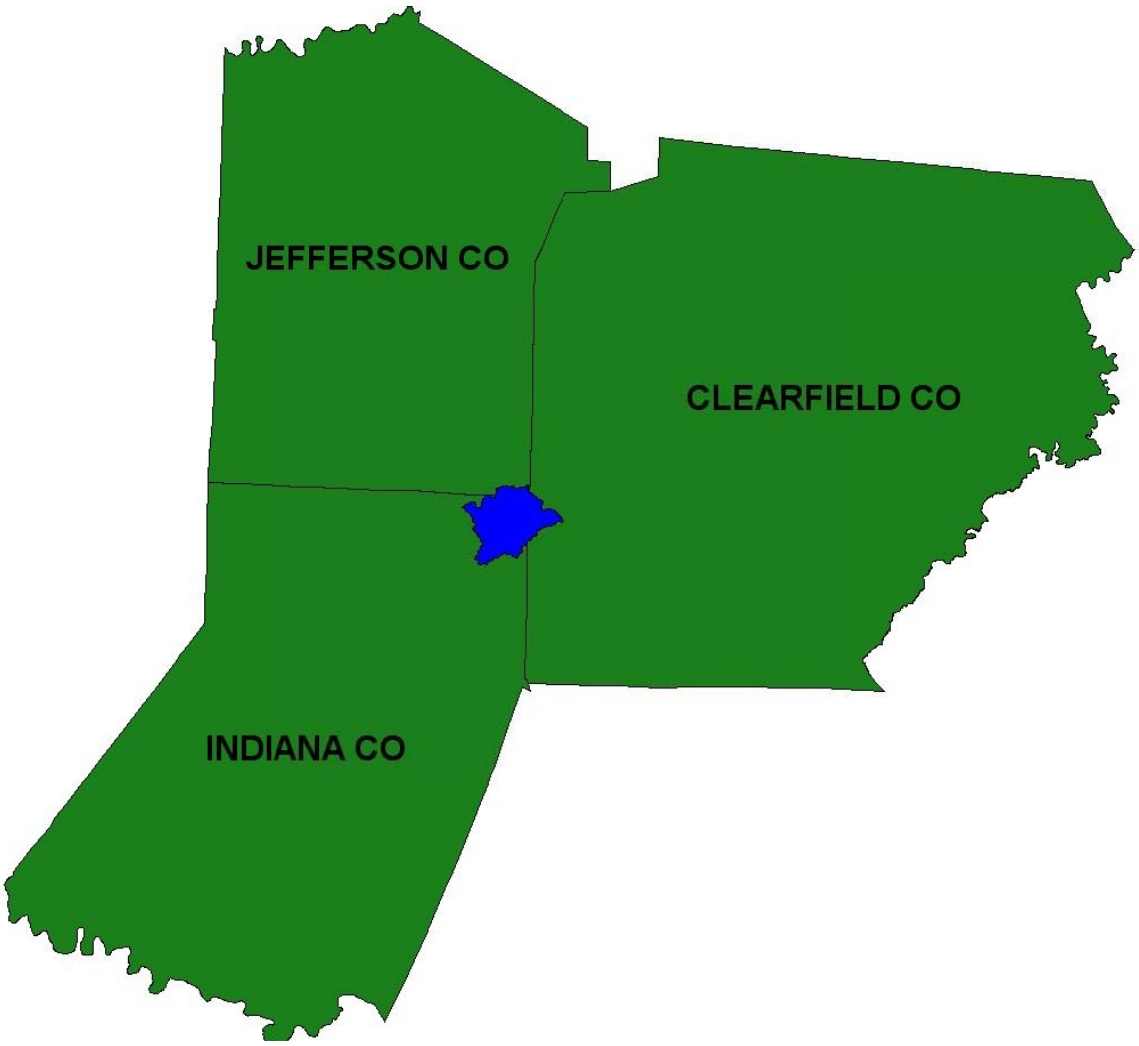


Figure 1. Location of the Bear Run watershed in Indiana, Clearfield and Jefferson Counties Pennsylvania.

Figure 2. Map of the Bear Run watershed in Banks, Bell and Gaskill Townships.

Introduction

Beginning in 1995, the Indiana County Conservation District (ICCD) became interested in the restoration of the Bear Run watershed, an approximately 19.3 square mile drainage basin of the West Branch of the Susquehanna River. In 1995 a small scale assessment of the current stream water quality and some abandoned mine drainage (AMD) discharge sites was initiated with assistance from Americorp volunteers. Even though no real restoration action was completed post assessment, a better understanding of the Bear Run watershed was accomplished for ease into possible future action.

That future action surfaced with the rise of the Pennsylvania Department of Environmental Protection's (PA DEP) Growing Greener Initiative. In 2002 the ICCD submitted and was awarded a $9,072 Growing Greener grant (Document # 3521140) for a more comprehensive non-point source (NPS) assessment of the Bear Run watershed. Pollution sources from agriculture, urbanization, silviculture and especially resource extraction were the focus of the investigation.

The compilation of past collected data was first completed for the elimination of redundancy. In addition, field collection of data could be lessened and quickened. This compilation was made simple since the Susquehanna River Basin Commission (SRBC) was completing a Total Maximum Daily Load (TMDL) study of the Bear Run watershed just prior to this NPS pollution assessment. All data collected by the SRBC was graciously made available to us for our compilation.

Field collection of data to fill gaps in the past data was initiated in the summer of 2003 and completed in the fall of 2005. Major NPS pollution impacts were located and investigated. These sites were then organized on a Delorme 3-D TopoQuads Digital Mapping Program.

A water monitoring program of the AMD discharges impacting the watershed began in summer 2004 and concluded in fall 2005. Most priority discharges were sampled twelve times. Water quality sampling was also completed upstream and downstream of these priority discharges to document the stream degradation caused by each. All other minor discharges and tributaries were sampled at least twice. Sampling was completed to capture data during high, normal and low flow events.

All collected data was then analyzed and organized into this restoration plan. The Bear Run Restoration Plan should be used as a guide for all future remediation work.

Watershed Characteristics

The Bear Run Watershed, located in State Water Plan (SWP) 08B, is an approximately 19.3 square mile drainage (comprised of approximately just over 45 stream miles) of the West Branch of the Susquehanna River in Indiana, Jefferson and Clearfield Counties (Figure 1). The headwaters of Bear Run begin near the town of Hillman, Indiana County. Bear Run then flows southeast until its confluence with the South Branch of Bear Run. There Bear Run flows east to its confluence with the West Branch of the Susquehanna River in the town of McGees Mills, Clearfield County (Figure 2). Just over 30% of the watershed is located in State Game Land (SGL) 174.

The Bear Run watershed is found within the Pittsburgh Low Plateau Phsyiographic Unit (Figure 3). The Pittsburgh Low Plateau Unit is described as having a smooth to irregular, undulating surface; with narrow relatively shallow valleys; strip mines and reclaimed land. The underlying rock types are mainly composed of shale, siltstone, sandstone, limestone and coal. The geologic structure is described as having moderate to low amplitude open folds decreasing in occurrence northwestward. Elevations range from 1325 ft at the confluence of Bear Run with the West Branch of the Susquehanna River to

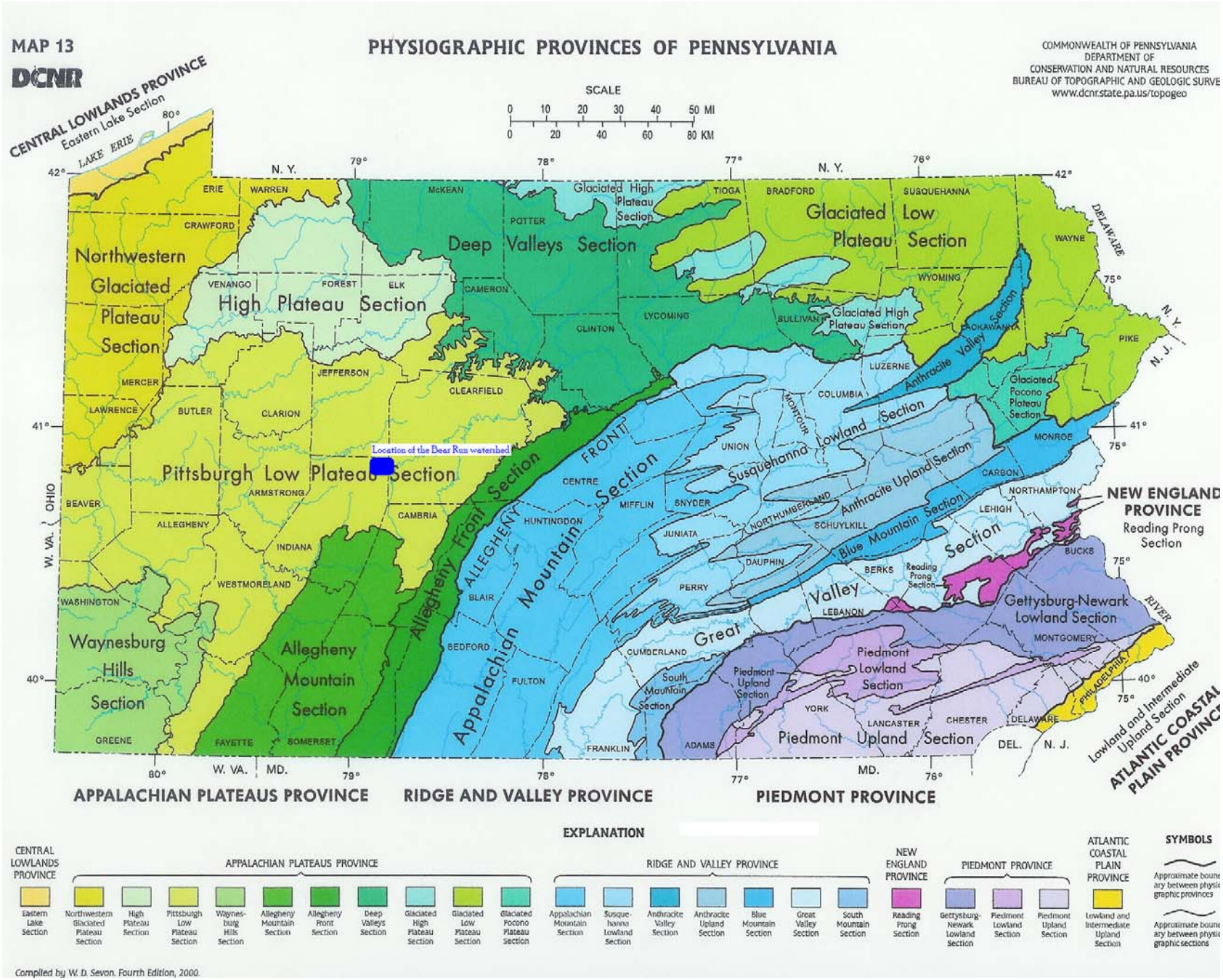


Figure 3. A map of the Physiographic Providences of Pennsylvania. The Bear Run Watershed is outlined in blue.

slightly greater than 2100 ft very near the boundary where Indiana, Clearfield and Jefferson Counties meet. The average slope of the main stem is just over 1.6%.

A majority of the watershed (82.14% or approximately 15.85 square miles) lies within the Allegheny Formation (Figure 4). This is where the main coal seam mined, the Lower Kittanning, is present. In the stream valleys of the watershed, the Pottsville Formation is present and accounts for 12.1% or 2.33 square miles of the watershed. The Mercer Coal Seams are present here, including the Clarion and Brookville which have been mined. At the highest elevation points in the watershed, particularly around the watershed boundary on higher peaks, the Glenshaw Formation is found. The Glenshaw Formation only accounts for 5.76% or 1.11 square miles of the watershed. The Chestnut Ridge Anticline travels through the middle of the South Branch of Bear Run sub watershed (Figure 5).

A majority of the watershed (69.28% or 13.37 square miles) is comprised of Hazleton Soils (Figure 6). Hazleton Soils are deep, well drained, and stony or channery. They formed in material weathered from sandstone. Hazleton Soils tend to favor red oak, ash, yellow poplar, black oak, sugar maple and white pine. The other major soil type found in the Bear Run watershed is the Gilpin. Gilpin Soil comprises 26.66% or 5.15 square miles of the watershed. Gilpin soils are moderately deep, well drained and medium textured. They are usually found on uplands and contain some clay. Gilpin Soils tend to favor red oak, ash, sugar maple, yellow poplar and Virginia pine. Two other soils types, Tilset and Udotherts, are found in the watershed, but only comprise slightly over 4%, or just over 0.75 square miles of the watershed.

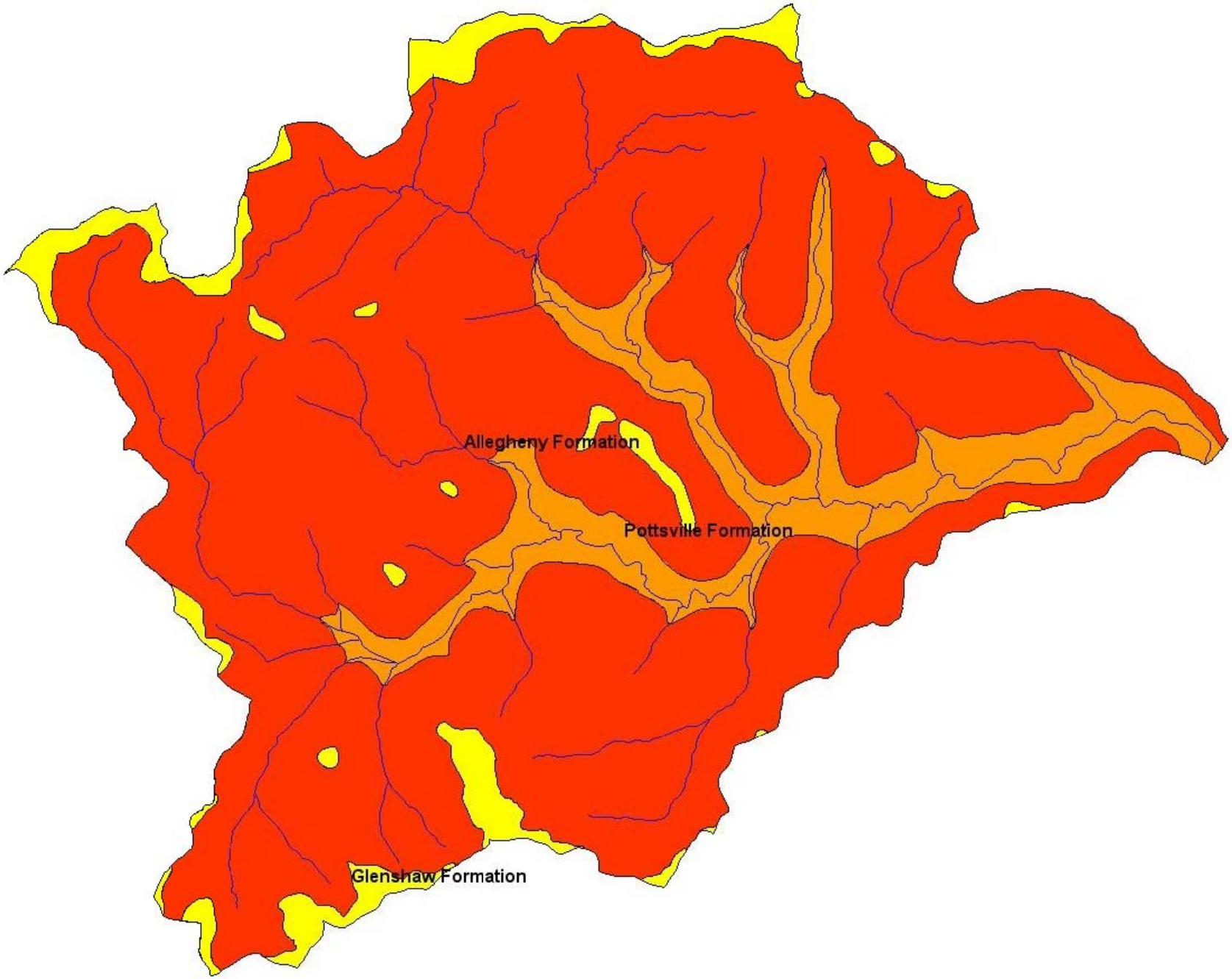


Figure 4. The geological map of the Bear Run Watershed.

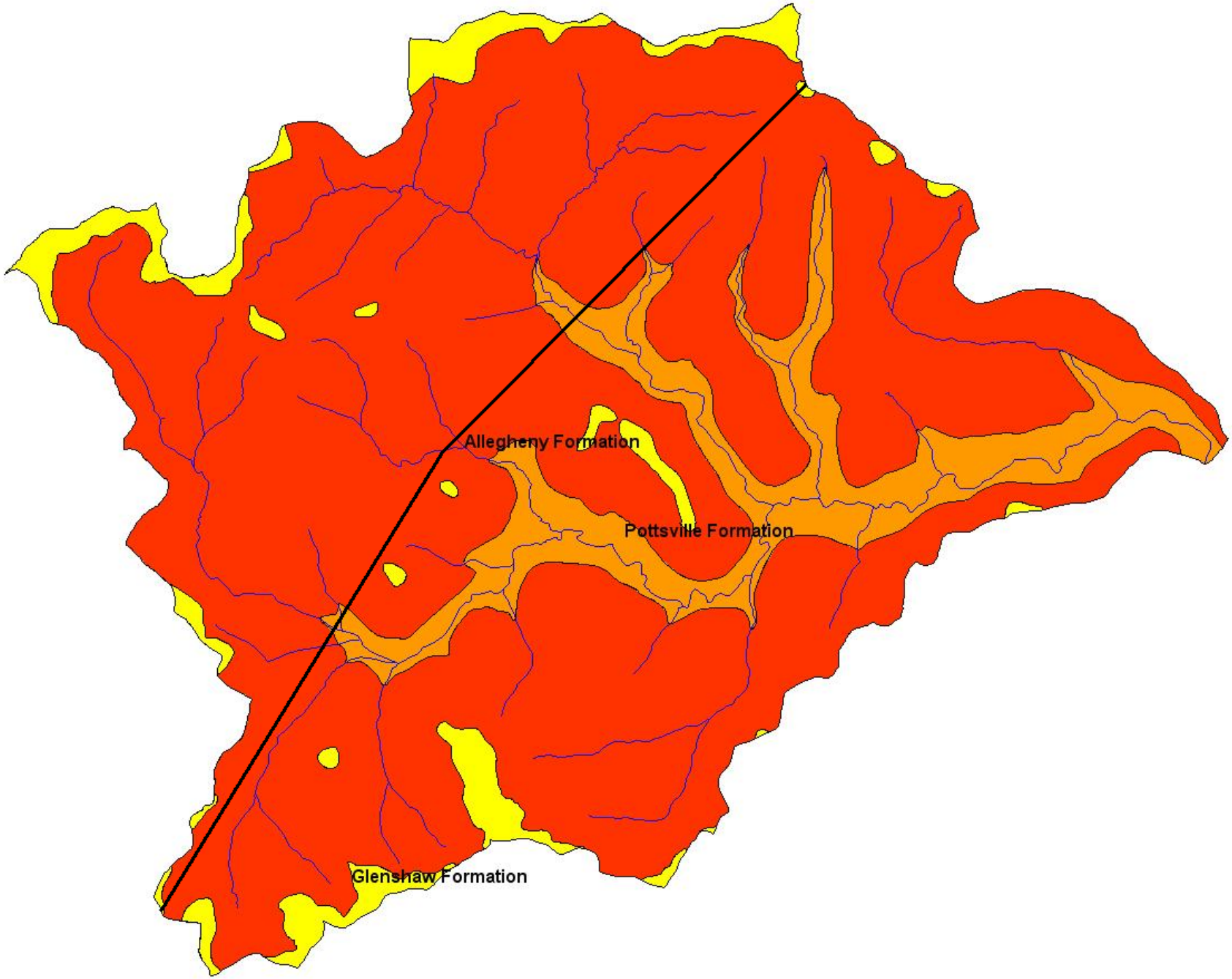


Figure 5. The approximate location of the Chestnut Ridge Anticline through the Bear Run Watershed.

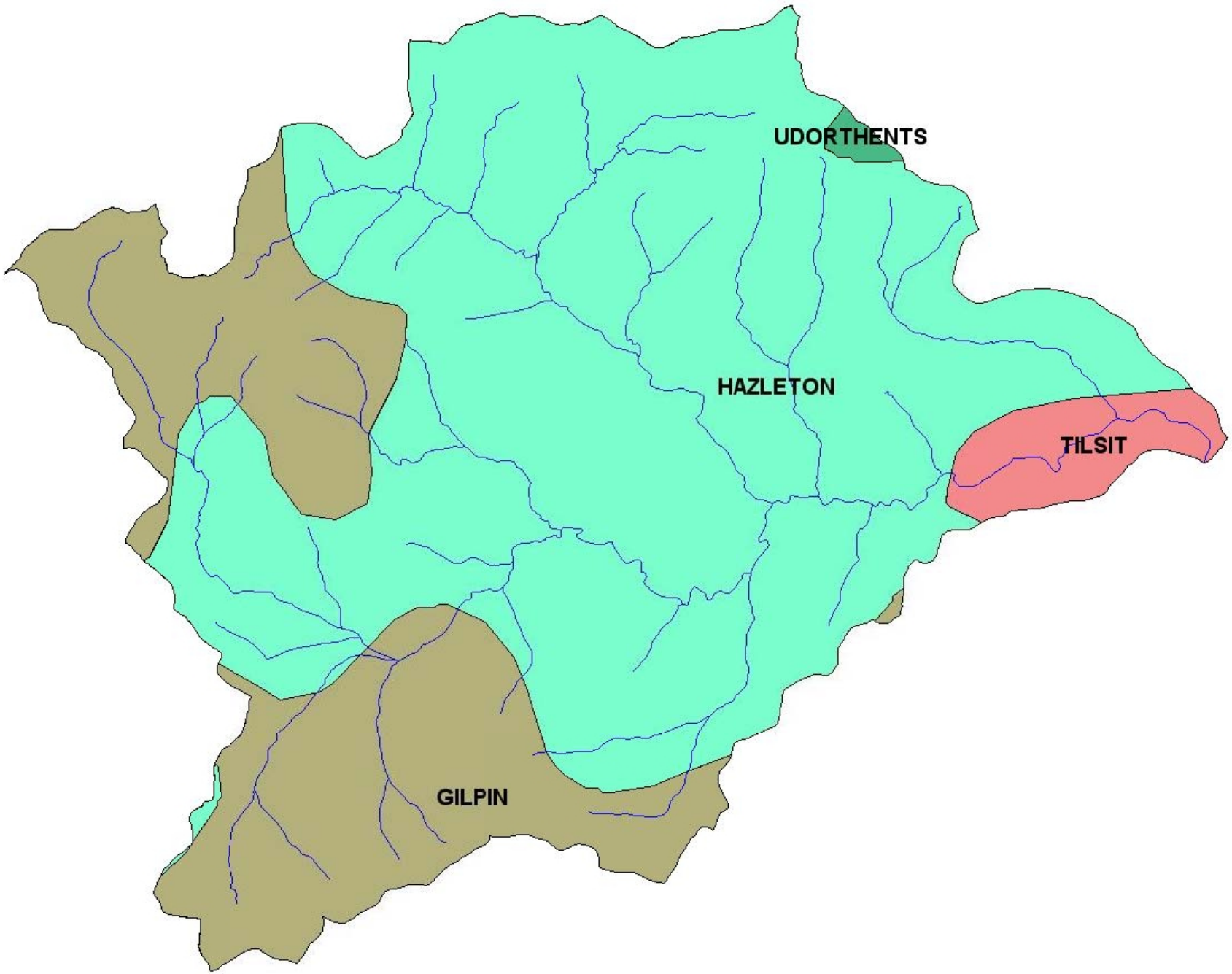
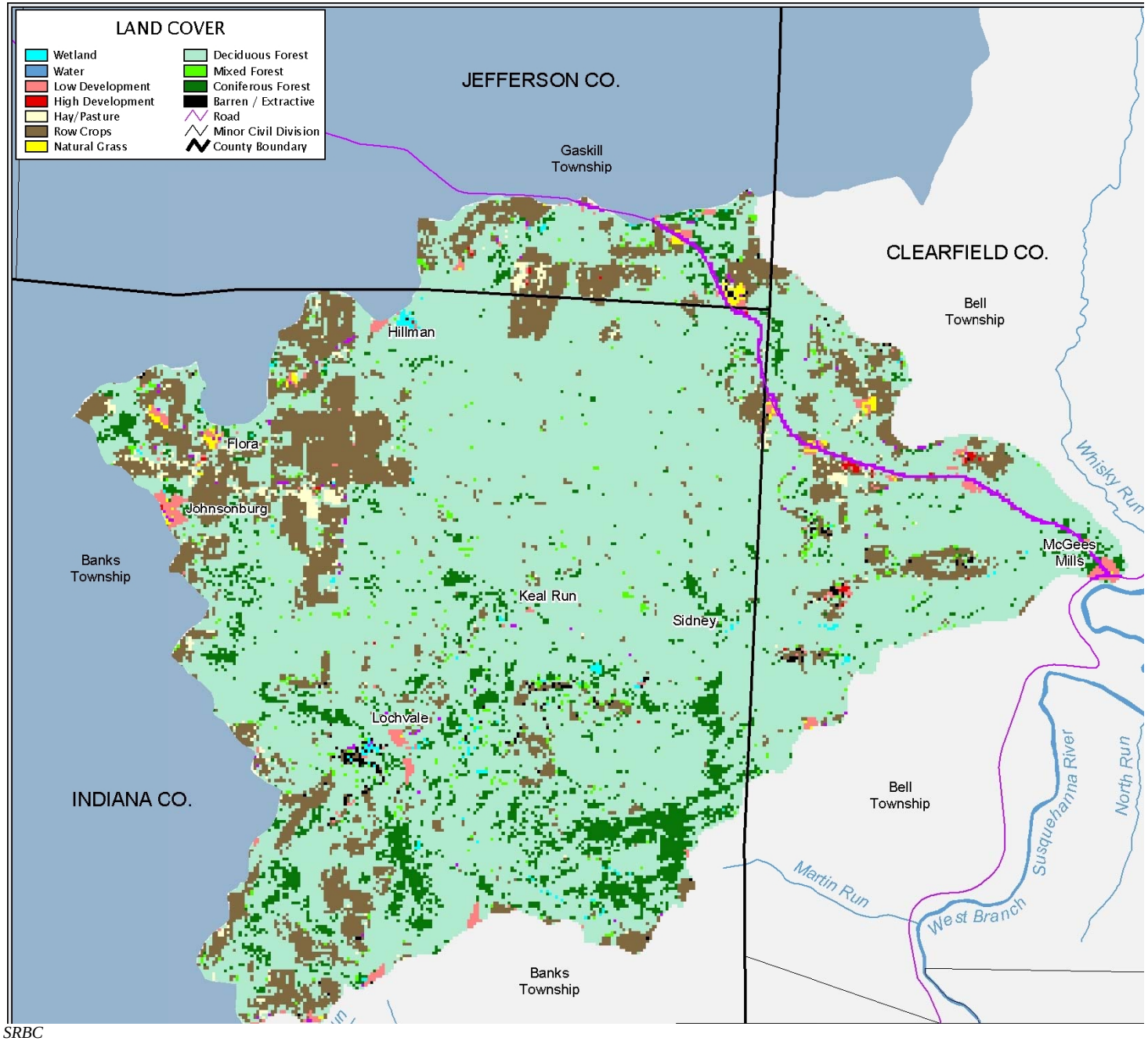


Figure 6. A map of the soils found in the Bear Run watershed.

As you can see from Figure 7, most of the land use in the Bear Run watershed is classified as either mixed or coniferous forest (79% or 15.25 square miles). Farmland, consisting of hay or pasture land, row crops and natural grasses, are a distant second (15.2% or 2.93 square miles). Farmlands are mainly found in the small populated areas around the towns of Hillman, Flora and Johnsonburg in the headwaters of the South Branch of Bear Run and Bear Run proper. Disturbed land, mainly in the form of past coal mining sites, accounts for 5.6% or 1.08 square miles of watershed. As you can see, low and high impact development in the Bear Run watershed is extremely minimal, making the Bear Run watershed extremely attractive to restoration.

Upon further examination of the land use map supplied by SRBC, several large expanses of what are identified as row crops are actually reclaimed surface mines. This realization actually lessens the farmland usage to about 10% and increases the disturbed land to about 10% as well.



SRBC

Figure 7. A map of the land uses in the Bear Run watershed.

Current State of the Bear Run Watershed

According to the SRBC's completed Bear Run Watershed TMDL document (Appendix E), coal mining has occurred in the Bear Run watershed since the 1880s (SRBC 2005). In 1931, the Pennsylvania Fish and Boat Commission surveyed the mouths of Bear Run and the South Branch of Bear Run and noted that both were severely polluted by AMD (PFBC 1931).

Additional sampling at the mouth of Bear Run was completed from 1970-1972 during the PA DEP Scarlift study on the West Branch of the Susquehanna River. Water quality illustrated major impacts from the mining operations completed and still occurring in the watershed (Table 1).

Table 1. The water quality at the mouth of Bear Run collected during the West Branch of the Susquehanna River Scarlift Report 1970-1972.

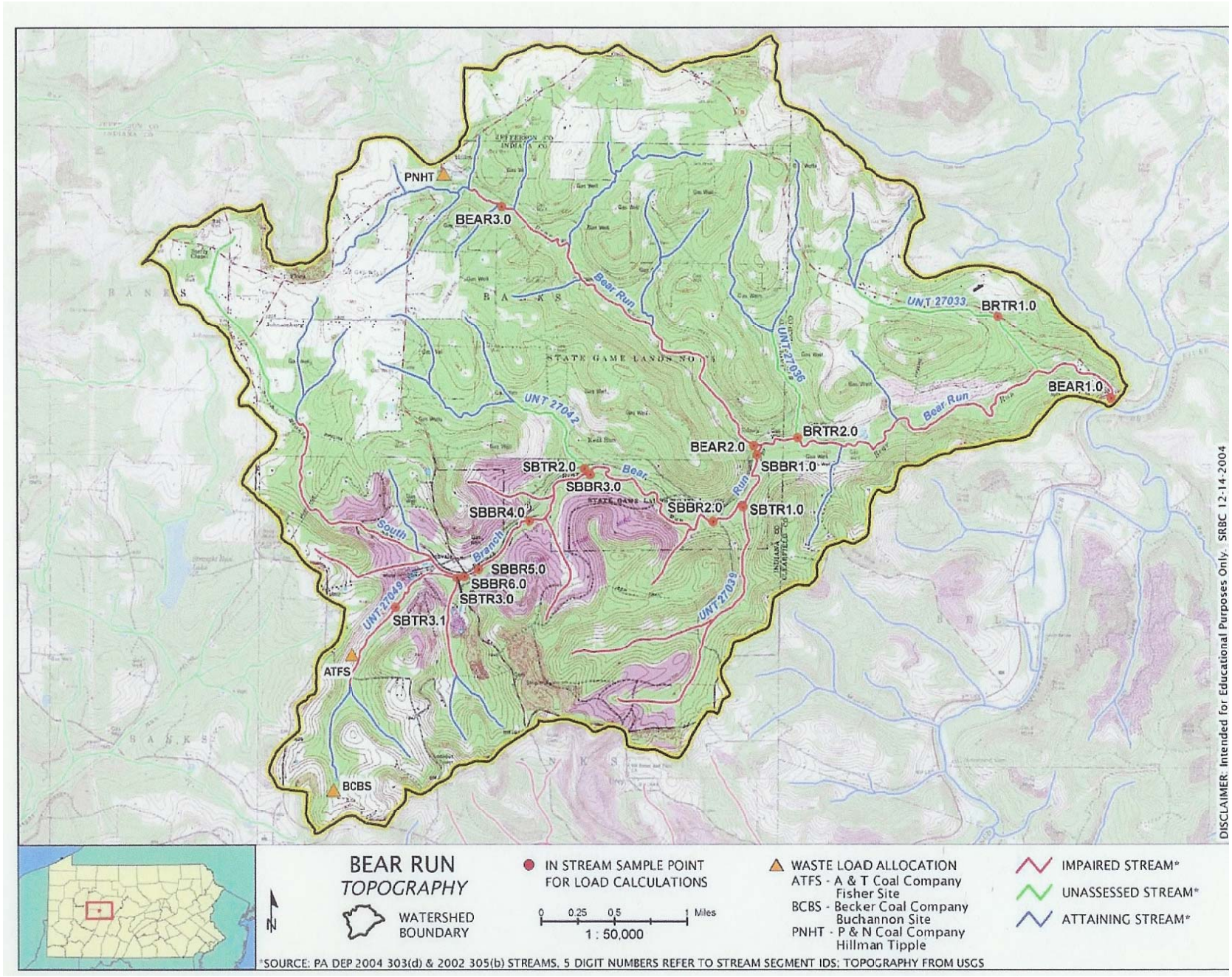
Date	Flow	pH	Alk	Acidity	Total Fe	SO4	Acidity Load	Fe Load
	GPM	Lab					lb/day	lb/day
10/7/1970	2423.52	3.70	0.00	38.00	1.20	134.00	1106.97	34.96
11/10/1970	8976.00	4.10	0.00	24.00	1.80	67.00	2589.40	194.20
6/23/1971	1346.40	3.80	0.00	32.00	0.90	134.00	517.88	14.57
9/15/1971	22440.00	3.40	0.00	65.00	16.90	77.00	17532.37	4558.42
6/21/1972	11220.00	3.90	0.00	19.00	3.40	77.00	2562.42	458.54
6/22/1972	89760.00	4.20	0.00	9.00	10.40	37.00	9710.24	11220.72
Ave	**22694.32**	**3.85**	**0.00**	**31.17**	**5.77**	**87.67**	**5669.88**	**2746.90**

Currently, the entire Bear Run watershed is classified as a cold water fishery (CWF) by the PA DEP Chapter 93 Water Quality Standards (PA DEP 2001). Beginning in 1996, the Bear Run watershed also has 17 listings on the PA DEP 303d List of Impaired Waters. Information on these listings and a map of impaired stretches can be found in Table 2 and Figure 8.

Table 2. Bear Run stream segments listed on the PA DEP 303d List of Impaired Waters (SRBC 2005).

Year	Miles	Segment ID	PA DEP Stream Code	Stream Name	Data Source	Source	US EPA 305b Cause Code
1996	2.9	4125	27032	Bear Run	305b Report	Resource Extraction	Metals
1996	5.3	4126	27038	South Branch of Bear Run	305b Report	Resource Extraction	Metals and pH
1998	8.3	4125 & 4126	27032	Bear Run watershed	Surface Water Monitoring Program	AMD	Metals and pH
2002	3.0	4125	27032	Bear Run	Surface Water Monitoring Program	AMD	Metals
2002	5.2	4126	27032, 27038	Bear Run and South Branch of Bear Run	Surface Water Monitoring Program	AMD	Metals and pH
2004	3.2	4126	27032	Bear Run	Surface Water Monitoring Program	AMD	Metals
2004	3.1	4125	27032	Bear Run	Surface Water Monitoring Program	AMD	Metals
2004	2.0	4126	27038	South Branch of Bear Run	Surface Water Monitoring Program	AMD	Metals and pH
2004	3.2	20030929-1930-JCO	27038	South Branch of Bear Run	Surface Water Monitoring Program	AMD	Metals and pH
2004	2.0	20030929-1932-JCO	27039	UNT 27039	Surface Water Monitoring Program	AMD	Metals and pH
2004	1.0	20030929-1929-JCO	27040	UNT 27040	Surface Water Monitoring Program	AMD	Metals and pH
2004	0.5	20030929-1929-JCO	27041	UNT 27041	Surface Water Monitoring Program	AMD	Metals and pH
2004	0.6	20030929-1929-JCO	27045	UNT 27045	Surface Water Monitoring Program	AMD	Metals and pH
2004	0.8	20030929-1929-JCO	27046	UNT 27046	Surface Water Monitoring Program	AMD	Metals and pH
2004	0.7	20030929-1929-JCO	27047	UNT 27047	Surface Water Monitoring Program	AMD	Metals and pH
2004	1.2	20030929-1929-JCO	27049	UNT 27049	Surface Water Monitoring Program	AMD	Metals and pH
2004	0.9	20030929-1929-JCO	27051	UNT 27051	Surface Water Monitoring Program	AMD	Metals and pH

Pennsylvania's 1996, 1998 and 2002 Section 303d lists were approved by the US EPA. The draft 2004 Section 303d list has not yet been approved at the time of SRBC's Bear Run Watershed TMDL completion.



SRBC

Figure 8. A map of the impaired stretches of Bear Run.

Bear Run is a watershed with a multiple personality disorder (Table 3). Bear Run before its confluence with the South Branch of Bear Run is an extremely fertile, high quality cold water fishery containing an enormous population of native brook trout, some reaching 12" in length (Figure 9). Consequently, one of the recommendations of this plan will be to petition the PA DEP Environmental Quality Board (EQB) to re-designate this section of stream from the current CWF to High Quality CWF (HQ-CWF) or possibly Exceptional Value (EV).

Table 3. The average water quality at selected sites in the Bear Run Watershed.

Location	Flow	pH	Alk.	Acid.	Fe	Mn	Al	SO_4
	GPM	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Bear Run Upstream South Branch	1863.67	6.80	18.97	0.27	0.31	0.11	<0.50	51.23
South Branch Mouth	6251.63	4.30	4.82	30.33	3.00	2.17	1.82	116.29
Downstream of Confluence	9154.84	4.80	6.43	19.50	1.97	2.09	1.28	105.20

Dan Heggenstaller

Figure 9. A native Bear Run brook trout.

The South Branch of Bear Run, on the other hand, is one of the worst streams in Indiana County in terms of abandoned mine drainage (AMD) (Figure 10). Much of the South Branch is devoid of any fish life. Downstream of the confluence of the two branches lies a stream battling between the high quality characteristics of the headwaters and the AMD impaired South Branch.

Beth Dillon

Figure 10. The South Branch of Bear Run near its confluence with Bear Run.

The impact of the South Branch on the quality of Bear Run can be illustrated perfectly by first graphing where the AMD loading is originating and by graphing the pollution concentrations and loadings along the Bear Run stream monitoring stations (Figures 11-15). As illustrated (BRS03 is just upstream of the confluence with

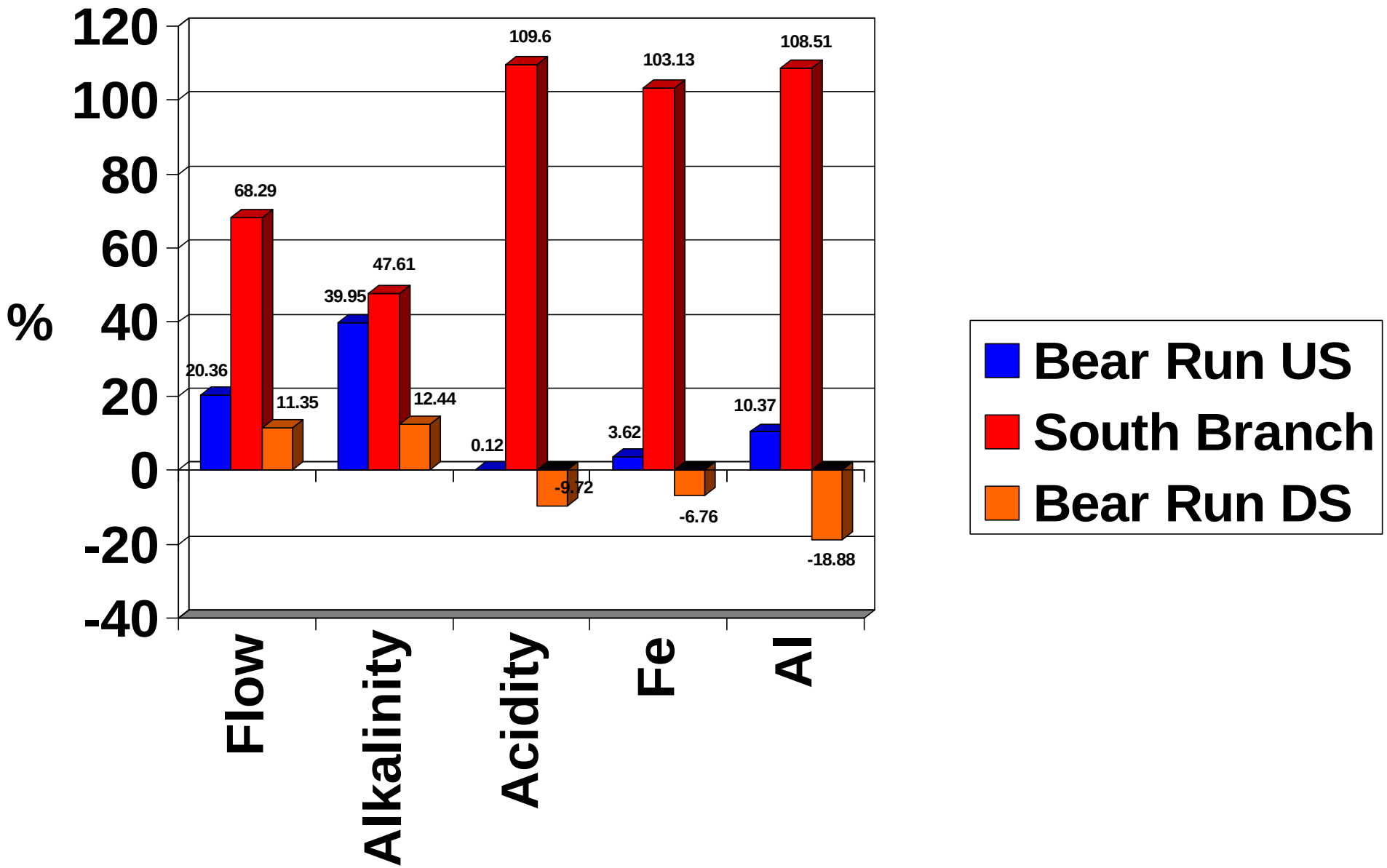


Figure 11. The AMD loading % contribution from each sub watershed.

Figure 12. The alkalinity and acidity concentrations along the main stem sampling stations of Bear Run.

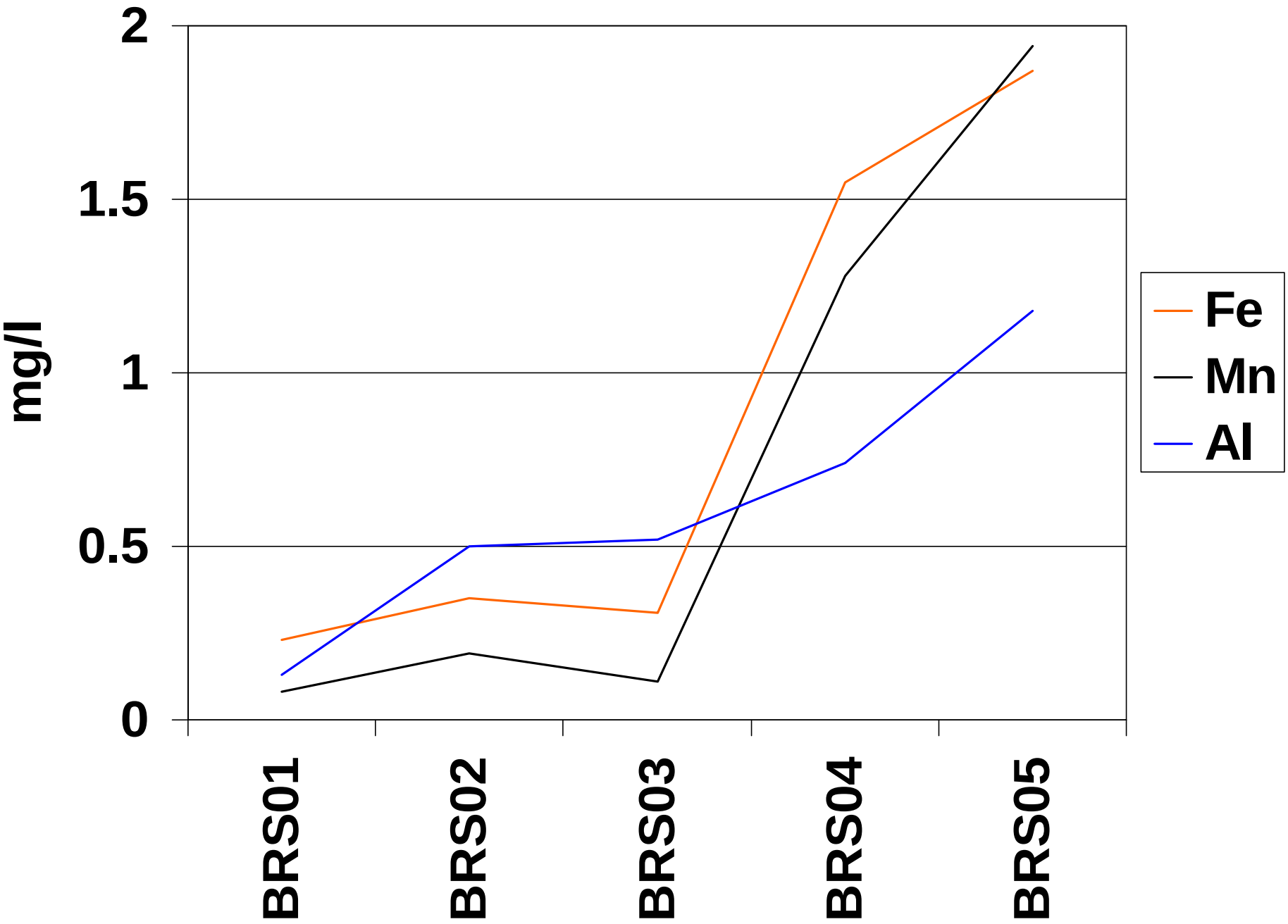


Figure 13. The metal concentrations along the main stem sampling stations of Bear Run.

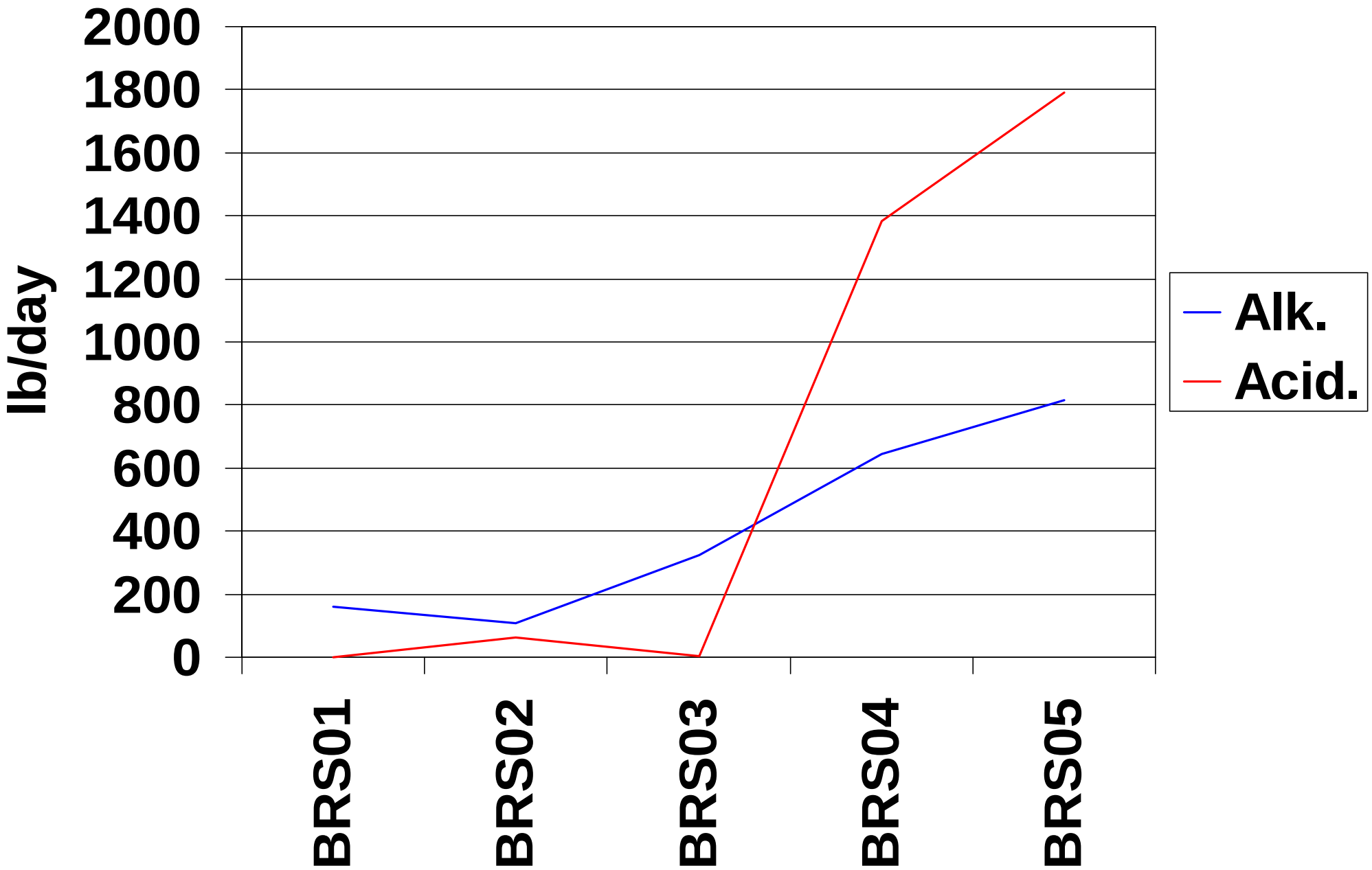


Figure 14. The alkalinity and acidity loadings along the main stem sampling stations of Bear Run.

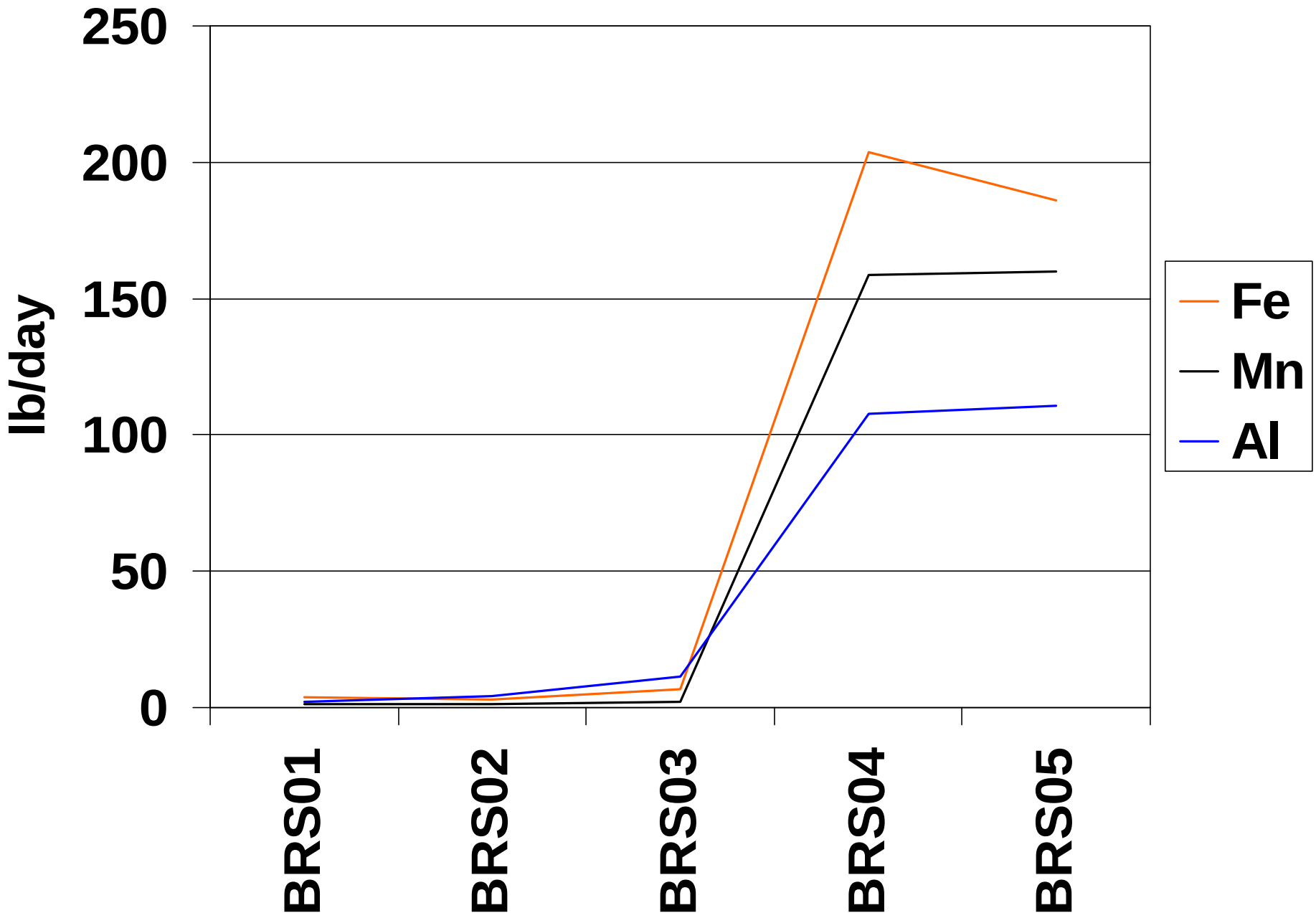


Figure 15. The metal loadings along the main stem sampling stations of Bear Run.

the South Branch and BRS04 is downstream), a vast majority of the AMD pollution originates in the South Branch sub watershed and impacts the main stem of Bear Run substantially.

The South Branch of Bear Run

Sub Watershed Characteristics

The South Branch of Bear Run sub watershed accounts for slightly more than 50% of the watershed area, with a drainage basin of 10.0 square miles comprised of approximately 25.8 stream miles (Figure 16). The headwaters begin near the town of Flora in Indiana County. The South Branch then flows generally southeast for nearly seven miles to its confluence with the main stem of Bear Run, near the ghost town of Sidney.

AMD Impacts

By far, the largest pollution impact to the South Branch is from AMD. Twenty AMD discharges were located and sampled for water quality (Table 4 and Figure 17). In addition, seven of the tributary streams and seven stations along the main stem of the South Branch (through this assessment and SRBC TMDL sampling) were sampled as well.

Through our analysis, nine discharges and four tributaries are contributing a majority of the AMD pollution load into the South Branch (Figure 18 and 19) By our calculations, 70.7% (195 Tons/Year) of the acidity loading, 83.7% (59 Tons/Year) of the Fe loading, 68.8% (15 Tons/Year) of the Mn loading and 76.2% (15 Tons/Year) of the Al loading originates from these nine discharges and four tributaries. The following restoration plan outlines a project by project strategy to vastly reduce the amount of pollution emanating from these priority sites utilizing typical passive AMD treatment systems, the use of treated mine water for tributary dilution, coal refuse reclamation and the input of limestone sand into tributary headwaters.

Table 4. Discharge and stream station water quality in the South Branch sub watershed.

Location	Date	Flow	Lab	TDS	Cond	Alk.	Field Acid.	Acid.	Fe	Mn	Al	SO4	Temp	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
		gpm	pH	ppm	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	F/C	lb/day	lb/day	lb/day	lb/day	lb/day
SBS01	7/7/2004	178.53	6.40	60.00	106.00	15.00	nd	0.00	0.33	0.05	0.07	15.00	63.40	32.19	0.00	0.71	0.11	0.15
	11/10/2004	716.28	6.70	60.00	99.00	14.00	nd	0.00	0.25	0.06	0.05	18.00	40.10	120.54	0.00	2.15	0.52	0.43
	2/15/2005	8894.14	6.10	60.00	112.00	12.00	nd	2.00	0.48	0.13	0.42	15.00	36.90	1282.89	213.82	51.32	13.90	44.90
	11/17/2005	626.31	6.40	80.00	162.00	9.00	nd	3.00	0.10	0.03	0.05	21.00	47.30	67.75	22.58	0.75	0.23	0.38
	Min	178.53	6.10	60.00	99.00	9.00	nd	0.00	0.10	0.03	0.05	15.00	36.90	32.19	0.00	0.71	0.11	0.15
	Ave	**2603.82**	**6.40**	**65.00**	**119.75**	**12.50**	**nd**	**1.25**	**0.29**	**0.07**	**0.15**	**17.25**	**46.93**	**375.84**	**59.10**	**13.73**	**3.69**	**11.46**
	Max	8894.14	6.70	80.00	162.00	15.00	nd	3.00	0.48	0.13	0.42	21.00	63.40	1282.89	213.82	51.32	13.90	44.90
SBD01	7/7/2004	746.73	5.90	180.00	279.00	51.00	nd	0.00	14.60	2.11	0.05	60.00	51.30	457.76	0.00	131.05	18.94	0.45
	8/17/2004	490.09	6.60	180.00	266.00	56.00	nd	0.00	13.20	2.19	0.05	59.00	54.70	329.89	0.00	77.76	12.90	0.29
	9/27/2004	554.66	6.50	180.00	284.00	58.00	nd	0.00	13.40	1.86	0.05	54.00	51.20	386.69	0.00	89.34	12.40	0.33
	11/10/2004	451.90	6.50	190.00	282.00	60.00	nd	0.00	15.30	2.40	0.05	67.00	49.70	325.91	0.00	83.11	13.04	0.27
	11/21/2004	493.87	6.50	190.00	273.00	55.00	nd	-40.00	14.00	2.14	0.05	63.00	49.30	326.50	-237.45	83.11	12.70	0.30
	1/10/2005	436.85	6.30	190.00	260.00	52.00	nd	-39.00	16.40	2.43	0.05	62.00	48.30	273.05	-204.79	86.12	12.76	0.26
	1/28/2005	560.88	6.60	200.00	275.00	52.00	nd	-35.00	13.80	2.18	0.05	66.00	46.40	350.57	-235.96	93.04	14.70	0.34
	2/15/2005	448.39	6.40	170.00	265.00	58.00	nd	-44.00	9.19	1.62	0.05	70.00	50.50	312.60	-237.14	49.53	8.73	0.27
	4/6/2005	581.48	6.20	200.00	255.00	53.00	nd	-41.00	25.90	2.21	0.05	53.00	50.20	370.44	-286.56	181.03	15.45	0.35
	5/25/2005	326.95	6.30	160.00	309.00	61.00	nd	-42.00	15.20	2.34	0.18	52.00	50.40	239.73	-165.06	59.74	9.20	0.71
	7/20/2005	387.92	6.80	180.00	272.00	61.00	nd	-46.00	16.10	2.12	0.05	57.00	51.70	284.43	-214.49	75.07	9.89	0.23
	8/3/2005	275.05	6.60	150.00	300.00	64.00	nd	-44.00	16.80	2.31	0.05	56.00	50.70	211.59	-145.47	55.54	7.64	0.17
	Min	275.05	5.90	150.00	255.00	51.00	nd	-46.00	9.19	1.62	0.05	52.00	46.40	211.59	-286.56	49.53	7.64	0.17
	Ave	**479.56**	**6.43**	**180.83**	**276.67**	**56.75**	**nd**	**-27.58**	**15.32**	**2.16**	**0.06**	**59.92**	**50.37**	**322.43**	**-143.91**	**88.70**	**12.36**	**0.33**
	Max	746.73	6.80	200.00	309.00	64.00	nd	0.00	25.90	2.43	0.18	70.00	54.70	457.76	0.00	181.03	18.94	0.71
UNT27049 US	7/5/1991	175.00	6.8	nd	245	36.00	nd	28.00	0.64	0.23	nd	63.00	nd	75.73	58.90	1.35	0.48	nd
	10/2/1991	20.00	7.0	nd	382	78.00	nd	6.00	0.91	0.48	nd	84.00	nd	18.75	1.44	0.22	0.12	nd
	2/6/1992	250.00	6.5	nd	300	32.00	nd	12.00	0.21	0.08	nd	53.00	nd	96.16	36.06	0.63	0.24	nd
	5/4/1992	300.00	6.5	nd	266	28.00	nd	12.00	0.18	0.04	nd	84.00	nd	100.97	43.27	0.65	0.14	nd
	7/6/1992	250.00	6.8	nd	258	32.00	nd	4.00	0.26	0.09	nd	53.00	nd	96.16	12.02	0.78	0.27	nd
	12/21/1992	986.00	7.0	nd	218	24.40	nd	2.50	0.22	0.10	nd	48.80	2.00	289.18	29.63	2.61	1.19	nd
	2/22/1993	612.00	7.0	nd	241	35.80	nd	3.00	0.30	0.11	nd	63.30	2.00	263.35	22.07	2.21	0.81	nd
	5/20/1993	816.00	6.8	nd	258	40.10	nd	20.90	0.35	0.13	nd	62.80	16.00	393.31	204.99	3.43	1.28	nd
	8/10/1993	18.00	7.4	nd	332	67.30	nd	3.40	0.49	0.21	nd	73.40	17.00	14.56	0.74	0.11	0.05	nd

Location	Date	Flow	Lab	TDS	Cond	Alk.	Field Acid.	Acid.	Fe	Mn	Al	SO4	Temp	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
		gpm	pH	ppm	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	F/C	lb/day	lb/day	lb/day	lb/day	lb/day
	12/22/1993	nd	7.6	nd	203	22.80	nd	2.50	0.14	0.06	nd	60.70	3.00	nd	nd	nd	nd	nd
	3/7/1994	250.00	6.8	nd	222	35.00	nd	2.30	0.14	0.06	nd	64.50	8.00	105.18	6.91	0.42	0.18	nd
	5/20/1994	nd	6.9	nd	212	28.90	nd	2.00	0.17	0.07	nd	58.50	9.00	nd	nd	nd	nd	nd
	9/9/1994	nd	6.9	nd	189	29.70	nd	2.50	0.24	0.09	nd	43.90	13.00	nd	nd	nd	nd	nd
	11/17/1994	nd	6.5	nd	161	20.90	nd	2.80	0.18	0.08	nd	36.10	8.00	nd	nd	nd	nd	nd
	12/28/1994	nd	6.5	nd	237	30.50	nd	2.40	0.18	0.08	nd	56.80	10.00	nd	nd	nd	nd	nd
	3/3/1995	nd	6.5	nd	181	18.90	nd	2.30	0.11	0.05	nd	43.50	7.00	nd	nd	nd	nd	nd
	6/27/1995	nd	7.4	nd	321	61.70	nd	3.20	0.41	0.13	nd	73.00	20.00	nd	nd	nd	nd	nd
	8/16/1995	nd	7.0	nd	339	69.90	nd	3.60	0.88	0.25	nd	66.30	20.00	nd	nd	nd	nd	nd
	12/22/1995	350.00	7.3	nd	268	34.70	nd	1.70	0.28	0.44	nd	65.30	4.00	145.98	7.15	1.18	1.85	nd
	3/25/1996	200.00	6.5	nd	185	16.50	nd	2.30	0.39	0.06	nd	52.80	7.00	39.67	5.53	0.94	0.14	nd
	6/3/1996	300.00	7.8	nd	350	59.80	nd	2.50	0.24	0.55	nd	93.80	14.00	215.64	9.02	0.87	1.98	nd
	8/28/1996	100.00	7.5	nd	265	43.90	nd	3.20	0.37	0.14	nd	60.00	18.00	52.77	3.85	0.44	0.17	nd
	10/8/1996	400.00	7.4	nd	283	36.20	nd	2.50	0.83	0.75	nd	81.60	14.00	174.05	12.02	3.99	3.61	nd
	1/2/1997	nd	6.7	nd	166	20.30	nd	1.50	0.15	0.07	nd	43.10	7.00	nd	nd	nd	nd	nd
	4/21/1997	75.00	7.3	nd	242	35.90	nd	5.70	0.04	0.09	nd	65.90	5.00	32.36	5.14	0.04	0.08	nd
	Min	18.00	6.50	nd	161.00	16.50	nd	1.50	0.04	0.04	nd	36.10	2.00	14.56	0.74	0.04	0.05	nd
	Ave	**318.88**	**6.97**	**nd**	**252.96**	**37.57**	**nd**	**5.39**	**0.33**	**0.18**	**nd**	**62.04**	**10.20**	**132.11**	**28.67**	**1.24**	**0.79**	**nd**
	Max	986.00	7.75	nd	382.00	78.00	nd	28.00	0.91	0.75	nd	93.80	20.00	393.31	204.99	3.99	3.61	nd
SBD02	3/6/1985	5.00	2.9	nd	2595	0.00	nd	1228.00	334.60	24.20	nd	1790.00	nd	0.00	73.80	20.11	1.45	nd
	9/5/1985	1.00	2.6	nd	4050	0.00	nd	1774.00	325.90	60.00	nd	1790.00	nd	0.00	21.32	3.92	0.72	nd
	12/30/1985	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	2/12/1986	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/29/1986	3.00	2.9	nd	3195	0.00	nd	1362.00	325.60	36.20	nd	840.00	nd	0.00	49.11	11.74	1.31	nd
	7/22/1986	2.00	2.8	nd	3330	0.00	nd	1223.00	302.80	36.20	nd	1095.00	nd	0.00	29.40	7.28	0.87	nd
	10/13/1986	5.00	3.0	nd	2210	0.00	nd	997.00	16.80	15.46	nd	1180.00	nd	0.00	59.92	1.01	0.93	nd
	2/9/1987	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/17/1987	1.00	2.7	nd	2420	0.00	nd	973.00	183.90	24.60	nd	1075.00	nd	0.00	11.70	2.21	0.30	nd
	8/10/1987	1.00	2.5	nd	3760	0.00	nd	2100.00	343.10	28.80	nd	3159.00	nd	0.00	25.24	4.12	0.35	nd
	10/22/1987	3.00	2.9	nd	2900	0.00	nd	1140.00	208.20	40.70	nd	2527.00	nd	0.00	41.11	7.51	1.47	nd
	1/8/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/22/1988	1.00	2.2	nd	3515	0.00	nd	1530.00	222.20	22.60	nd	885.00	nd	0.00	18.39	2.67	0.27	nd
	7/22/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/14/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	1/27/1989	2.00	3.0	nd	3000	0.00	nd	1364.00	315.40	21.50	nd	1432.00	nd	0.00	32.79	7.58	0.52	nd

Location	Date	Flow	Lab	TDS	Cond	Alk.	Field Acid.	Acid.	Fe	Mn	Al	SO4	Temp	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
		gpm	pH	ppm	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	F/C	lb/day	lb/day	lb/day	lb/day	lb/day
	4/24/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	8/9/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/2/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	1/11/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	5/2/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	8/13/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/14/1990	1.00	2.9	nd	2186	0.00	nd	980.00	157.20	13.60	nd	1348.00	nd	0.00	11.78	1.89	0.16	nd
	1/10/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/11/1991	1.00	2.4	nd	2576	0.00	nd	922.00	139.90	16.60	nd	1474.00	nd	0.00	11.08	1.68	0.20	nd
	7/5/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/2/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	Min	0.00	2.20	nd	2186.00	0.00	nd	922.00	16.80	13.60	nd	840.00	nd	0.00	0.00	0.00	0.00	nd
	Ave	**0.96**	**2.72**	**nd**	**2978.08**	**0.00**	**nd**	**1299.42**	**239.63**	**28.37**	**nd**	**1549.58**	**nd**	**0.00**	**14.28**	**2.66**	**0.32**	**nd**
	Max	5.00	3.00	nd	4050.00	0.00	nd	2100.00	343.10	60.00	nd	3159.00	nd	0.00	73.80	20.11	1.47	nd
SBD03	3/6/1985	12.00	2.8	nd	2795	0.00	nd	1236.00	325.30	24.11	nd	1685.00	nd	0.00	178.28	46.92	3.48	nd
	9/5/1985	1.00	2.75	nd	2635	0.00	nd	1073.00	299.00	42.30	nd	695.00	nd	0.00	12.90	3.59	0.51	nd
	12/30/1985	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	2/12/1986	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/29/1986	1.00	3.1	nd	1945	0.00	nd	858.00	63.80	29.40	nd	610.00	nd	0.00	10.31	0.77	0.35	nd
	7/22/1986	1.00	2.95	nd	2440	0.00	nd	694.00	202.40	35.30	nd	1010.00	nd	0.00	8.34	2.43	0.42	nd
	10/13/1986	1.00	2.9	nd	2070	0.00	nd	725.00	70.40	18.57	nd	1095.00	nd	0.00	8.71	0.85	0.22	nd
	2/9/1987	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/17/1987	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	8/10/1987	4.00	2.5	nd	2740	0.00	nd	990.00	46.40	24.90	nd	1012.00	nd	0.00	47.60	2.23	1.20	nd
	10/22/1987	1.00	2.8	nd	3200	0.00	nd	1040.00	64.20	37.10	nd	3686.00	nd	0.00	12.50	0.77	0.45	nd
	1/8/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/22/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	7/22/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/14/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	1/27/1989	1.00	3.7	nd	2800	0.00	nd	1320.00	59.20	34.90	nd	970.00	nd	0.00	15.87	0.71	0.42	nd
	4/24/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	8/9/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/2/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	1/11/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	5/2/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd

Location	Date	Flow	Lab	TDS	Cond	Alk.	Field Acid.	Acid.	Fe	Mn	Al	SO4	Temp	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
		gpm	pH	ppm	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	F/C	lb/day	lb/day	lb/day	lb/day	lb/day
	8/13/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/14/1990	1.00	2.8	nd	2189	0.00	nd	880.00	49.60	14.17	nd	1137.00	nd	0.00	10.58	0.60	0.17	nd
	1/10/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/11/1991	1.00	2.5	nd	2364	0.00	nd	880.00	35.20	20.30	nd	1474.00	nd	0.00	10.58	0.42	0.24	nd
	7/5/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/2/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	Min	0.00	2.50	nd	1945.00	0.00	nd	694.00	35.20	14.17	nd	610.00	nd	0.00	0.00	0.00	0.00	nd
	Ave	**0.89**	**2.88**	**nd**	**2517.80**	**0.00**	**nd**	**969.60**	**121.55**	**28.11**	**nd**	**1337.40**	**nd**	**0.00**	**11.69**	**2.20**	**0.28**	**nd**
	Max	12.00	3.70	nd	3200.00	0.00	nd	1320.00	325.30	42.30	nd	3686.00	nd	0.00	178.28	46.92	3.48	nd
SBD04	3/6/1985	10.00	2.85	nd	2660	0.00	nd	1217.00	346.70	22.56	nd	1790.00	nd	0.00	146.28	41.67	2.71	nd
	9/5/1985	2.00	2.55	nd	4725	0.00	nd	2164.00	468.00	55.70	nd	3055.00	nd	0.00	52.02	11.25	1.34	nd
	12/30/1985	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	2/12/1986	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/29/1986	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	7/22/1986	3.00	2.7	nd	4105	0.00	nd	2180.00	527.10	30.40	nd	1930.00	nd	0.00	78.61	19.01	1.10	nd
	10/13/1986	7.00	2.75	nd	3380	0.00	nd	923.00	200.10	17.32	nd	1260.00	nd	0.00	77.66	16.84	1.46	nd
	2/9/1987	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/17/1987	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	8/10/1987	5.00	2.4	nd	4104	0.00	nd	1792.00	255.90	36.30	nd	590.00	nd	0.00	107.70	15.38	2.18	nd
	10/22/1987	5.00	2.6	nd	5800	0.00	nd	2500.00	634.00	35.90	nd	4739.00	nd	0.00	150.25	38.10	2.16	nd
	1/8/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/22/1988	5.00	2.2	nd	3700	0.00	nd	1520.00	342.90	17.90	nd	1264.00	nd	0.00	91.35	20.61	1.08	nd
	7/22/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/14/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	1/27/1989	5.00	3.5	nd	4400	0.00	nd	1900.00	502.00	25.80	nd	1135.00	nd	0.00	114.19	30.17	1.55	nd
	4/24/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	8/9/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/2/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	1/11/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	5/2/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	8/13/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/14/1990	2.00	2.6	nd	3401	0.00	nd	1426.00	234.30	14.25	nd	1474.00	nd	0.00	34.28	5.63	0.34	nd
	1/10/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/11/1991	3.00	2.5	nd	2710	0.00	nd	824.00	152.20	21.80	nd	1516.00	nd	0.00	29.71	5.49	0.79	nd
	7/5/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd

Location	Date	Flow	Lab	TDS	Cond	Alk.	Field Acid.	Acid.	Fe	Mn	Al	SO4	Temp	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
		gpm	pH	ppm	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	F/C	lb/day	lb/day	lb/day	lb/day	lb/day
	10/2/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	Min	0.00	2.20	nd	2660.00	0.00	nd	824.00	152.20	14.25	nd	590.00	nd	0.00	0.00	0.00	0.00	nd
	Ave	**1.74**	**2.67**	**nd**	**3898.50**	**0.00**	**nd**	**1644.60**	**366.32**	**27.79**	**nd**	**1875.30**	**nd**	**0.00**	**32.67**	**7.56**	**0.54**	nd
	Max	10.00	3.50	nd	5800.00	0.00	nd	2500.00	634.00	55.70	nd	4739.00	nd	0.00	150.25	41.67	2.71	nd
UNT27049 DS	7/5/1991	200.00	6.0	nd	298	2.00	nd	32.00	3.15	1.35	nd	105.00	nd	4.81	76.93	7.57	3.25	nd
	10/2/1991	35.00	7.0	nd	349	36.00	nd	28.00	0.56	0.43	nd	84.00	nd	15.15	11.78	0.24	0.18	nd
	2/6/1992	300.00	6.2	nd	347	18.00	nd	12.00	2.10	0.86	nd	63.00	nd	64.91	43.27	7.57	3.10	nd
	5/4/1992	500.00	5.6	nd	385	8.00	nd	60.00	4.15	1.39	nd	105.00	nd	48.08	360.60	24.94	8.35	nd
	7/6/1992	500.00	6.0	nd	255	16.00	nd	32.00	1.66	0.67	nd	63.00	nd	96.16	192.32	9.98	4.03	nd
	12/21/1992	1386.00	3.9	nd	413	0.00	nd	44.90	14.10	2.56	nd	159.80	7.00	0.00	748.02	234.90	42.65	nd
	2/22/1993	884.00	5.1	nd	212	1.80	nd	10.90	2.11	1.01	nd	71.20	2.00	19.13	115.82	22.42	10.73	nd
	5/20/1993	898.00	6.7	nd	370	20.30	nd	3.30	2.76	1.51	nd	128.70	14.00	219.12	35.62	29.79	16.30	nd
	8/10/1993	20.00	8.6	nd	658	92.10	nd	0.00	0.13	0.12	nd	229.20	18.00	22.14	0.00	0.03	0.03	nd
	12/22/1993	nd	8.5	nd	266	39.50	nd	0.00	0.27	0.11	nd	66.20	3.00	nd	nd	nd	nd	nd
	3/7/1994	585.00	6.7	nd	248	38.10	nd	2.80	0.94	0.74	nd	73.40	8.00	267.91	19.69	6.61	5.20	nd
	5/20/1994	nd	6.9	nd	260	31.60	nd	3.30	0.95	0.92	nd	83.20	8.00	nd	nd	nd	nd	nd
	9/19/1994	nd	6.8	nd	227	22.40	nd	3.10	1.10	0.55	nd	68.70	16.00	nd	nd	nd	nd	nd
	11/17/1994	nd	6.5	nd	173	23.40	nd	2.40	0.18	0.22	nd	36.50	8.00	nd	nd	nd	nd	nd
	12/28/1994	nd	6.1	nd	338	13.70	nd	8.40	3.99	1.29	nd	124.60	10.00	nd	nd	nd	nd	nd
	3/3/1995	nd	6.2	nd	264	10.20	nd	5.20	2.54	1.22	nd	87.10	8.00	nd	nd	nd	nd	nd
	6/27/1995	nd	6.9	nd	410	30.20	nd	4.90	3.21	1.00	nd	149.00	20.00	nd	nd	nd	nd	nd
	8/16/1995	nd	6.8	nd	323	32.00	nd	3.30	0.52	0.41	nd	100.20	19.00	nd	nd	nd	nd	nd
	12/22/1995	500.00	7.0	nd	221	22.40	nd	2.10	0.14	0.04	nd	29.70	4.00	134.62	12.62	0.84	0.24	nd
	3/25/1996	350.00	6.6	nd	210	19.90	nd	2.30	0.54	0.44	nd	61.20	7.00	83.72	9.68	2.27	1.85	nd
	6/3/1996	150.00	7.6	nd	304	45.50	nd	2.50	0.26	0.13	nd	80.70	14.00	82.04	4.51	0.47	0.23	nd
	8/28/1996	150.00	7.4	nd	279	39.40	nd	3.20	0.42	0.57	nd	68.40	19.00	71.04	5.77	0.76	1.03	nd
	10/8/1996	225.00	7.4	nd	263	39.10	nd	2.70	0.45	0.08	nd	75.30	14.00	105.75	7.30	1.22	0.22	nd
	1/2/1997	nd	6.7	nd	186	21.70	nd	1.50	0.46	0.41	nd	52.10	7.00	nd	nd	nd	nd	nd
	4/21/1997	162.00	7.3	nd	258	35.70	nd	6.40	0.15	0.55	nd	74.40	6.00	69.52	12.46	0.29	1.07	nd
	Min	20.00	3.90	nd	173.00	0.00	nd	0.00	0.13	0.04	nd	29.70	2.00	0.00	0.00	0.03	0.03	nd
	Ave	**427.81**	**6.65**	**nd**	**300.68**	**26.36**	**nd**	**11.09**	**1.87**	**0.74**	**nd**	**89.58**	**10.60**	**81.50**	**103.52**	**21.87**	**6.15**	**nd**
	Max	1386.00	8.58	nd	658.00	92.10	nd	60.00	14.10	2.56	nd	229.20	20.00	267.91	748.02	234.90	42.65	nd
UNT27047 US	7/7/2004	111.42	6.1	130	233	12.00	nd	0.00	0.73	0.52	0.13	69.00	62.40	16.07	0.00	0.98	0.70	0.17
	11/28/2005	678.59	6.5	100	176	11.00	nd	0.00	0.36	0.21	0.20	34.00	39.70	89.72	0.00	2.94	1.71	1.63

Location	Date	Flow	Lab	TDS	Cond	Alk.	Field Acid.	Acid.	Fe	Mn	Al	SO4	Temp	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
		gpm	pH	ppm	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	F/C	lb/day	lb/day	lb/day	lb/day	lb/day
	Ave	**395.01**	**6.30**	**115.00**	**204.50**	**11.50**	**nd**	**0.00**	**0.55**	**0.37**	**0.17**	**51.50**	**51.05**	**52.90**	**0.00**	**1.96**	**1.20**	**0.90**
UNT27047 DS	7/7/2004	117.14	3.4	210	382	0.00	nd	36.00	2.47	1.56	2.42	100.00	63.50	0.00	50.69	3.48	2.20	3.41
	11/28/2005	784.12	5.5	100	181	6.00	nd	7.00	1.00	0.47	0.87	38.00	39.70	56.55	65.98	9.43	4.43	8.20
	Ave	**450.63**	**4.45**	**155.00**	**281.50**	**3.00**	**nd**	**21.50**	**1.74**	**1.02**	**1.65**	**69.00**	**51.60**	**28.28**	**58.33**	**6.45**	**3.31**	**5.80**
SBS02	12/12/2002	2293.82	5.8	nd	202	14.20	8.00	39.80	2.00	0.66	1.22	64.50	1.00	391.52	220.57	55.14	18.20	33.64
	1/22/2003	1851.43	6.0	nd	237	11.20	18.00	47.40	2.90	1.07	1.76	88.05	0.10	249.25	400.58	64.54	23.81	39.17
	4/3/2003	3613.92	5.0	nd	201	7.60	14.00	47.80	1.68	0.62	1.32	53.70	10.30	330.14	608.15	72.98	26.93	57.34
	5/28/2003	2150.2	6.4	nd	209	11.60	6.00	31.40	1.37	0.62	0.79	47.80	12.90	299.81	155.07	35.41	16.02	20.42
	7/1/2003	829.52	6.5	nd	298	18.60	10.00	0.00	1.52	1.09	0.88	103.20	16.90	185.46	99.71	15.16	10.87	8.77
	7/29/2003	3465.18	6.6	nd	173	13.60	8.00	0.00	1.16	0.49	0.64	40.50	15.80	566.46	333.21	48.32	20.41	26.66
	Min	829.52	5.00	nd	173.00	7.60	6.00	0.00	1.16	0.49	0.64	40.50	0.10	185.46	99.71	15.16	10.87	8.77
	Ave	**2367.35**	**6.05**	**nd**	**220.00**	**12.80**	**10.67**	**27.73**	**1.77**	**0.76**	**1.10**	**66.29**	**9.50**	**337.10**	**302.88**	**48.59**	**19.37**	**31.00**
	Max	3613.92	6.60	nd	298.00	18.60	18.00	47.80	2.90	1.09	1.76	103.20	16.90	566.46	608.15	72.98	26.93	57.34
SBD05	7/28/2004	32.30	3.2	460	927	0.00	nd	81.00	21.50	7.95	4.77	320.00	57.60	0.00	31.45	8.35	3.09	1.85
	8/17/2004	41.29	3.1	470	888	0.00	nd	94.00	24.30	8.57	4.75	348.00	57.10	0.00	46.65	12.06	4.25	2.36
	9/27/2004	58.91	3.3	430	706	0.00	nd	67.00	15.60	6.60	3.10	286.00	60.30	0.00	47.44	11.05	4.67	2.20
	11/10/2004	47.61	3.3	430	733	0.00	nd	74.00	17.90	7.61	3.43	300.00	50.90	0.00	42.35	10.24	4.35	1.96
	11/21/2004	60.21	3.3	450	809	0.00	nd	67.00	17.30	7.18	3.18	295.00	49.80	0.00	48.49	12.52	5.20	2.30
	1/10/2005	63.18	3.6	320	557	0.00	nd	40.00	7.89	5.80	2.70	222.00	46.20	0.00	30.38	5.99	4.40	2.05
	1/28/2005	261.97	3.1	650	1170	0.00	nd	143.00	23.40	8.04	10.80	414.00	47.50	0.00	450.29	73.68	25.32	34.01
	4/6/2005	114.26	3.3	430	835	0.00	nd	74.00	10.40	5.66	4.28	292.00	56.40	0.00	101.63	14.28	7.77	5.88
	5/25/2005	34.91	3.4	460	765	0.00	nd	80.00	14.90	5.74	3.99	276.00	53.90	0.00	33.57	6.25	2.41	1.67
	7/20/2005	9.76	3.1	420	934	0.00	nd	85.00	38.30	9.83	5.26	383.00	62.00	0.00	9.97	4.49	1.15	0.62
	8/3/2005	20.76	3.5	530	919	0.00	nd	139.00	50.30	9.89	6.97	433.00	62.10	0.00	34.69	12.55	2.47	1.74
	11/28/2005	5.00	3.2	520	851	0.00	nd	93.00	12.50	7.94	5.07	363.00	47.40	0.00	5.59	0.75	0.48	0.30
	Min	5.00	3.10	320.00	557.00	0.00	nd	40.00	7.89	5.66	2.70	222.00	46.20	0.00	5.59	0.75	0.48	0.30
	Ave	**62.51**	**3.28**	**464.17**	**841.17**	**0.00**	**nd**	**86.42**	**21.19**	**7.57**	**4.86**	**327.67**	**54.27**	**0.00**	**73.54**	**14.35**	**5.46**	**4.75**
	Max	261.97	3.60	650.00	1170.00	0.00	nd	143.00	50.30	9.89	10.80	433.00	62.10	0.00	450.29	73.68	25.32	34.01
SBD06	7/7/2004	72.57	3.1	430	799	0.00	nd	70.00	6.15	4.42	3.73	269.00	62.00	0.00	61.06	5.36	3.86	3.25
	8/17/2004	30.16	3.1	500	815	0.00	nd	92.00	6.24	4.74	4.89	312.00	69.40	0.00	33.35	2.26	1.72	1.77
	9/27/2004	43.00	3.3	420	701	0.00	nd	68.00	17.70	4.74	4.26	255.00	50.80	0.00	35.15	9.15	2.45	2.20
	11/10/2004	30.54	3.6	480	664	0.00	nd	74.00	22.30	4.98	4.02	287.00	49.90	0.00	27.16	8.19	1.83	1.48

Location	Date	Flow	Lab	TDS	Cond	Alk.	Field Acid.	Acid.	Fe	Mn	Al	SO4	Temp	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
		gpm	pH	ppm	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	F/C	lb/day	lb/day	lb/day	lb/day	lb/day
	11/21/2004	34.11	3.3	410	754	0.00	nd	71.00	21.80	4.65	3.95	276.00	49.40	0.00	29.11	8.94	1.91	1.62
	1/10/2005	52.17	3.4	400	655	0.00	nd	63.00	18.10	4.98	3.43	255.00	49.00	0.00	39.51	11.35	3.12	2.15
	1/28/2005	106.50	3.0	610	1240	0.00	nd	163.00	56.20	7.90	14.70	422.00	49.30	0.00	208.66	71.94	10.11	18.82
	4/6/2005	56.90	3.3	370	744	0.00	nd	67.00	25.50	5.20	4.04	276.00	50.70	0.00	45.82	17.44	3.56	2.76
	5/25/2005	28.18	3.6	400	666	0.00	nd	80.00	25.10	4.61	4.54	275.00	49.90	0.00	27.10	8.50	1.56	1.54
	7/20/2005	13.46	2.9	580	1420	0.00	nd	184.00	71.40	7.06	16.50	462.00	50.60	0.00	29.77	11.55	1.14	2.67
	8/3/2005	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	0.00
	11/28/2005	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	0.00
	Min	0.00	2.90	370.00	655.00	0.00	nd	63.00	6.15	4.42	3.43	255.00	49.00	0.00	0.00	0.00	0.00	0.00
	Ave	**38.97**	**3.26**	**460.00**	**845.80**	**0.00**	**nd**	**93.20**	**27.05**	**5.33**	**6.41**	**308.90**	**53.10**	**0.00**	**44.72**	**12.89**	**2.60**	**3.19**
	Max	106.50	3.60	610.00	1420.00	0.00	nd	184.00	71.40	7.90	16.50	462.00	69.40	0.00	208.66	71.94	10.11	18.82
SBD07	7/7/2004	365.70	5.5	440	670	23.00	nd	0.00	47.10	4.67	0.10	295.00	53.20	101.10	0.00	207.04	20.53	0.44
	8/17/2004	276.39	6.0	450	647	26.00	nd	0.00	45.80	4.65	0.06	301.00	55.80	86.38	0.00	152.16	15.45	0.20
	9/27/2004	417.38	6.2	430	690	41.00	nd	4.00	41.30	4.70	0.35	293.00	54.20	205.69	20.07	207.20	23.58	1.76
	11/10/2004	232.24	6.2	460	702	50.00	nd	0.00	51.50	5.18	0.07	318.00	49.40	139.58	0.00	143.76	14.46	0.20
	11/21/2004	167.61	6.0	460	700	37.00	nd	-8.00	42.90	4.37	0.06	313.00	48.90	74.54	-16.12	86.43	8.80	0.12
	1/10/2005	385.25	6.2	430	678	53.00	nd	8.00	41.30	5.16	1.21	307.00	48.60	245.43	37.05	191.25	23.89	5.60
	1/28/2005	286.50	5.8	450	623	23.00	nd	-9.00	41.40	4.77	0.20	289.00	48.10	79.21	-30.99	142.57	16.43	0.69
	4/6/2005	388.40	5.9	430	604	31.00	nd	-11.00	38.10	4.29	0.38	260.00	54.00	144.73	-51.35	177.87	20.03	1.77
	5/25/2005	144.56	6.3	410	682	59.00	nd	-14.00	37.10	3.82	0.06	250.00	53.20	102.52	-24.33	64.47	6.64	0.10
	7/20/2005	59.81	6.3	400	625	39.00	nd	-24.00	43.10	4.16	0.05	273.00	54.90	28.04	-17.25	30.99	2.99	0.04
	8/3/2005	49.94	6.4	420	670	50.00	nd	-24.00	44.70	4.49	0.05	275.00	55.80	30.01	-14.41	26.83	2.70	0.03
	11/28/2005	96.51	6.2	430	640	37.00	nd	-14.00	33.20	3.78	0.05	244.00	47.60	42.92	-16.24	38.51	4.38	0.06
	Min	49.94	5.50	400.00	604.00	23.00	nd	-24.00	33.20	3.78	0.05	244.00	47.60	28.04	-51.35	26.83	2.70	0.03
	Ave	**239.19**	**6.08**	**434.17**	**660.92**	**39.08**	**nd**	**-7.67**	**42.29**	**4.50**	**0.22**	**284.83**	**51.98**	**106.68**	**-9.46**	**122.42**	**13.32**	**0.92**
	Max	417.38	6.40	460.00	702.00	59.00	nd	8.00	51.50	5.18	1.21	318.00	55.80	245.43	37.05	207.20	23.89	5.60
SBS3	12/12/2002	2572.21	5.6	nd	268	10.80	12.00	32.20	2.80	1.10	1.51	88.70	1.30	333.91	371.02	86.57	34.01	46.69
	1/22/2003	2052.81	5.4	nd	367	8.80	26.00	51.40	6.18	2.03	2.15	151.40	0.10	217.14	641.54	152.49	50.09	53.05
	4/3/2003	4069.13	5.0	nd	262	7.80	20.00	48.00	3.27	1.14	1.49	82.40	10.60	381.51	978.22	159.94	55.76	72.88
	5/28/2003	2694.06	5.7	nd	294	8.20	12.00	35.60	2.78	1.24	1.11	87.40	12.80	265.54	388.59	90.02	40.15	35.94
	7/1/2003	1247.84	5.9	nd	449	11.30	20.00	45.40	4.63	2.11	1.41	180.75	17.20	169.49	299.98	69.45	31.65	21.15
	7/29/2003	3529.32	6.0	nd	231	10.60	14.00	39.40	2.31	0.90	0.90	61.10	16.20	449.68	593.91	98.00	38.18	38.18
	Min	1247.84	5.00	nd	231.00	7.80	12.00	32.20	2.31	0.90	0.90	61.10	0.10	169.49	299.98	69.45	31.65	21.15
	Ave	**2694.23**	**5.60**	**nd**	**311.83**	**9.58**	**17.33**	**42.00**	**3.66**	**1.42**	**1.43**	**108.63**	**9.70**	**302.88**	**545.54**	**109.41**	**41.64**	**44.65**

Location	Date	Flow	Lab	TDS	Cond	Alk.	Field Acid.	Acid.	Fe	Mn	Al	SO4	Temp	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
		gpm	pH	ppm	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	F/C	lb/day	lb/day	lb/day	lb/day	lb/day
	Max	4069.13	6.00	nd	449.00	11.30	26.00	51.40	6.18	2.11	2.15	180.75	17.20	449.68	978.22	159.94	55.76	72.88
SBD08	7/28/2004	180.42	3.4	220	501	0.00	nd	30.00	14.90	3.49	0.16	138.00	62.50	0.00	65.06	32.31	7.57	0.35
	8/17/2004	75.17	3.0	450	902	0.00	nd	74.00	25.70	6.48	0.22	337.00	59.60	0.00	66.86	23.22	5.85	0.20
	9/27/2004	142.87	4.4	320	547	4.00	nd	47.00	20.40	4.45	0.13	245.00	57.60	6.87	80.71	35.03	7.64	0.22
	11/10/2004	132.25	3.7	370	610	0.00	nd	50.00	23.70	5.76	0.17	275.00	46.80	0.00	79.48	37.67	9.16	0.27
	11/21/2004	113.23	3.3	400	733	0.00	nd	44.00	20.50	5.35	0.15	274.00	46.90	0.00	59.89	27.90	7.28	0.20
	1/10/2005	343.32	4.9	230	365	6.00	nd	23.00	8.35	2.06	0.13	164.00	41.60	24.76	94.91	34.46	8.50	0.54
	4/6/2005	233.85	3.6	250	476	0.00	nd	22.00	9.88	2.80	0.13	166.00	52.60	0.00	61.84	27.77	7.87	0.37
	5/25/2005	80.43	3.5	410	689	0.00	nd	54.00	17.00	5.59	0.19	272.00	55.10	0.00	52.21	16.44	5.40	0.18
	7/20/2005	53.01	3.2	480	945	0.00	nd	59.00	20.00	7.91	0.31	307.00	63.60	0.00	37.59	12.74	5.04	0.20
	8/3/2005	37.87	3.3	470	826	0.00	nd	107.00	19.80	8.30	0.34	318.00	62.10	0.00	48.71	9.01	3.78	0.15
	11/28/2005	126.79	3.4	340	613	0.00	nd	34.00	10.70	4.09	0.28	183.00	43.70	0.00	51.82	16.31	6.23	0.43
	Min	37.87	3.00	220.00	365.00	0.00	nd	22.00	8.35	2.06	0.13	138.00	41.60	0.00	37.59	9.01	3.78	0.15
	Ave	**138.11**	**3.61**	**358.18**	**655.18**	**0.91**	**nd**	**49.45**	**17.36**	**5.12**	**0.20**	**243.55**	**53.83**	**2.88**	**63.55**	**24.81**	**6.76**	**0.28**
	Max	343.32	4.90	480.00	945.00	6.00	nd	107.00	25.70	8.30	0.34	337.00	63.60	24.76	94.91	37.67	9.16	0.54
SBD09	8/24/2004	73.15	3.1	480	756	0.00	nd	78.00	3.48	9.19	1.51	276.00	62.90	0.00	68.58	3.06	8.08	1.33
	11/10/2004	36.00	3.3	480	759	0.00	nd	50.00	3.77	9.70	1.89	274.00	43.90	0.00	21.64	1.63	4.20	0.82
	1/28/2005	83.38	3.4	460	695	0.00	nd	46.00	3.46	7.79	1.77	228.00	32.60	0.00	46.10	3.47	7.81	1.77
	Ave	**64.18**	**3.27**	**473.33**	**736.67**	**0.00**	nd	**58.00**	**3.57**	**8.89**	**1.72**	**259.33**	**46.47**	**0.00**	**45.44**	**2.72**	**6.70**	**1.31**
SBD10	8/24/2004	40.00	2.8	690	1150	0.00	nd	212.00	74.00	12.00	4.65	431.00	66.80	0.00	101.93	35.58	5.77	2.24
	11/11/2004	20.00	3.2	560	973	0.00	nd	204.00	76.60	11.70	3.12	391.00	50.00	0.00	49.04	18.41	2.81	0.75
	Ave	**30.00**	**3.00**	**625.00**	**1061.50**	**0.00**	nd	**208.00**	**75.30**	**11.85**	**3.89**	**411.00**	**58.40**	**0.00**	**75.49**	**27.00**	**4.29**	**1.49**
SBD11	8/24/2004	15.00	3.4	290	503	0.00	nd	42.00	2.50	5.91	1.67	177.00	nd	0.00	7.57	0.45	1.07	0.30
	11/11/2004	15.86	3.7	280	453	0.00	nd	36.00	1.67	5.32	2.33	175.00	43.70	0.00	6.86	0.32	1.01	0.44
	Ave	**15.43**	**3.55**	**285.00**	**478.00**	**0.00**	nd	**39.00**	**2.09**	**5.62**	**2.00**	**176.00**	**43.70**	**0.00**	**7.22**	**0.38**	**1.04**	**0.37**
SBD12	8/24/2004	18.00	2.8	700	1200	0.00	nd	176.00	40.60	14.90	1.95	432.00	79.10	0.00	38.08	8.78	3.22	0.42
	11/11/2004	9.35	3.1	680	1060	0.00	nd	172.00	46.30	13.50	2.16	414.00	52.00	0.00	19.33	5.20	1.52	0.24
	Ave	**13.68**	**2.95**	**690.00**	**1130.00**	**0.00**	nd	**174.00**	**43.45**	**14.20**	**2.06**	**423.00**	**65.55**	**0.00**	**28.70**	**6.99**	**2.37**	**0.33**
SBS4	12/12/2002	2717.17	4.90	nd	309	8.20	24.00	52.80	4.29	1.78	1.82	111.90	1.20	267.82	783.85	140.11	58.14	59.44
	1/22/2003	1720.16	5.00	nd	405	8.60	34.00	55.40	7.07	2.56	2.18	177.40	0.10	177.82	702.99	146.18	52.93	45.07

Location	Date	Flow	Lab	TDS	Cond	Alk.	Field Acid.	Acid.	Fe	Mn	Al	SO4	Temp	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
		gpm	pH	ppm	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	F/C	lb/day	lb/day	lb/day	lb/day	lb/day
	4/3/2003	4533.28	4.80	nd	286	7.60	22.00	47.90	3.87	1.48	1.61	91.65	9.00	414.12	1198.78	210.88	80.65	87.73
	5/28/2003	2429.53	5.00	nd	330	6.40	14.00	42.60	3.88	1.74	1.26	111.30	13.20	186.90	408.84	113.31	50.81	36.80
	7/1/2003	1485.53	4.90	nd	496	7.20	26.00	59.80	6.03	2.81	1.40	209.80	15.90	128.56	464.26	107.67	50.18	25.00
	7/29/2003	4069.9	5.30	nd	258	8.00	12.00	34.20	3.00	1.31	0.94	74.50	16.10	391.36	587.04	146.76	64.09	45.98
	Min	1485.53	4.80	nd	258.00	6.40	12.00	34.20	3.00	1.31	0.94	74.50	0.10	128.56	408.84	107.67	50.18	25.00
	Ave	**2825.93**	**4.98**	**nd**	**347.33**	**7.67**	**22.00**	**48.78**	**4.69**	**1.95**	**1.54**	**129.43**	**9.25**	**261.10**	**690.96**	**144.15**	**59.46**	**50.00**
	Max	4533.28	5.30	nd	496.00	8.60	34.00	59.80	7.07	2.81	2.18	209.80	16.10	414.12	1198.78	210.88	80.65	87.73
SBD13	7/28/2004	37.51	3.3	370	617	0.00	nd	65.00	2.91	7.12	4.71	187.00	64.00	0.00	29.31	1.31	3.21	2.12
	11/28/2005	10.00	3.4	450	724	0.00	nd	62.00	3.89	9.07	3.91	247.00	44.90	0.00	7.45	0.47	1.09	0.47
	Ave	**23.76**	**3.35**	**410.00**	**670.50**	**0.00**	**nd**	**63.50**	**3.40**	**8.10**	**4.31**	**217.00**	**54.45**	**0.00**	**18.38**	**0.89**	**2.15**	**1.30**
SBD14	8/24/2004	35.00	2.7	910	1330	0.00	nd	258.00	30.90	16.10	4.86	478.00	78.70	0.00	108.54	13.00	6.77	2.04
	11/11/2004	34.56	2.9	800	1210	0.00	nd	226.00	26.70	15.40	6.87	431.00	49.50	0.00	93.88	11.09	6.40	2.85
	Ave	**34.78**	**2.80**	**855.00**	**1270.00**	**0.00**	**nd**	**242.00**	**28.80**	**15.75**	**5.87**	**454.50**	**64.10**	**0.00**	**101.21**	**12.05**	**6.59**	**2.45**
SBD15	8/24/2004	32.65	3.2	490	789	0.00	nd	116.00	2.98	12.40	10.20	332.00	nd	0.00	45.52	1.17	4.87	4.00
	11/11/2004	18.92	3.4	500	754	0.00	nd	245.00	1.47	11.10	8.42	323.00	47.60	0.00	55.72	0.33	2.52	1.91
	Ave	**25.79**	**3.30**	**495.00**	**771.50**	**0.00**	**nd**	**180.50**	**2.23**	**11.75**	**9.31**	**327.50**	**47.60**	**0.00**	**50.62**	**0.75**	**3.70**	**2.96**
SBD16	8/24/2004	43.01	3.2	470	764	0.00	nd	104.00	2.71	8.00	6.67	308.00	64.50	0.00	53.77	1.40	4.14	3.45
	11/11/2004	22.39	3.5	450	736	0.00	nd	71.00	2.30	7.47	6.58	243.00	43.10	0.00	19.11	0.62	2.01	1.77
	Ave	**32.70**	**3.35**	**460.00**	**750.00**	**0.00**	**nd**	**87.50**	**2.51**	**7.74**	**6.63**	**275.50**	**53.80**	**0.00**	**36.44**	**1.01**	**3.07**	**2.61**
UNT27046	8/24/2004	17.95	4.3	90	152	4.00	nd	12.00	0.12	0.87	0.49	51.00	58.80	0.86	2.59	0.03	0.19	0.11
	12/5/2005	51.61	4.7	100	151	4.00	nd	12.00	0.31	0.60	0.68	35.00	33.20	2.48	7.44	0.19	0.37	0.42
	Ave	**34.78**	**4.50**	**95.00**	**151.50**	**4.00**	**nd**	**12.00**	**0.22**	**0.74**	**0.59**	**43.00**	**46.00**	**1.67**	**5.02**	**0.11**	**0.28**	**0.26**
UNT27045	7/28/2004	175.03	4.7	50	65	4.00	nd	8.00	0.39	0.33	0.35	17.00	61.40	8.42	16.83	0.82	0.69	0.74
	11/28/2005	137.44	5.0	50	90	5.00	nd	7.00	0.12	0.22	0.25	22.00	39.90	8.26	11.56	0.20	0.36	0.41
	Ave	**156.24**	**4.85**	**50.00**	**77.50**	**4.50**	**nd**	**7.50**	**0.26**	**0.28**	**0.30**	**19.50**	**50.65**	**8.34**	**14.20**	**0.51**	**0.53**	**0.57**
SBD17	7/7/2004	175.55	3.3	250	486	0.00	nd	46.00	3.31	3.12	3.47	132.00	50.40	0.00	97.07	6.98	6.58	7.32
	8/17/2004	172.34	3.3	270	442	0.00	nd	54.00	2.41	2.80	3.11	140.00	50.50	0.00	111.86	4.99	5.80	6.44
	9/27/2004	150.76	3.5	360	563	0.00	nd	56.00	3.00	5.56	4.95	198.00	52.70	0.00	101.48	5.44	10.08	8.97
	11/11/2004	137.43	3.3	280	439	0.00	nd	44.00	1.92	3.11	3.63	142.00	50.50	0.00	72.68	3.17	5.14	6.00

Location	Date	Flow	Lab	TDS	Cond	Alk.	Field Acid.	Acid.	Fe	Mn	Al	SO4	Temp	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
		gpm	pH	ppm	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	F/C	lb/day	lb/day	lb/day	lb/day	lb/day
	11/21/2004	115.39	3.5	270	447	0.00	nd	44.00	1.57	2.57	3.39	134.00	48.90	0.00	61.03	2.18	3.56	4.70
	1/10/2005	237.60	3.4	360	560	0.00	nd	73.00	4.40	4.07	5.67	183.00	48.70	0.00	208.48	12.57	11.62	16.19
	1/28/2005	187.68	3.4	320	575	0.00	nd	59.00	2.32	3.94	4.89	191.00	48.20	0.00	133.10	5.23	8.89	11.03
	4/6/2006	180.42	3.6	280	451	0.00	nd	39.00	1.59	3.71	3.30	122.00	52.30	0.00	84.58	3.45	8.05	7.16
	5/25/2005	105.02	3.6	270	454	0.00	nd	42.00	1.98	2.60	3.40	113.00	49.70	0.00	53.02	2.50	3.28	4.29
	7/20/2005	21.92	3.4	250	492	0.00	nd	137.00	1.26	2.34	4.39	129.00	52.90	0.00	36.10	0.33	0.62	1.16
	8/3/2005	23.11	3.4	270	477	0.00	nd	116.00	1.19	2.35	5.27	122.00	53.60	0.00	32.22	0.33	0.65	1.46
	11/28/2005	51.44	3.6	250	403	0.00	nd	36.00	0.69	2.44	2.83	99.00	48.90	0.00	22.26	0.43	1.51	1.75
	Min	21.92	3.30	250.00	403.00	0.00	nd	36.00	0.69	2.34	2.83	99.00	48.20	0.00	22.26	0.33	0.62	1.16
	Ave	**129.89**	**3.44**	**285.83**	**482.42**	**0.00**	**nd**	**62.17**	**2.14**	**3.22**	**4.03**	**142.08**	**50.61**	**0.00**	**84.49**	**3.97**	**5.48**	**6.37**
	Max	237.60	3.60	360.00	575.00	0.00	nd	137.00	4.40	5.56	5.67	198.00	53.60	0.00	208.48	12.57	11.62	16.19
SBS05	12/12/2002	3399.3	4.8	nd	311	8.00	26.00	51.00	4.79	2.23	1.86	117.00	1.50	326.88	1062.35	195.72	91.12	76.00
	1/22/2003	3096.45	4.8	nd	419	7.40	40.00	60.00	7.33	3.06	2.51	178.90	0.10	275.42	1488.77	272.82	113.89	93.42
	4/2/2003	6850.53	4.4	nd	274	5.20	26.00	33.20	2.64	1.26	1.33	85.00	10.20	428.19	2140.93	217.39	103.75	109.52
	5/28/2003	2944.67	4.7	nd	354	5.80	22.00	50.40	3.98	2.20	1.52	117.60	13.20	205.29	778.69	140.87	77.87	53.80
	7/1/2003	1412.6	4.1	nd	531	3.20	34.00	60.20	5.24	3.45	1.76	209.00	16.80	54.33	577.30	88.97	58.58	29.88
	7/29/2003	4115.5	4.8	nd	274	7.00	16.00	37.60	3.26	1.72	1.12	80.30	15.60	346.28	791.49	161.27	85.09	55.40
	Min	1412.60	4.10	nd	274.00	3.20	16.00	33.20	2.64	1.26	1.12	80.30	0.10	54.33	577.30	88.97	58.58	29.88
	Ave	**3636.51**	**4.60**	**nd**	**360.50**	**6.10**	**27.33**	**48.73**	**4.54**	**2.32**	**1.68**	**131.30**	**9.57**	**272.73**	**1139.92**	**179.51**	**88.38**	**69.67**
	Max	6850.53	4.80	nd	531.00	8.00	40.00	60.20	7.33	3.45	2.51	209.00	16.80	428.19	2140.93	272.82	113.89	109.52
UNT27042	12/12/2002	653.09	5.1	nd	87	8.00	8.00	27.20	0.30	0.33	0.50	29.70	2.00	62.80	213.52	2.36	2.59	3.93
	1/22/2003	469.22	5.2	nd	85	7.60	10.00	28.20	0.30	0.27	0.50	24.50	0.10	42.86	159.05	1.69	1.52	2.82
	4/2/2003	1498.78	5.3	nd	75	8.20	8.00	18.00	0.30	0.15	0.50	20.00	9.40	147.73	324.28	5.40	2.70	9.01
	5/28/2003	755.06	5.3	nd	74	6.00	6.00	16.40	0.30	0.19	0.50	20.00	12.30	54.45	148.84	2.72	1.72	4.54
	7/1/2003	194.33	5.4	nd	96	7.40	10.00	17.40	0.30	0.28	0.50	39.10	17.10	17.29	40.64	0.70	0.65	1.17
	7/29/2003	890.51	5.8	nd	75	8.00	8.00	31.60	0.32	0.22	0.50	22.40	15.60	85.63	338.24	3.43	2.35	5.35
	Min	194.33	5.10	nd	74.00	6.00	6.00	16.40	0.30	0.15	0.50	20.00	0.10	17.29	40.64	0.70	0.65	1.17
	Ave	**743.50**	**5.35**	**nd**	**82.00**	**7.53**	**8.33**	**23.13**	**0.30**	**0.24**	**0.50**	**25.95**	**9.42**	**68.46**	**204.10**	**2.72**	**1.92**	**4.47**
	Max	1498.78	5.80	nd	96.00	8.20	10.00	31.60	0.32	0.33	0.50	39.10	17.10	147.73	338.24	5.40	2.70	9.01
SBD18	7/7/2004	33.02	2.9	590	1030	0.00	nd	176.00	3.86	1.49	18.10	317.00	49.80	0.00	69.85	1.53	0.59	7.18
	8/17/2004	53.86	2.9	650	1010	0.00	nd	202.00	5.02	1.69	20.00	401.00	49.70	0.00	130.77	3.25	1.09	12.95
	9/27/2004	168.83	3.3	590	631	0.00	nd	95.00	4.85	1.30	8.43	192.00	49.70	0.00	192.79	9.84	2.64	17.11
	11/11/2004	33.81	3.1	610	998	0.00	nd	196.00	4.08	1.36	16.60	361.00	49.60	0.00	79.65	1.66	0.55	6.75

Location	Date	Flow	Lab	TDS	Cond	Alk.	Field Acid.	Acid.	Fe	Mn	Al	SO4	Temp	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
		gpm	pH	ppm	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	F/C	lb/day	lb/day	lb/day	lb/day	lb/day
	11/21/2004	11.36	3.1	630	1070	0.00	nd	174.00	4.66	1.58	18.50	325.00	49.10	0.00	23.76	0.64	0.22	2.53
	1/10/2005	567.28	3.4	370	571	0.00	nd	84.00	4.09	1.35	8.66	170.00	48.70	0.00	572.77	27.89	9.21	59.05
	1/28/2005	100.16	3.2	470	735	0.00	nd	108.00	3.57	1.29	12.00	213.00	48.70	0.00	130.02	4.30	1.55	14.45
	4/6/2005	341.96	3.2	400	682	0.00	nd	97.00	3.26	1.29	10.50	184.00	49.30	0.00	398.70	13.40	5.30	43.16
	5/25/2005	25.36	3.1	590	1000	0.00	nd	166.00	3.85	1.44	18.50	359.00	49.10	0.00	50.60	1.17	0.44	5.64
	7/20/2005	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	0.00
	8/3/2005	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	0.00
	11/28/2005	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	0.00
	Min	0.00	2.90	370.00	571.00	0.00	nd	84.00	3.26	1.29	8.43	170.00	48.70	0.00	0.00	0.00	0.00	0.00
	Ave	**111.30**	**3.13**	**544.44**	**858.56**	**0.00**	**nd**	**144.22**	**4.14**	**1.42**	**14.59**	**280.22**	**49.30**	**0.00**	**137.41**	**5.31**	**1.80**	**14.07**
	Max	567.28	3.40	650.00	1070.00	0.00	nd	202.00	5.02	1.69	20.00	401.00	49.80	0.00	572.77	27.89	9.21	59.05
UNT27041	8/24/2004	93.52	3.7	120	222	0.00	nd	20.00	0.82	2.24	0.42	66	58.3	0.00	22.48	0.92	2.52	0.47
	12/5/2005	137.33	4.2	110	174	2.00	nd	2.00	0.95	1.69	0.45	52	37.1	3.30	3.30	1.57	2.79	0.74
	Ave	**115.43**	**3.95**	**115.00**	**198.00**	**1.00**	**nd**	**11.00**	**0.89**	**1.97**	**0.44**	**59.00**	**47.70**	**1.65**	**12.89**	**1.24**	**2.65**	**0.61**
SBS6	12/12/2002	4183.53	4.8	nd	282	8.00	22.00	53.60	3.75	2.05	1.53	100.30	0.30	402.29	1106.29	188.57	103.09	76.94
	1/23/2003	1702.48	4.7	nd	385	7.60	42.00	52.20	5.55	2.94	1.99	172.40	0.10	155.52	859.48	113.57	60.16	40.72
	4/2/2003	11877.58	4.4	nd	235	5.00	22.00	27.40	1.91	1.14	1.09	70.65	6.20	713.84	3140.91	272.69	162.76	155.62
	5/28/2003	7215.63	4.5	nd	306	5.80	20.00	40.00	2.79	2.03	1.19	100.30	11.60	503.04	1734.64	241.98	176.07	103.21
	7/1/2003	2777.85	3.9	nd	498	0.00	28.00	45.20	2.65	3.22	1.50	188.20	17.70	0.00	934.91	88.48	107.52	50.08
	7/29/2003	7393.4	4.7	nd	245	6.60	14.00	33.80	2.41	1.63	0.93	70.30	16.60	586.53	1244.16	214.17	144.86	82.65
	Min	1702.48	3.90	nd	235.00	0.00	14.00	27.40	1.91	1.14	0.93	70.30	0.10	0.00	859.48	88.48	60.16	40.72
	Ave	**5858.41**	**4.50**	**nd**	**325.17**	**5.50**	**24.67**	**42.03**	**3.18**	**2.17**	**1.37**	**117.03**	**8.75**	**393.54**	**1503.40**	**186.58**	**125.74**	**84.87**
	Max	11877.58	4.80	nd	498.00	8.00	42.00	53.60	5.55	3.22	1.99	188.20	17.70	713.84	3140.91	272.69	176.07	155.62
SBD19	11/11/2004	22.25	2.6	1260	2170	0.00	nd	360.00	23.50	1.10	18.40	586.00	48.00	0.00	96.28	6.28	0.29	4.92
	11/21/2004	18.89	2.6	nd	2160	0.00	nd	361.00	28.80	1.56	17.10	612.00	nd	0.00	81.97	6.54	0.35	3.88
	1/10/2004	254.22	2.7	1060	1610	0.00	nd	253.00	18.10	0.89	16.30	411.00	47.10	0.00	773.10	55.31	2.72	49.81
	4/6/2005	113.10	2.7	950	1710	0.00	nd	234.00	14.10	0.85	12.10	427.00	57.00	0.00	318.11	19.17	1.16	16.45
	5/25/2005	33.46	2.6	1080	1920	0.00	nd	311.00	21.40	1.25	16.80	535.00	55.10	0.00	125.08	8.61	0.50	6.76
	7/20/2005	5.00	2.6	1110	1900	0.00	nd	386.00	44.20	1.84	23.00	670.00	71.90	0.00	23.20	2.66	0.11	1.38
	8/3/2005	2.00	2.7	1070	1880	0.00	nd	403.00	50.10	2.08	23.70	687.00	75.20	0.00	9.69	1.20	0.05	0.57
	12/5/2005	32.07	2.6	1220	1760	0.00	nd	327.00	19.60	1.13	17.80	540.00	38.90	0.00	126.05	7.56		6.86
	Min	2.00	2.60	950.00	1610.00	0.00	nd	234.00	14.10	0.85	12.10	411.00	38.90	0.00	9.69	1.20	0.05	0.57
	Ave	**60.12**	**2.64**	**1107.14**	**1888.75**	**0.00**	**nd**	**329.38**	**27.48**	**1.34**	**18.15**	**558.50**	**56.17**	**0.00**	**194.19**	**13.42**	**0.74**	**11.33**

Location	Date	Flow	Lab	TDS	Cond	Alk.	Field Acid.	Acid.	Fe	Mn	Al	SO4	Temp	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
		gpm	pH	ppm	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	F/C	lb/day	lb/day	lb/day	lb/day	lb/day
	Max	254.22	2.70	1260.00	2170.00	0.00	nd	403.00	50.10	2.08	23.70	687.00	75.20	0.00	773.10	55.31	2.72	49.81
SBD20	11/11/2004	46.23	3.1	660	1100	0.00	nd	187.00	2.32	4.17	20.40	370.00	49.30	0.00	103.91	1.29	2.32	11.34
	11/21/2004	52.59	3.1	nd	1050	0.00	nd	180.00	2.11	3.92	20.30	363.00	nd	0.00	113.78	1.33	2.48	12.83
	1/10/2005	230.71	3.2	540	810	0.00	nd	134.00	1.44	2.59	14.90	271.00	42.80	0.00	371.60	3.99	7.18	41.32
	4/6/2005	106.71	3.1	500	916	0.00	nd	141.00	1.72	3.48	18.90	296.00	51.20	0.00	180.85	2.21	4.46	24.24
	5/25/2005	30.69	3.1	630	1110	0.00	nd	188.00	2.20	3.76	21.70	389.00	49.50	0.00	69.35	0.81	1.39	8.00
	7/20/2005	10.00	3.0	690	1260	0.00	nd	209.00	9.37	4.87	21.10	480.00	63.50	0.00	25.12	1.13	0.59	2.54
	8/3/2005	5.00	3.1	nd	1250	0.00	nd	223.00	11.30	5.67	22.50	518.00	nd	0.00	13.40	0.68	0.34	1.35
	12/5/2005	27.30	3.2	600	865	0.00	nd	136.00	1.39	4.04	15.20	348.00	39.20	0.00	44.63	0.46	1.33	4.99
	Min	5.00	3.00	500.00	810.00	0.00	nd	134.00	1.39	2.59	14.90	271.00	39.20	0.00	13.40	0.46	0.34	1.35
	Ave	**63.65**	**3.11**	**603.33**	**1045.13**	**0.00**	nd	**174.75**	**3.98**	**4.06**	**19.38**	**379.38**	**49.25**	**0.00**	**115.33**	**1.49**	**2.51**	**13.33**
	Max	230.71	3.20	690.00	1260.00	0.00	nd	223.00	11.30	5.67	22.50	518.00	63.50	0.00	371.60	3.99	7.18	41.32
UNT27039 SB	7/28/2004	937.60	4.1	120	209	1.00	nd	21.00	0.51	2.39	2.12	57.00	58.20	11.27	236.67	5.75	26.94	23.89
	11/10/2004	167.58	4.2	170	270	2.00	nd	26.00	0.40	4.24	3.37	100.00	41.60	4.03	52.37	0.81	8.54	6.79
	3/22/2005	644.50	4.3	170	301	3.00	nd	27.00	0.37	3.89	3.89	85.00	36.70	23.24	209.17	2.87	30.14	30.14
	11/17/2005	124.27	3.7	170	301	0.00	nd	51.00	0.45	3.68	3.83	84.00	47.60	0.00	76.18	0.67	5.50	5.72
	Min	124.27	3.70	120.00	209.00	0.00	nd	21.00	0.37	2.39	2.12	57.00	36.70	0.00	52.37	0.67	5.50	5.72
	Ave	**468.49**	**4.08**	**157.50**	**270.25**	**1.50**	**nd**	**31.25**	**0.43**	**3.55**	**3.30**	**81.50**	**46.03**	**9.63**	**143.60**	**2.52**	**17.78**	**16.63**
	Max	937.60	4.30	170.00	301.00	3.00	nd	51.00	0.51	4.24	3.89	100.00	58.20	23.24	236.67	5.75	30.14	30.14
UNT27039 NB	7/28/2004	1297.50	3.5	180	289	0.00	nd	43.00	2.24	0.80	2.95	61.00	58.60	0.00	670.63	34.93	12.48	46.01
	11/10/2004	237.58	3.4	250	399	0.00	nd	56.00	3.50	1.05	4.84	118.00	39.50	0.00	159.92	9.99	3.00	13.82
	3/22/2005	997.46	3.5	230	363	0.00	nd	47.00	1.89	1.00	4.94	90.00	34.90	0.00	563.51	22.66	11.99	59.23
	11/17/2005	91.56	3.5	190	335	0.00	nd	41.00	1.81	1.15	2.51	74.00	47.40	0.00	45.12	1.99	1.27	2.76
	Min	91.56	3.40	180.00	289.00	0.00	nd	41.00	1.81	0.80	2.51	61.00	34.90	0.00	45.12	1.99	1.27	2.76
	Ave	**656.03**	**3.48**	**212.50**	**346.50**	**0.00**	**nd**	**46.75**	**2.36**	**1.00**	**3.81**	**85.75**	**45.10**	**0.00**	**359.79**	**17.40**	**7.18**	**30.46**
	Max	1297.50	3.50	250.00	399.00	0.00	nd	56.00	3.50	1.15	4.94	118.00	58.60	0.00	670.63	34.93	12.48	59.23
UNT27039	12/12/2002	682.58	4.1	nd	279	4.00	36.00	59.80	0.64	1.44	2.91	76.10	0.40	32.82	490.64	5.25	11.81	23.88
	1/23/2003	660.1	3.9	nd	385	0.00	64.00	59.40	1.21	1.95	4.81	152.40	0.10	0.00	471.30	9.60	15.47	38.16
	4/2/2003	1533.68	3.6	nd	376	0.00	56.00	57.00	1.53	1.46	4.27	115.80	6.80	0.00	1050.79	28.21	26.91	78.72
	5/28/2003	1038.34	3.8	nd	290	0.00	32.00	51.40	0.82	1.05	2.44	77.30	11.10	0.00	641.52	10.23	13.10	30.45
	7/1/2003	291.41	3.7	nd	455	0.00	54.00	59.60	1.13	1.85	4.03	145.50	16.30	0.00	208.76	3.96	6.48	14.12
	7/29/2003	1143.81	3.8	nd	291	0.00	36.00	30.60	1.04	1.24	2.30	68.80	16.00	0.00	420.71	14.30	17.05	31.62

Location	Date	Flow	Lab	TDS	Cond	Alk.	Field Acid.	Acid.	Fe	Mn	Al	SO4	Temp	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
		gpm	pH	ppm	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	F/C	lb/day	lb/day	lb/day	lb/day	lb/day
	Min	291.41	3.60	nd	279.00	0.00	32.00	30.60	0.64	1.05	2.30	68.80	0.10	0.00	208.76	3.96	6.48	14.12
	Ave	**891.65**	**3.82**	**nd**	**346.00**	**0.67**	**46.33**	**52.97**	**1.06**	**1.50**	**3.46**	**105.98**	**8.45**	**5.47**	**547.29**	**11.92**	**15.14**	**36.16**
	Max	1533.68	4.10	nd	455.00	4.00	64.00	59.80	1.53	1.95	4.81	152.40	16.30	32.82	1050.79	28.21	26.91	78.72
SBS7	12/11/2002	1658.36	4.7	nd	325	8.20	32.00	55.00	3.90	2.53	1.79	129.20	0.20	163.45	637.87	77.74	50.43	35.68
	1/21/2003	3971.61	4.5	nd	354	6.60	42.00	50.00	5.27	2.82	2.57	134.80	0.10	315.08	2005.03	251.58	134.62	122.69
	4/1/2003	7665.14	4.1	nd	331	2.60	40.00	45.00	4.18	1.91	2.33	116.40	5.40	239.55	3685.40	385.12	175.98	214.67
	5/28/2003	6898.73	4.2	nd	301	3.90	22.00	49.10	1.84	1.73	1.40	96.45	11.40	323.40	1824.30	152.58	143.46	116.09
	6/30/2003	3272.16	3.8	nd	479	0.00	32.00	47.60	1.48	2.91	1.87	163.20	17.10	0.00	1258.60	58.21	114.45	73.55
	7/28/2003	14043.76	4.5	nd	205	7.60	14.00	45.00	1.34	1.09	0.93	57.70	18.60	1282.93	2363.28	226.20	184.00	156.99
	Min	1658.36	3.80	nd	205.00	0.00	14.00	45.00	1.34	1.09	0.93	57.70	0.10	0.00	637.87	58.21	50.43	35.68
	Ave	**6251.63**	**4.30**	**nd**	**332.50**	**4.82**	**30.33**	**48.62**	**3.00**	**2.17**	**1.82**	**116.29**	**8.80**	**387.40**	**1962.41**	**191.91**	**133.82**	**119.95**
	Max	14043.76	4.70	nd	479.00	8.20	42.00	55.00	5.27	2.91	2.57	163.20	18.60	1282.93	3685.40	385.12	184.00	214.67

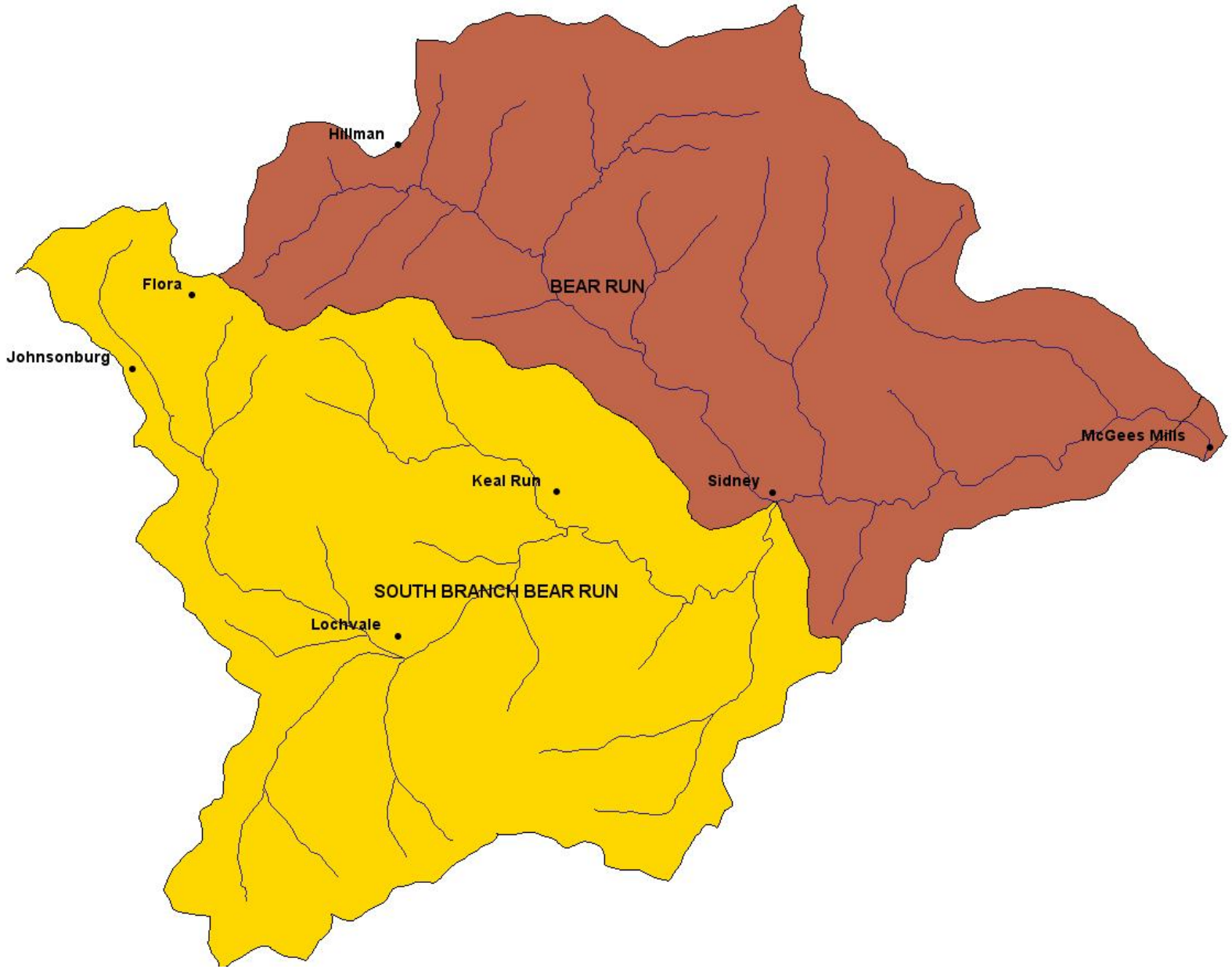


Figure 16. A map of the South Branch sub watershed.

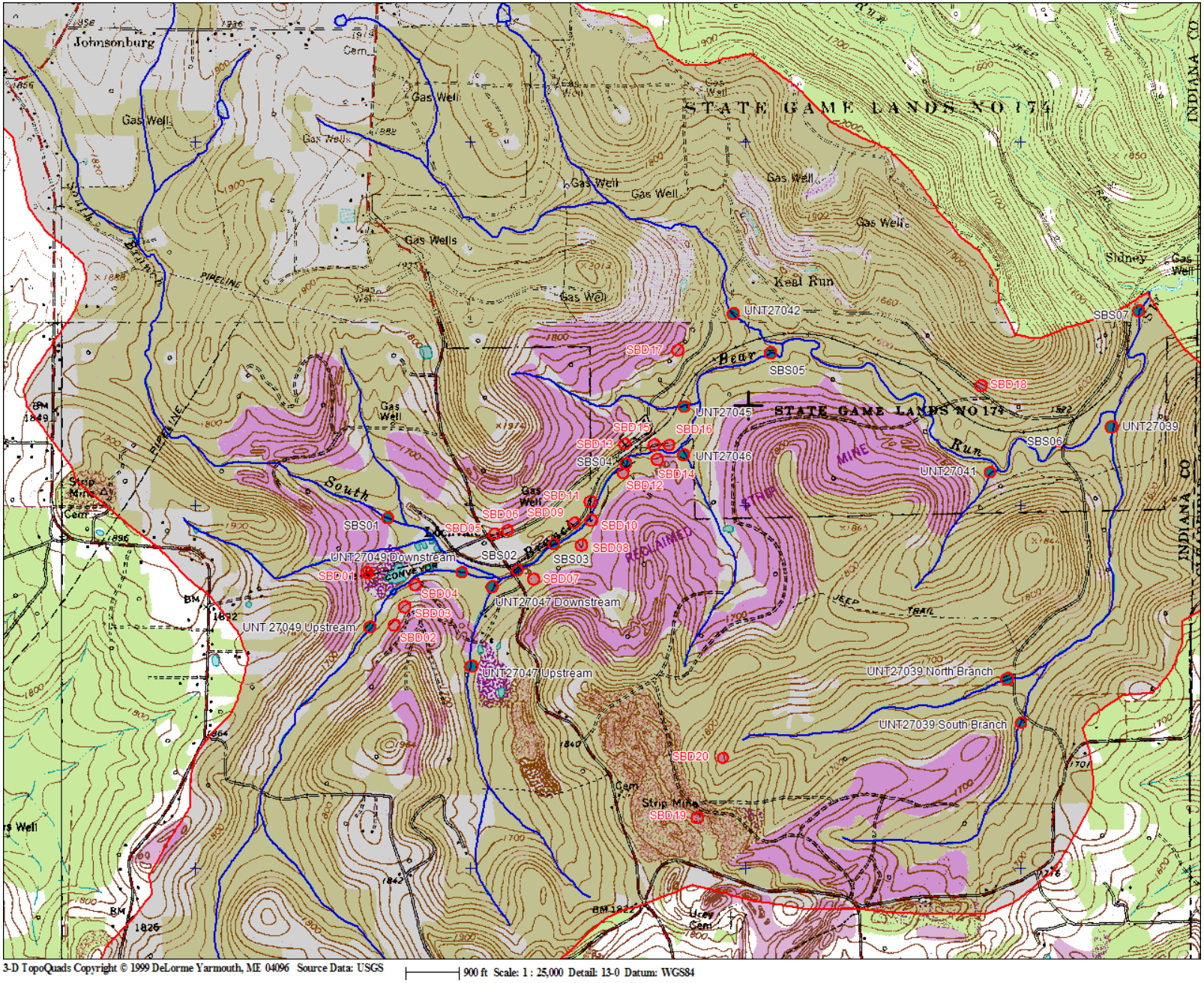


Figure 17. Locations of all the sampling stations in the South Branch sub watershed.

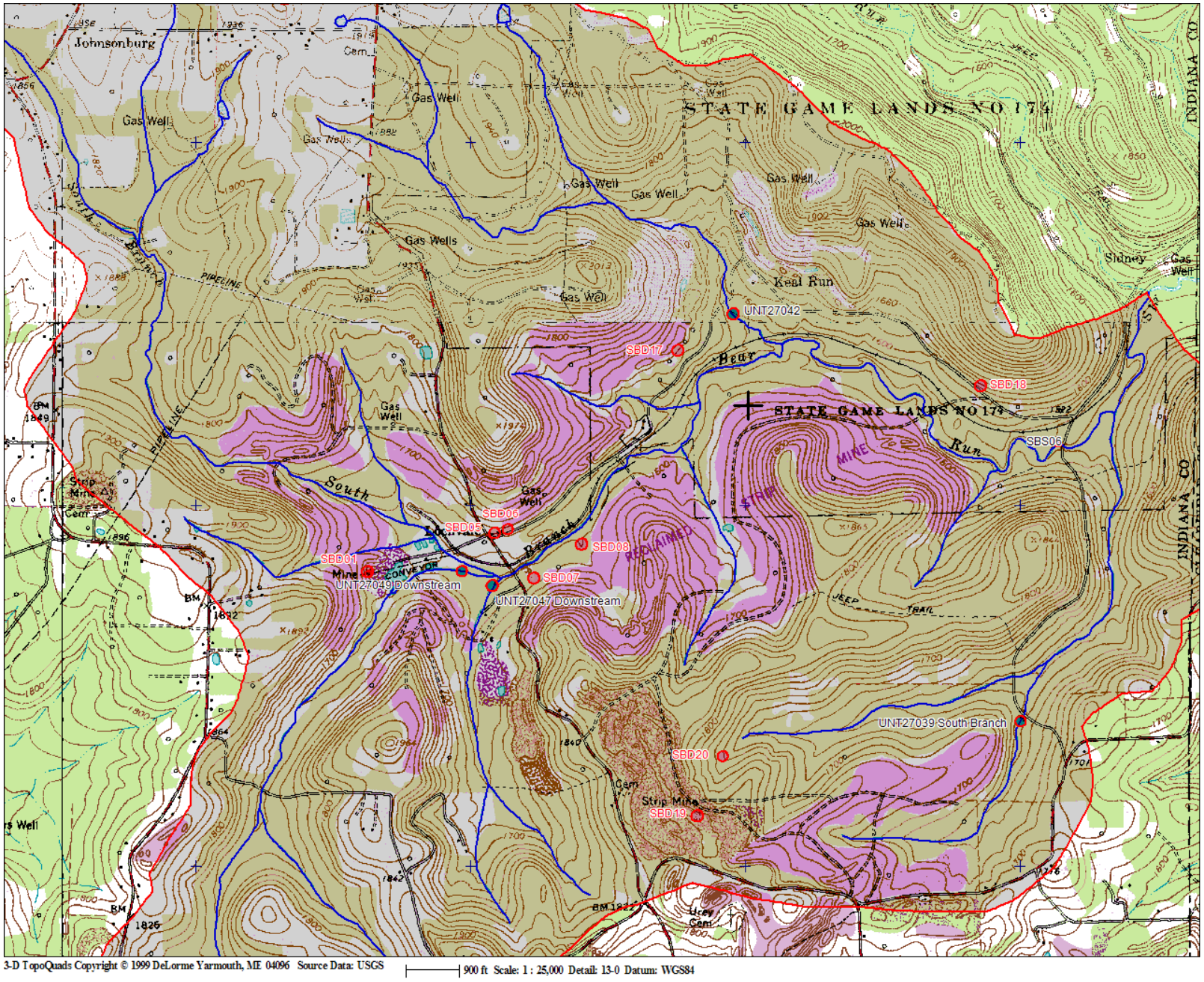


Figure 18. Locations of the priority discharges and tributaries of the South Branch.

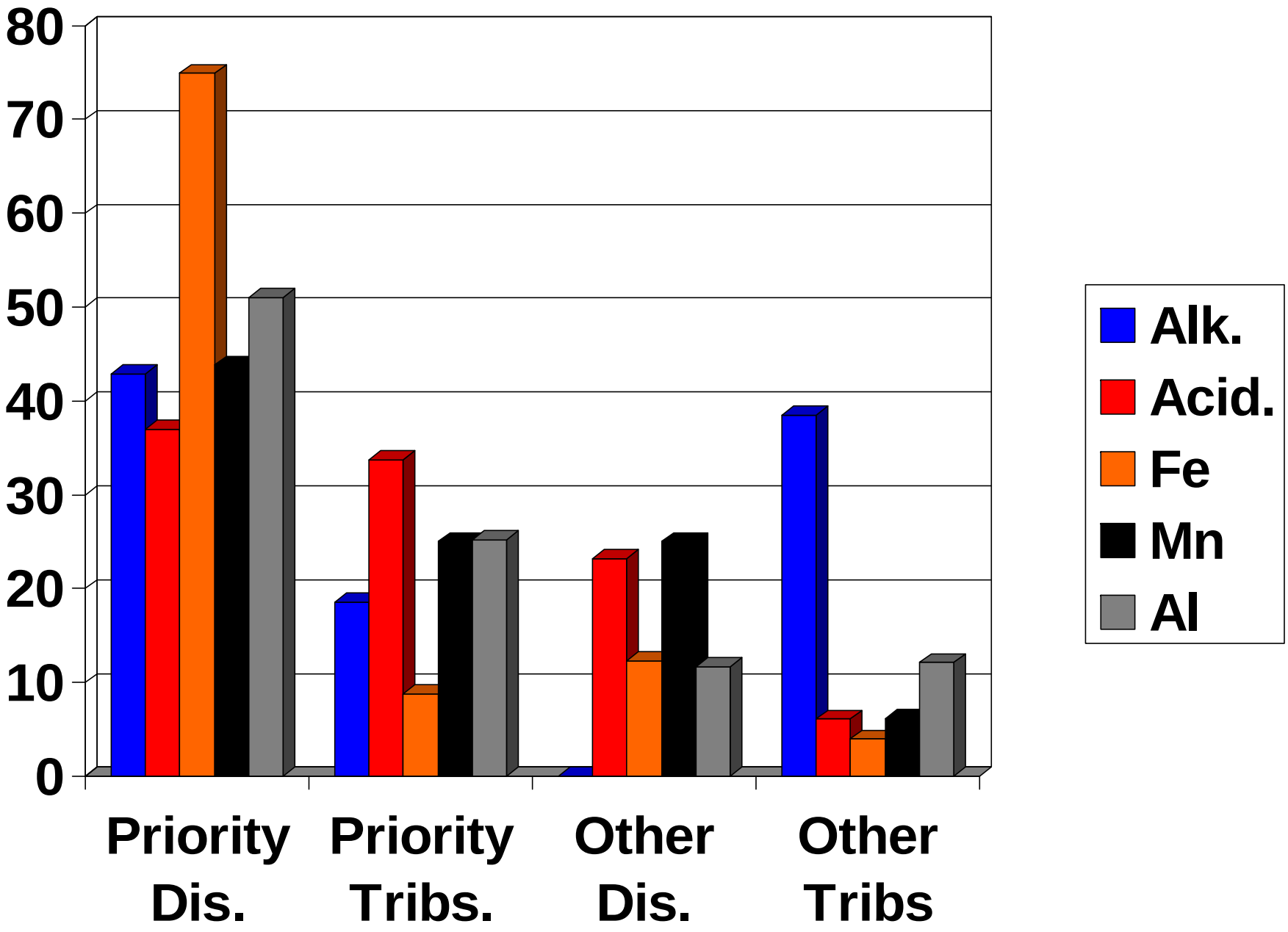


Figure 19. The % AMD loading from the priority discharges and tributaries of the South Branch.

SBD01 and UNT27049

SBD01 is the second largest producer of Fe in the watershed, contributing 23% of the loading or 16 Tons/Year. It is also the first AMD impact to the South Branch. The South Branch is relatively pristine upstream of SBD01 and is plagued by AMD starting with SBD01 to its confluence with the main stem of Bear Run.

SBD01 is a large flow, alkaline, drift mine discharge that is located on the Johnstown Coal and Coke Property (Figure 20). The Johnstown Coal and Coke Property has additional problems including approximately 25 acres of an unreclaimed drift mine and coal processing center and approximately 1000 ft of badly eroded stream banks, mainly on UNT27049, but also on the South Branch (Figure 21 and 22).

In addition, UNT27049 travels through the site and is also slightly impacted with AMD. UNT27049 contributes 6.8% (19 Tons/Year) of the acidity loading and 5.7% (4 Tons/Year) of the Fe loading into the South Branch.

Even though SBD01 is an easy treat, since retention and oxygen is all that is needed to precipitate the suspended Fe, the discharges that impact UNT27049 are not. Several small surface mining seeps impact UNT27049 to its south. These seeps would be hard to collect into a common treatment system and there may not even be enough land for the size of system needed.

Consequently, in 2005, the Evergreen Conservancy, out of Indiana, PA, in partnership with the Indiana County Conservation District and the Johnstown Coal and Coke Property owner submitted and was awarded an $11,000 PA DEP Growing Greener Grant to begin survey and design for a large scale project encompassing a passive AMD treatment system, 25 acres of

Figure 20. A picture of SBD01, the first AMD discharge to impact the South Branch.

Beth Dillon

Figure 21. A picture of stream bank erosion along the South Branch.

Figure 22. A picture of stream bank erosion along UNT27049.

surface reclamation, and approximately 1000 ft of natural stream design stream bank restoration. Work on the site should begin in spring 2006.

In addition through this project, we will be using mine water as a resource instead of a hindrance. Since SBD01 is net alkaline (59 Tons/Year), a portion of the treated water will be diverted into UNT27049 to dilute the slight AMD loading in this tributary, essentially creating in-stream treatment. This should remedy the impacts caused by both SBD01 and UNT27049 and decrease the acidity, and especially the Fe, loading into the South Branch substantially. The conceptual treatment system design for the AMD treatment portion of the project is found in Appendix A.

SBD07 and UNT27047

SBD07 is the largest producer of Fe in the watershed, contributing 31.9% of the loading or 22 Ton/Year. SBD07 is the third major AMD loading input into the South Branch after SBD01, UNT27049 and UNT27047.

SBD07 is a moderate flow, alkaline, drift mine discharge with a very heavy concentration of Fe averaging just over 42mg/l (Figure 23). SBD07 can be treated just the same as SBD01, with retention and oxygen; furthermore, it can be used as an alkalinity engine to dilute slight AMD impacts on a nearby tributary, UNT27047, just as SBD01.

UNT27047 receives AMD seeps from its north side from the same surface mine as UNT27049. As with the case with the seeps impacting UNT27049, these seeps have collection and available land issues. With SBD07 in close proximity and with it being alkaline, producing 19 Tons/Year, the effluent of the SBD07 treatment system will outfall into UNT27047 to dilute the slight AMD loading in this tributary, essentially creating in-stream treatment. UNT27047 contributes 3.9% (11 Tons/Year) of the acidity loading, 1.7% of the Fe loading (1 Ton/Year), 2.8% (0.6 Tons/Year) of the Mn loading and 5.4% (1 Ton/year) of the Al loading to the South Branch.

Permission for system construction will need to be obtained from the Pennsylvania Game Commission and Cal Lind, the property owner of the Johnstown Coal and Coke Property. This should not be a problem.

The conceptual treatment system design for the AMD treatment system is found in Appendix A.

Beth Dillon

Figure 23. A picture of the SBD07 discharge, the largest producer of Fe in the watershed.

SBD05, SBD06 and the Lochvale Coal Refuse Pile

SBD05 and SBD06 are the first truly acidic discharge inputs into the South Branch. Problem is, the exact numerical impact of these discharges was impossible to document since SBD06 and another discharge, which could not even be flow monitored, flow into the Lochvale Coal Refuse Pile and effluent as toe seeps into the South Branch (Figure 24). We were, however, able to sample and flow monitor SBD05 and SBD06 before SBD06 is lost into the pile and together they contribute 7.8% (22 Tons/Year) of the acidity loading, 7.1% (5 Tons/Year) of the Fe loading, 6.9% (1.5Tons/Year) of the Mn loading and 7.4% (1.4 Tons/Year) of the Al loading into the South Branch.

As mentioned, the problem is that another discharge which could not be flow monitored (artesian discharge flowing right into the coal spoil pile and lost) out of the same mine surface

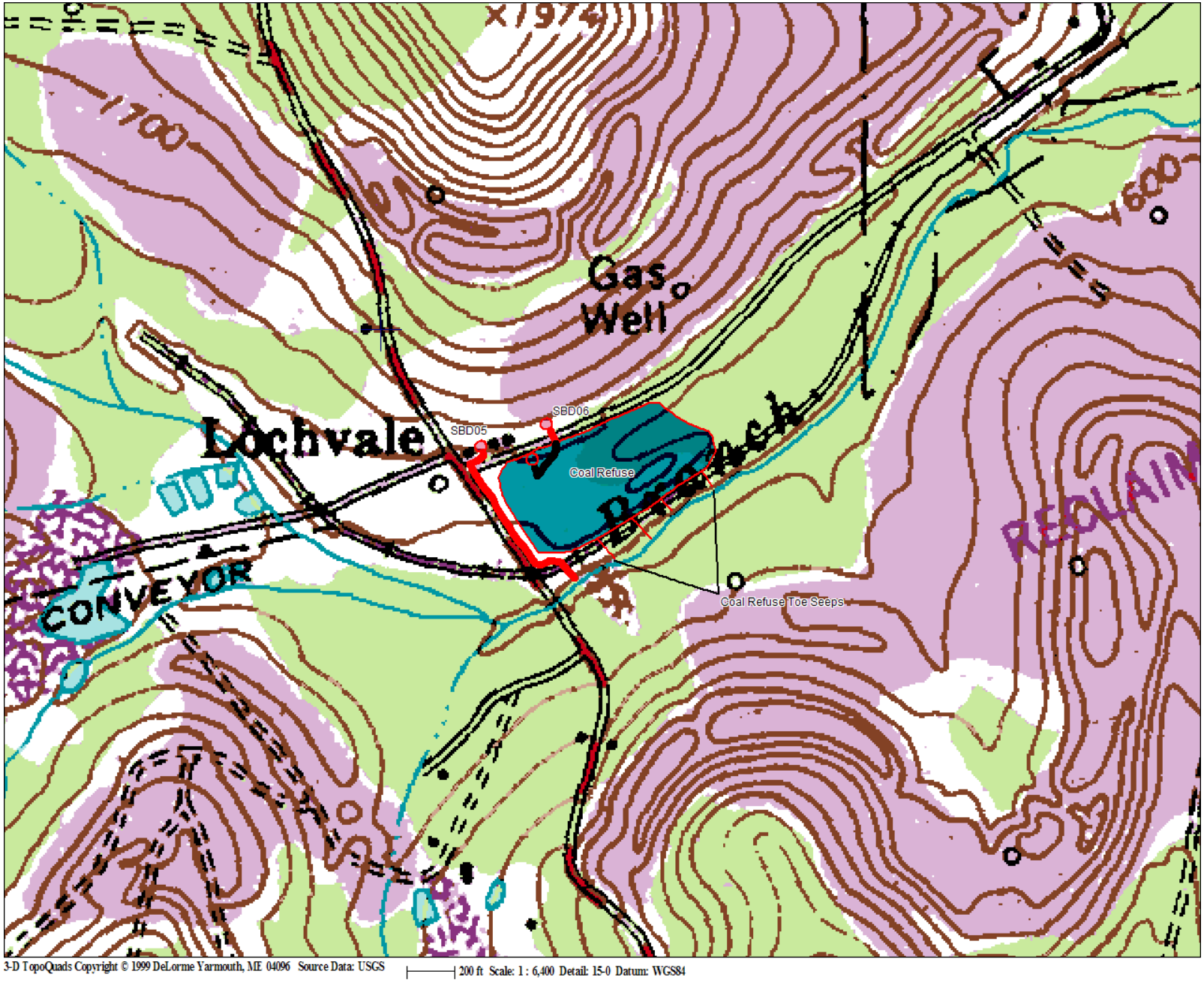


Figure 24. The location and flow characteristics of the Lochvale Coal Refuse Pile Discharges.

mine that SBD05 and SBD06 originates, has possible a higher flow than either SBD05 or SBD06 and absolutely increases the percent AMD loading contribution from this site. I am also of the opinion that the coal refuse pile may have a connection with the adjacent SBD09 discharge, not one of the nine priority discharges. It contributes 3% of the acidity loading into the South Branch and 5.7% of the Mn loading.

The first task that needs completed for the treatment of these discharges is the removal of the coal refuse pile. Once removed, all three discharges can be placed in a common channel so that an exact quality and quantity can be analyzed. The problem with this approach is that all the coal refuse onsite was sampled by Robindale Energy Services of Johnstown, PA in 2002 and found to be not economical (2926-4878 BTU) for the Cogeneration power plants. This leaves us with three options.

1. Contact Robindale Energy Services to investigate whether they would be interested in the material if it was transported to them, as transportation costs may have been the limiting factor for their own removal. If they are interested, submit a PA DEP Energy Harvest Grant for the costs associated with the removal and transportation of the pile.
2. Transport the material to another site in the watershed 2.5 miles downstream where another low BTU coal refuse pile exists. Level both piles to contour and seed and mulch for reclamation (Figure 25 and 26).
3. Push the Lochvale piles away from the discharges and level to contour as best as possible onsite. This may allow for enough room for the needed treatment system, a vertical flow wetland.

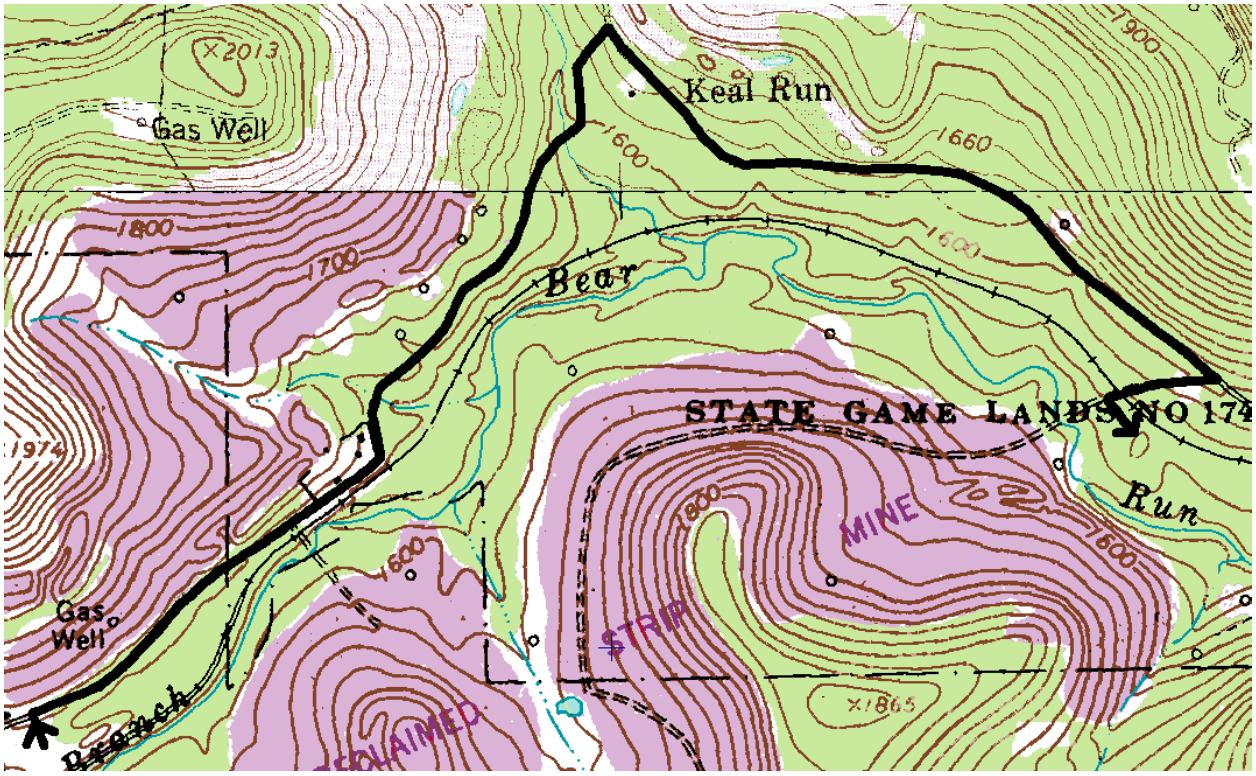


Figure 25. The possible transportation route for the Lochvale Coal Refuse Pile.

Figure 26. A picture of the possible refuse reclamation area where the Lochvale Coal Refuse Pile could be transported.

In my estimation, Option 1 may be feasible if Robindale is interested. Option 2 is very feasible. The only problem is justifying the cost of transportation and reclamation through a grant proposal. And Option 3 is unattractive.

The conceptual treatment system design for the AMD treatment system is found in Appendix A.

SBD08

The treatment of SBD08 may be the most difficult of the treatment systems needed for the nine priority discharges. Several seeps to the east of a very small unnamed and unmarked tributary combine to cause SBD08. The major problem in the treatment of this discharge is mainly location and the seepage nature of the discharge (Figure 27). Collection into a common system will be difficult and wetland issues may be present in the area that may make the project unfeasible for treatment.

Flows and water quality were collected just downstream of where SBD08 combines with the very small unnamed and unmarked tributary as this is the only area that a flow could be taken for loading calculations. SBD08 contributes 4.2% (12 Tons/Year) of the acidity loading, 6.5% (5 Tons/Year) of the Fe loading and 5.8% (1 Ton/Year) of Mn loading. The Al loading is inconsequential.

One recommendation of this restoration plan is to treat the other high priority discharges before initiating any activity at SBD08. If, after treatment of the other discharges, SBD08 impacts the South Branch enough that the integrity of the watershed is compromised downstream, funding should be obtained to first determine what if anything could be accomplished to mitigate the impacts of this seep area.

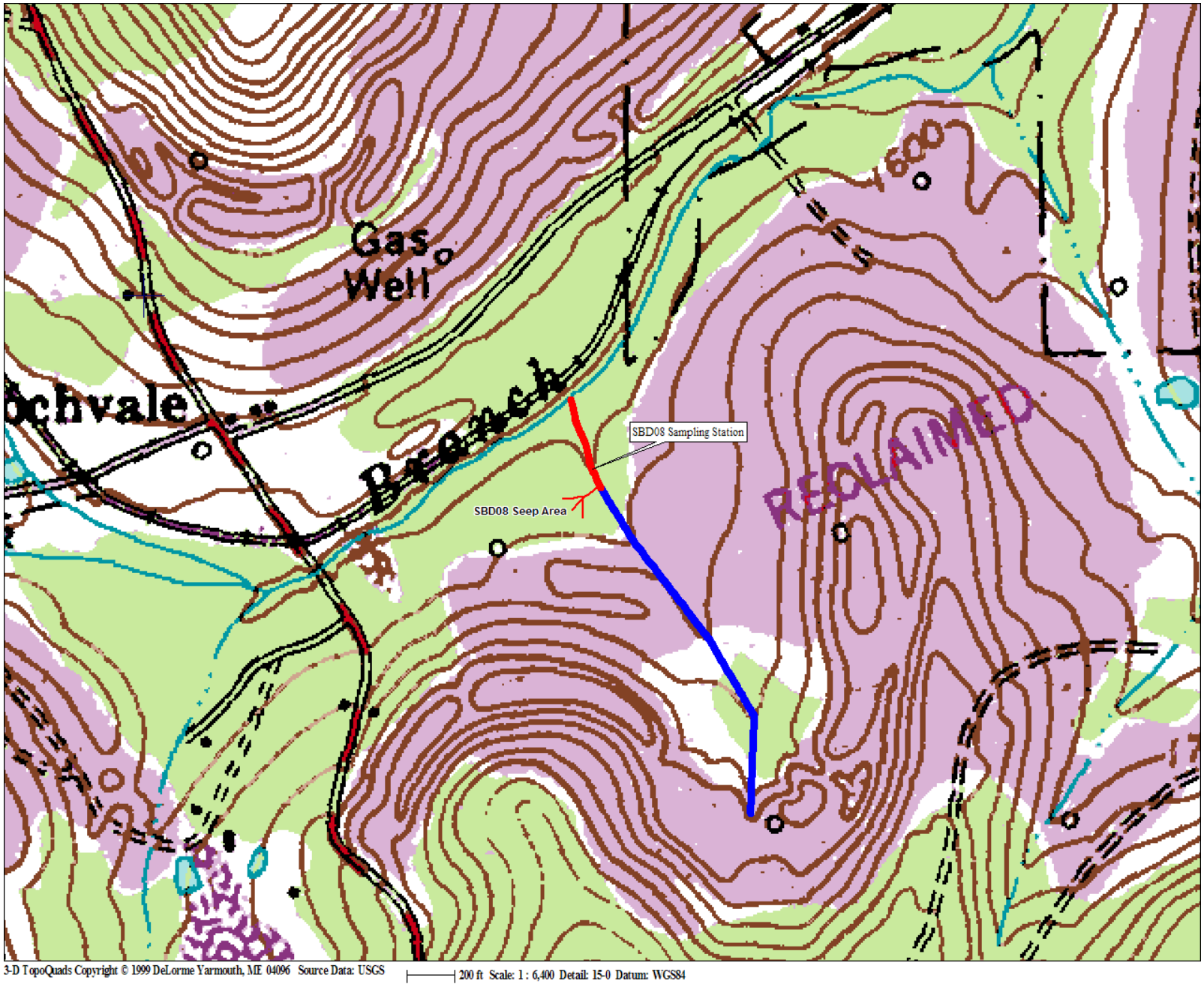


Figure 27. A map of the SBD08 discharge site.

A possible conceptual design option for the treatment of SBD08 is located in Appendix A of this restoration plan.

SBD17 and UNT27042

The treatment of SBD17 is a very attractive project in the restoration of the South Branch for three reasons. First and foremost, AMD pollution loading, especially acidity, will be eliminated from entering the South Branch. Secondly, the effluent of the eventually SBD17 passive treatment system can be use as a resource in the dilution/in-stream treatment of UNT27042, a 1.5 square mile sub watershed of the South Branch that suffers the consequences of acid rain and non-buffering local geology. And third, the restoration of UNT27042, utilizing the SBD17 treatment system effluent and headwaters limestone sand dosing, into a viable cold water fishery capable of supporting a reproductive brook trout fishery.

SBD17 and UNT27042 contributes 19.4% (53 Tons/Year) of the acidity loading, 6.3% (1 Ton/Year) of the Mn loading and 10% (2 Tons/year) of the aluminum loading into the South Branch. Fe loading is inconsequential.

In addition to the cost of the treatment system for SBD17, found in Appendix A of this restoration plan, limestone sand dosing costs for UNT27042 have been added to the total. Utilizing an equation supplied by Dr. William Kimmel of the California University of Pennsylvania, 64 tons of limestone sand should be placed in the headwaters of UNT27042 in the first year and 32 tons/year thereafter (Figure 28 and 29).

SBD18

SBD18 is an intriguing discharge due to its flow variability. During times of heavy precipitation coupled with snow melt, the discharge has been measured at 567 GPM.

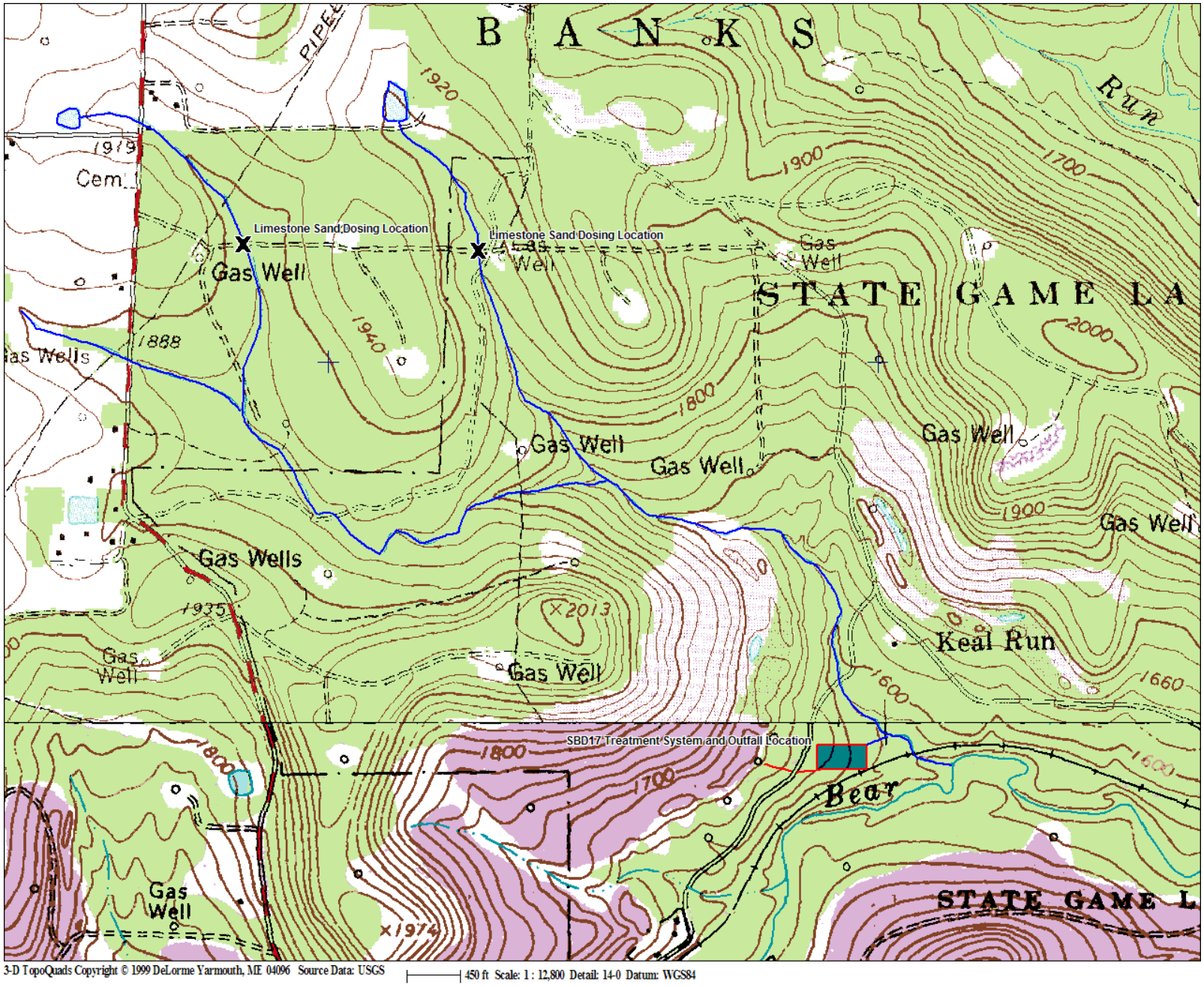


Figure 28. The SBD17 treatment system and UNT27042 limestone sand dosing locations.

Beth Dillon

Figure 29. The SBD17 drift mine entry and discharge.

However, during dry months of the year, one quarter of the months during this assessment, there was no flow exiting the drift mine. This flow variability, and the relatively elevated Al concentration (~15mg/l) of the discharge, may make passive treatment of this discharge very difficult.

The SBD18 discharge contributes 9.1% (25 Tons/Year) of the acidity loading, 1.4% (1 Ton/Year) of the Fe loading and 13.2% (3 Tons/Year) of the aluminum loading into the South Branch (Figure 30).

A mine pool study of SBD18 should be the first task initiated through the restoration of this discharge. This may shed some light as to the reason for the flow variability and possible projects that could be completed to lessen this variability (i.e. possible elimination of surface water infiltration into the mine pool from deep mine subsidence).

Beth Dillon

Figure 30. The SBD18 drift mine entry and discharge.

If flow variability cannot be remedied, a limestone dosing system utilizing a lime silo that functions off of discharge flow, a mixing channel and a settling pond is the recommended treatment system design. This is the only viable solution for the variable flow and elevated Al concentration of the discharge. A typical passive will more than likely clog with Al since during portions of the year the water in the system would be stagnant.

The conceptual design for this treatment system is located in Appendix A of this restoration plan.

SBD19, SBD20 and UNT27039

Due to foreseeable problems with passively treating the extremely adverse water qualities of SBD19 and SBD20, there are two possible options for the restoration of the AMD loading impacts from these three sources.

SBD19 and SBD20 are the only impacts to the water quality of UNT27040 (AKA the North Branch of UNT27039). The SBD19 drift mine discharge contributes 12.8% (35 Tons/Year) of the acidity loading, 3.4% (2 Tons/Year) of the Fe loading and 10.6% (2 Tons/Year) of the aluminum loading into the South Branch. The Mn loading is inconsequential. The SBD20 surface mine discharge contributes 7.6% (21 Tons/Year) of the acidity loading, 2.2% (0.5 Tons/Year) of the Mn loading and 12.5% (2.4 Tons/Year) of the aluminum loading into the South Branch. The Fe loading is inconsequential.

The Al concentrations (~19 mg/l) of both discharges and the acidity concentration of SBD19 (~330 mg/l) may make passive treatment difficult, but not impossible. The AMD conceptual treatment system design for these two discharges can be located in Appendix A of this restoration plan.

In addition to SBD19 and SBD20, UNT27039 is impacted by numerous seeps in its headwaters that make passive treatment near impossible due to collection problems. UNT27039 contributes 9.5% (26 Tons/Year) of the acidity loading, 15.3% (3 Tons/Year) of the Mn loading and 15.6% (3 Tons/Year) of the Al loading into the South Branch. A limestone sand dosing project on UNT27039 should be initiated as well. Utilizing a equation supplied by Dr. William Kimmel of the California University of Pennsylvania, 44 tons needs applied during the first year with 22 tons/year supplied thereafter (Figure 31).

However, a second option exists that may be less of a headache than treating the SBD19 and SBD20 discharges passively. Instead of just applying limestone sand to UNT27039, apply it as well to UNT27040 downstream of where SBD19 and SBD20 input. This increases the amount of limestone sand needed in the first year to 156 tons and to 78 tons/year thereafter (Figure 32).

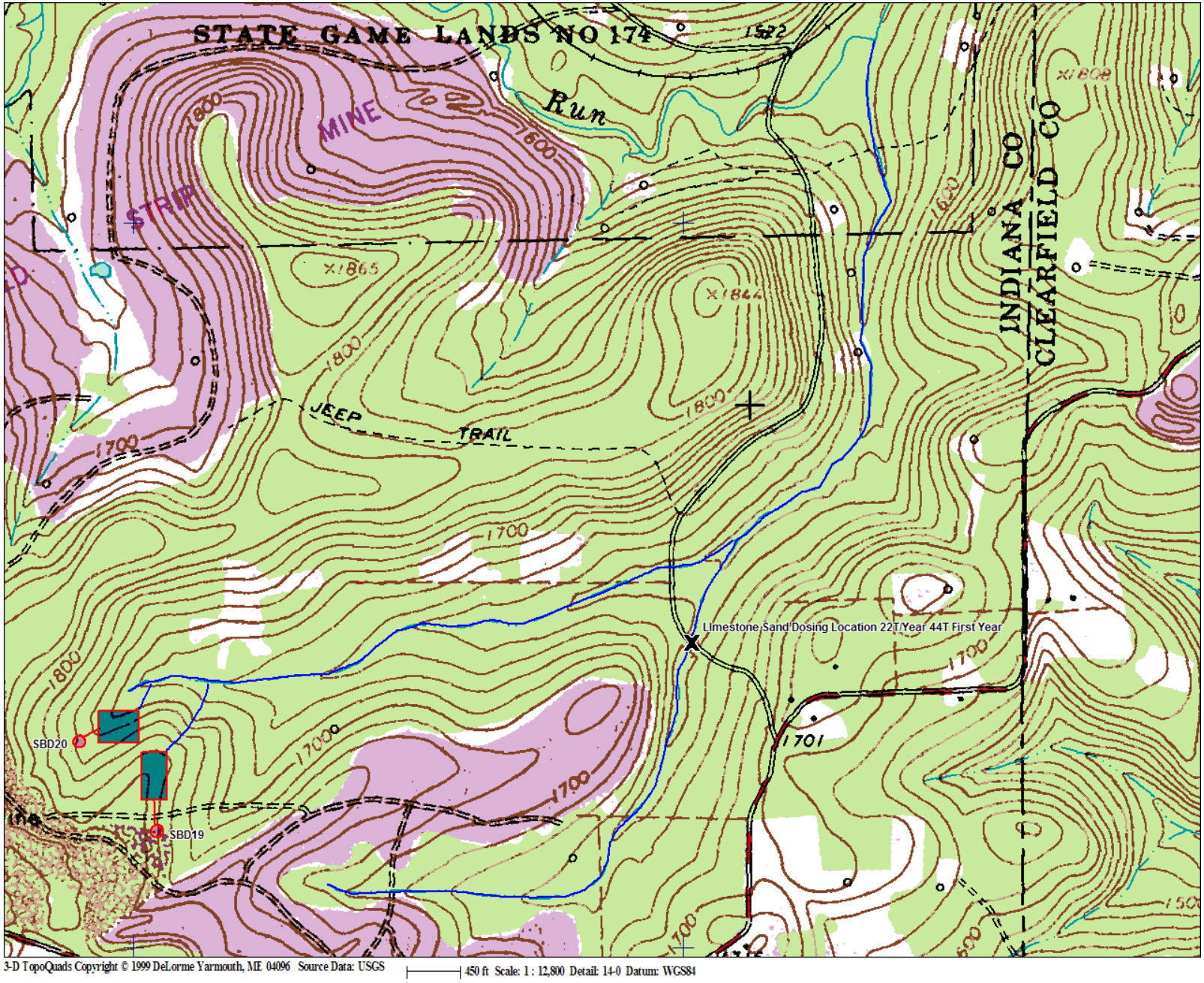


Figure 31. Option #1 for the restoration of UNT27039.

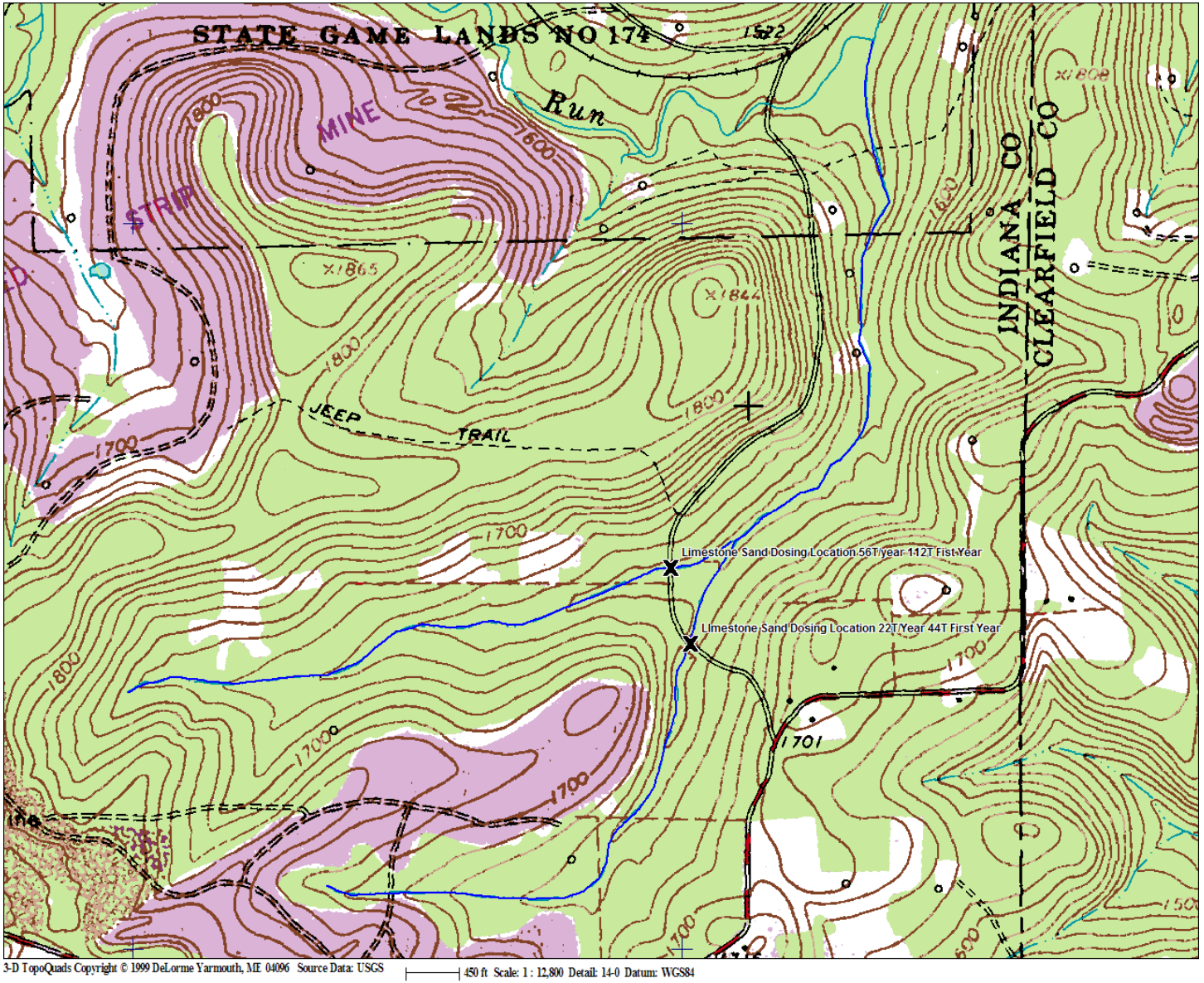


Figure 32. Option #2 for the restoration of UNT27039.

Both of these options are viable and both should be considered and analyzed before selecting the best. This is a very important project not only to the restoration of the South Branch, but also to expanding the reproductive trout water as UNT27039 (1.5 square miles) can be a viable cold water stream.

South Branch Reforestation Efforts

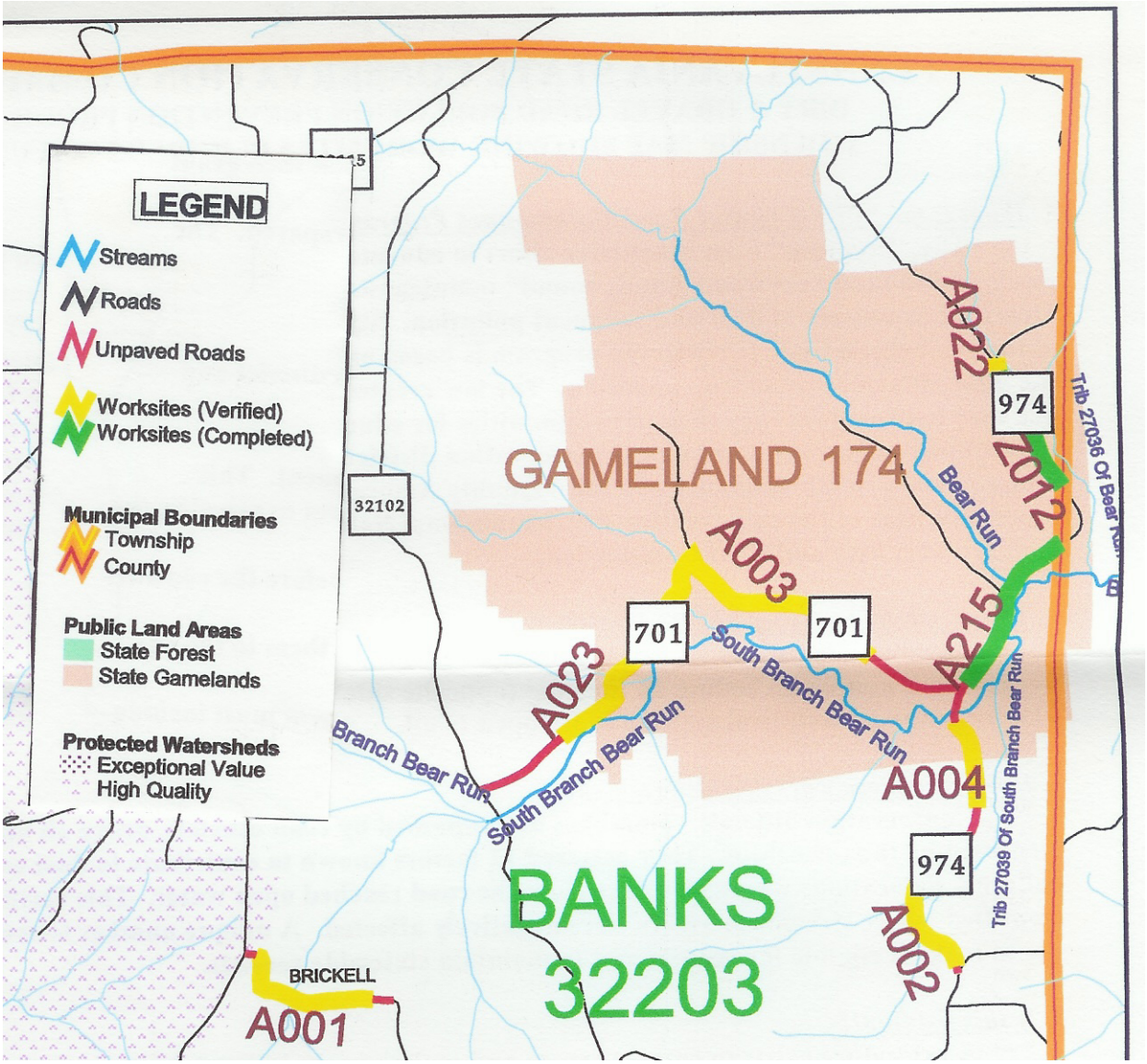
The other coal extraction impact in the South Branch is the large expanses of reclaimed and treeless past surface mines. The partners involved in the Bear Run restoration efforts should contact the major property owner, the Pennsylvania Game Commission, to gauge the interest for a large scale reforestation effort in the Bear Run watershed, particularly in the South Branch sub watershed. Reforestation will improve game land habitat, decrease stream temperatures, and reduce erosion.

Urban Impacts

As stated in the Watershed Characteristics section, the Bear Run watershed is an extremely rural watershed as nearly 80% is classified as forestland and over 30% is located in SGL 174. However, sedimentation loading inputs into the South Branch from two urban impacts, dirt and gravel roadways and gas line roadways, are more then likely the second largest pollution source behind AMD in the Bear Run watershed, particularly the South Branch.

Three stretches of dirt and gravel roads are located in the South Branch watershed (Figure 33). Banks Township has already completed several projects by receiving funding given to the ICCD from the PA Dirt and Gravel Road Program. The funding of Banks Township dirt and gravel road projects should continue as their work already has paid sedimentation loading

reduction dividends by diverting roadway runoff into vegetative strips and the installation of properly sized cross pipes and road culverts.



Penn State Center for Dirt and Gravel Road Studies

Figure 33. The planned and completed dirt and gravel road projects in the Bear Run watershed.

According to the USGS Topographic Maps, there are 75 gas wells in the South Branch sub watershed, or 7.5 per square mile. Most of these gas wells have roadways to them that are rarely maintained. The partners involved in the Bear Run restoration efforts should combine with

the local gas companies and the PGC to initiate a low cost, large-scale gas well roadway sedimentation reduction project utilizing mine conveyor belts to divert gas line roadway water off the road and into vegetative strips. The ICCD has successfully completed these types of projects elsewhere and should be utilized for consultation. An informational brochure constructed by the ICCD as to how to install these mine conveyor belt diversions can be found in Appendix D of this restoration plan.

Another urban impact documented in the South Branch sub watershed is illegal dumpsites. Three sites were located, two small and one massive in scope (Figure 34). The partners involved in the Bear Run restoration efforts should partner with the Indiana County Chapter of PA Clearways to clear these sites and then place structures to eliminate the ease of dumping at each site.

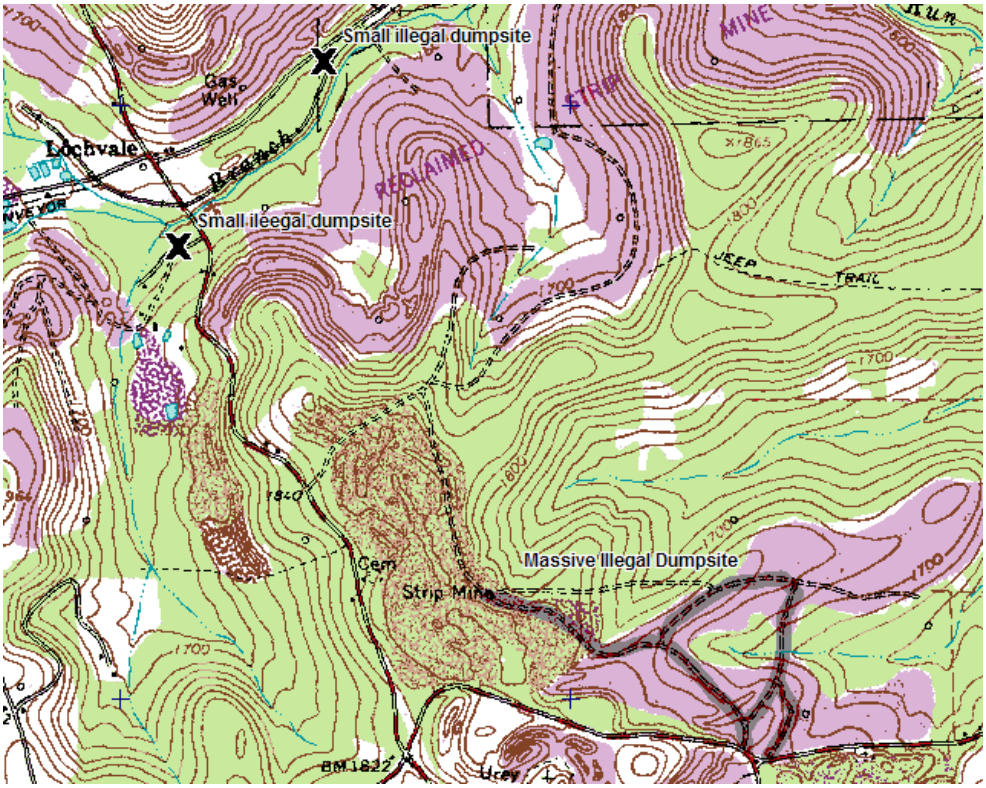


Figure 34. The three illegal dumpsite locations in the South Branch sub watershed.

Agricultural Impacts

The South Branch sub watershed is minimally impacted by agricultural practices. The only area of agricultural use is in the headwaters near the towns of Johnsonburg and Flora (Figure 7). The partners involved in the Bear Run restoration efforts should contact the ICCD Agricultural and Nutrient Management Specialist to determine if farms in the South Branch are in need of conservation practice installation.

If needed, these conservation practices could be completed through a cost-share grant program submitted to the PA DEP Growing Greener Program by the ICCD.

South Branch Stream Station Water Quality

The SRBC collected stream water quality and flow at six stations along the main stem of the South Branch. Through this assessment, we added one more to better document the water quality above all AMD impacts, i.e. the control.

1. SBS01 – Upstream of the Johnstown Coal and Coke Property (Figure 35).
2. SBS02 – Downstream of SBD01, UNT27049 and UNT27047
3. SBS03 – Downstream of SBD05, SBD06 and SBD07
4. SBS04 – Downstream of SBD08 – SBD12
5. SBS05 – Downstream of SBD13 – SBD17 as well as UNT27046 and UNT27045
6. SBS06 - Downstream of SBD18 and UNT27042 and UNT27041
7. SBS07 – Mouth of the South Branch (Figure 36).

As you can see by graphing the concentrations and loadings throughout these stations, the South Branch generally decreases in quality as you travel downstream (Figure 37-40).

Figure 35. A picture of the South Branch upstream of SBD01.

Figure 36. A picture near the mouth of the South Branch.

Figure 37. The alkalinity and acidity concentrations along the South Branch main stem sampling stations.

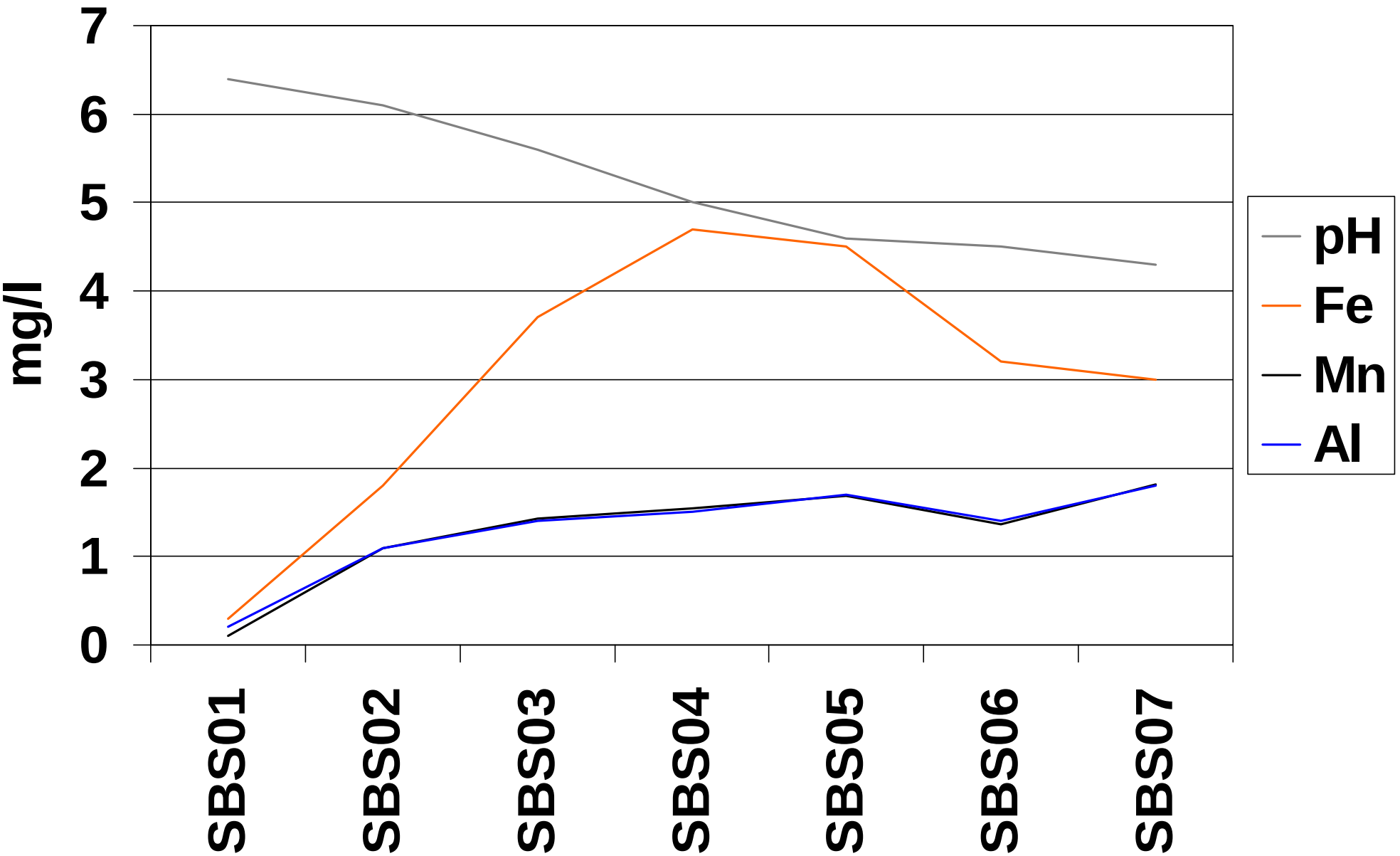


Figure 38. The pH and metal concentrations along the South Branch main stem sampling stations.

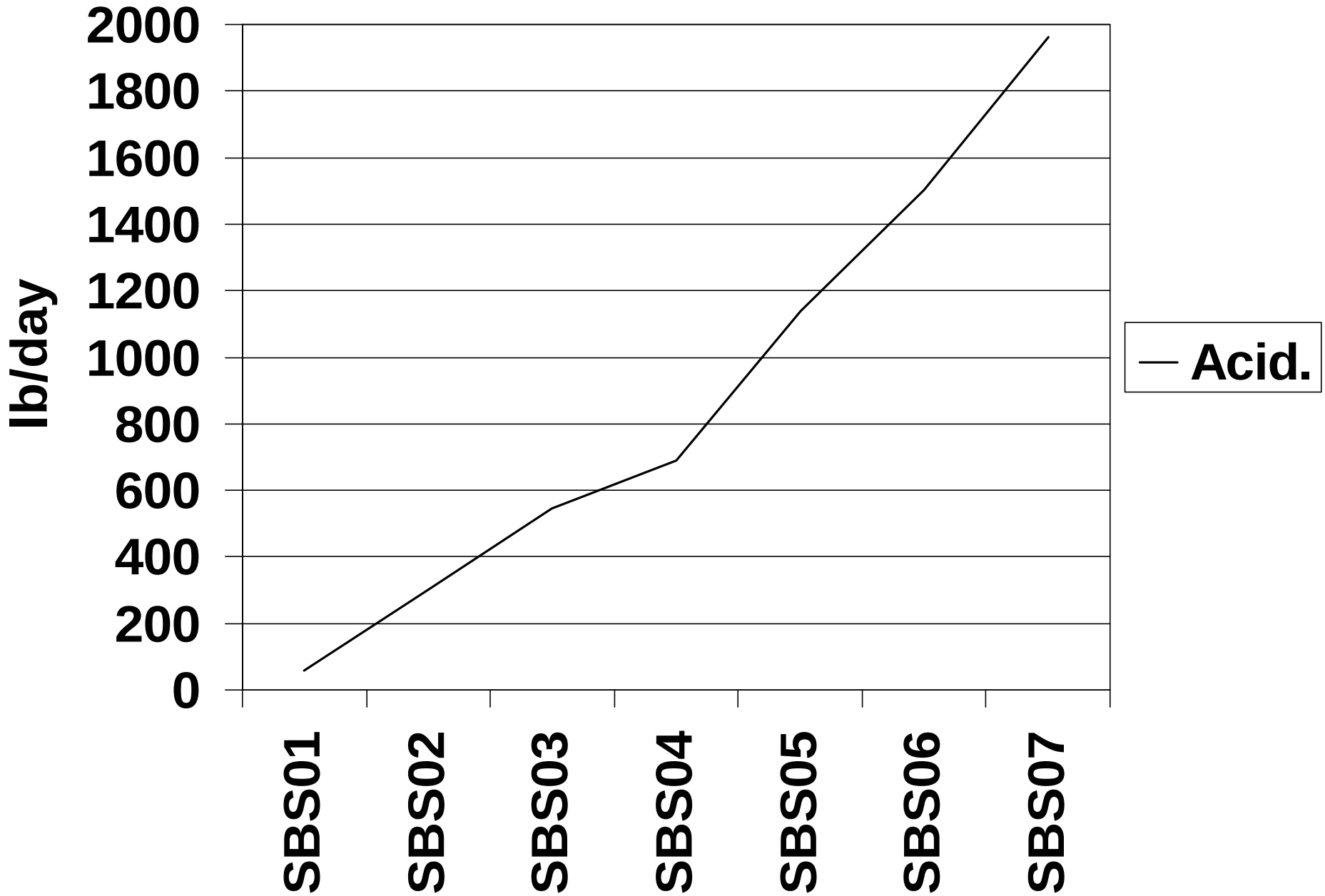


Figure 39. The acidity loading along the South Branch main stem sampling stations.

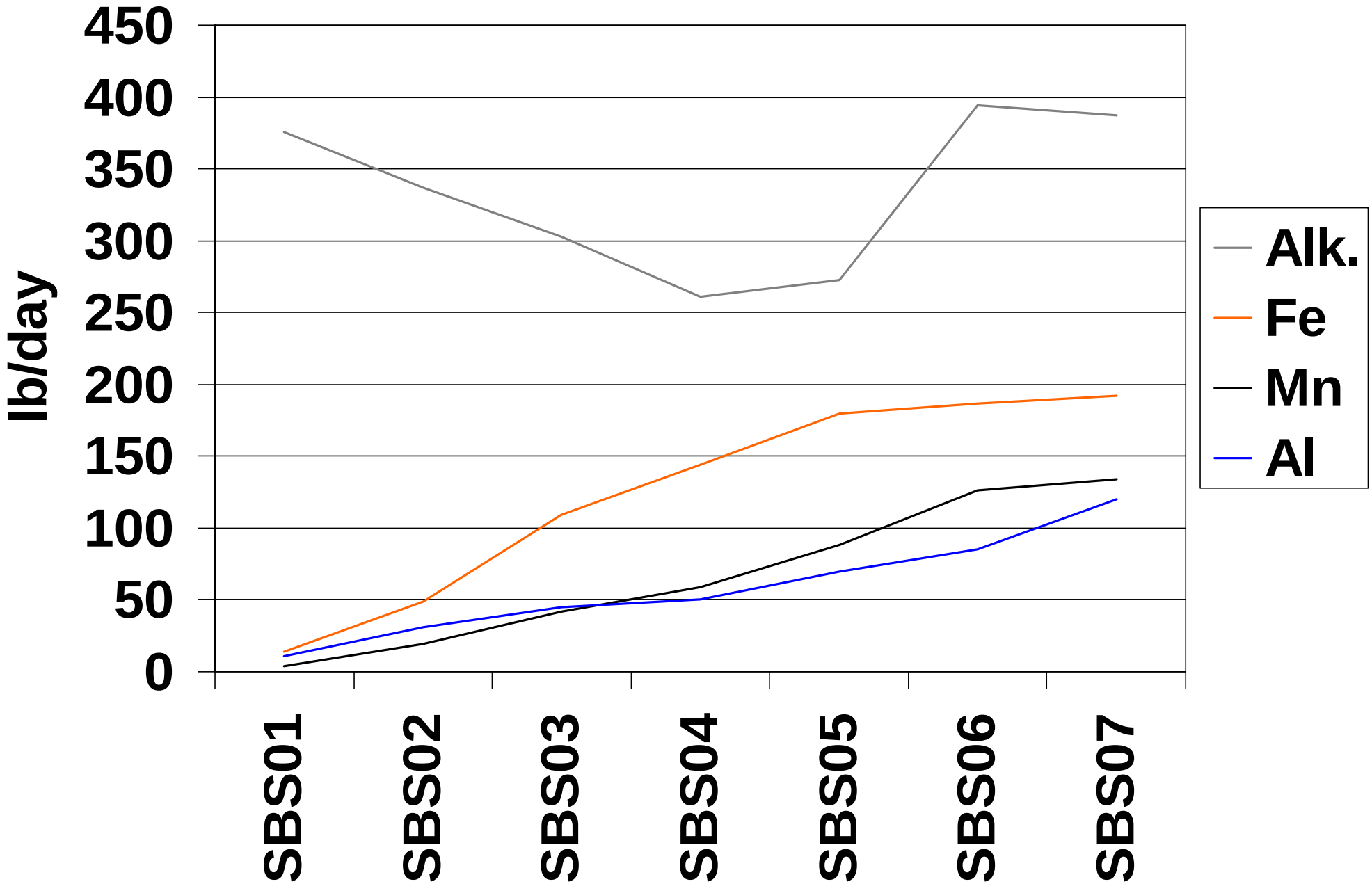


Figure 40. The metal loadings along the South Branch main stem sampling stations.

Overall South Branch Recommendations

1. **Complete the survey and design for the AMD treatment system, land reclamation and restoration of the natural stream channel at the Johnstown Coal and Coke Property. Obtain funding to complete the permitting and construction. In addition, utilize the treated SBD01 effluent to dilute the impacts from UNT27049. Utilize the conceptual design in Appendix A as a first, but not only, means of restoration.**

2. **Obtain funding to complete the design, permitting and construction of the SBD07 AMD treatment system. In addition, utilize the treated SBD07 effluent to dilute the impacts from UNT27047. Utilize the conceptual design in Appendix A as a first, but not only, means of restoration.**

3. **Obtain funding to complete the design, permitting and construction of the SBD17 AMD treatment system. Utilize the treated SBD17 effluent to dilute the impacts from UNT27042. In addition, add in the costs associated with applying limestone sand (64 tons in the first year and 32 tons/year thereafter) to the two UNT27042 headwater crossings identified in this restoration plan. Utilize the conceptual design in Appendix A as a first, but not only, means of restoration.**

4. **Contact Robindale Energy Services of Johnstown to gauge if there is an interest in the Lochvale Coal Spoil Pile if transported to their site as BTUs are too low to make it economically feasible for them to remove the material. If so, obtain a PA DEP Energy Harvest Grant to cover the costs associated with the removal and transportation of the pile.**

5. **If Recommendation #4 is not feasible, obtain funding to transport the Lochvale Coal Refuse Pile to the designated site in this restoration plan 2.5 miles downstream where it will be combined with another low BTU refuse pile. Each pile will then be leveled to contour and seeded and mulched.**

6. **Obtain funding to collect SBD05, SBD06 and the artesian discharge into a common channel at the now removed Lochvale Coal Refuse Pile. Obtain funding to better analyze the quality and quantity once per month for one year.**

7. **Obtain funding to complete the design permitting and construction of the Lochvale Treatment System. Utilize the conceptual design in Appendix A as a first, but not only, means of restoration.**

8. **Obtain funding for one of the two options for the restoration of UNT27039. Option #1 involves the construction of two passive AMD treatment systems for SBD19 and SBD20 and limestone sand dosing (44 tons in the first year and 22 tons/year thereafter) of UNT27039 at the designated location. Option**

#2 involves just the limestone sand dosing of UNT27039 which increases the amount of sand to 156 tons in the first year and 78 tons/year thereafter.

9. **Obtain funding to complete a mine pool study of SBD18 to investigate whether the variability of the flows could be decreased or eliminated.**

10. **If the flow variability of SBD18 cannot be remedied, then obtain funding for the design, permitting and construction of a limestone silo dosing type system described in Appendix A. If flow variability can be remedied, a typical vertical flow wetland treatment system should be constructed which is also described in Appendix A.**

11. **Obtain funding to reassess the South Branch to determine if it is now a viable cold water fishery capable of supporting cold water fish. If it is, reestablish that cold water fish community with stockings of native brook trout located in Bear Run upstream of the South Branch. If the South Branch is still degraded obtain funding to determine how to treat the SBD08 discharge. If treatment is feasible, obtain funding for the permitting and construction of that system. Utilize the conceptual design in Appendix A as a first, but not only, means of restoration.**

12. **Continue to fund and support the dirt and gravel road projects completed by Banks Township.**

13. **Form a partnership with the local gas companies and the Pennsylvania Game Commission on a large scale, low cost gas line road sedimentation reduction project utilizing mine conveyor belt diversions to divert water off the roadway and into vegetative strips. An information brochure describing this process can be found in Appendix D.**

14. **Assist the Indiana County Conservation District Agricultural and Nutrient Management Technician with a possible agricultural best management practice cost-share installation program focused on the headwaters of the South Branch. A PA DEP Growing Greener Grant Proposal may be submitted if conservation practices need to be installed.**

15. **Work with the Indiana County Chapter of PA Clearways on the clearing of the three illegal dumpsites located in the South Branch through the assessment.**

Bear Run Upstream of the South Branch

Sub Watershed Characteristics

The portion of the Bear Run watershed upstream of the South Branch accounts for nearly 25% of the Bear Run watershed area, with a drainage basin of 4.8 square miles comprised of approximately 11.9 stream miles. The headwaters begin near the town of Hillman in Indiana County. Bear Run then flows southeast until its confluence with the South Branch near the ghost town of Sidney.

As mentioned previously, this section of Bear Run upstream of the South Branch may be the most pristine watershed in Indiana County. It contains a massive population of native brook trout that, according to a Western Pennsylvania Conservancy Cold Water Heritage Project Study, is of Class A status according to guidelines set forth by the Pennsylvania Fish and Boat Commission (PFBC) (Table 5 and 6 and Figure 41 and 42) However, this section of Bear Run is neither classified as Class A by the PFBC or as High Quality or Exceptional Value by PA DEP. The first recommendation of this restoration plan is to obtain these classifications which will protect the integrity of the watershed in the future from pollution impacts.

AMD Impacts

There are only two AMD impacts in the entire Bear Run watershed upstream of the South Branch, one exiting a P&N Coal Company tipple and coal processing site and a small discharge about 100 ft upstream of the South Branch confluence that is inconsequential only inputting 2 Tons of Fe/year (Figure 43). P&N has several sedimentation ponds onsite that flow in response to precipitation events. These ponds seem to have an influence on the quality of Bear Run as water quality and quantities were

Table 5. Site #1 trout survey on Bear Run. Brook trout 98% abundance.

	Length	Weight	<5.9"	Date	8/9/2005	
	inches	lbs	lbs	Stream Width	12ft	3.6576 Meters
	2.75	0.0080	0.0080	Stream Length	230ft	70 Meters
	6.40	0.1100		m^2	256.032	
	2.00	0.0029	0.0029	acres	4046.856	
	6.00	0.0900				
	6.00	0.0900				
	2.50	0.0050	0.0050			
	2.20	0.0037	0.0037			
	7.00	0.1440				
	2.40	0.0046	0.0046			
	2.20	0.0037	0.0037			
	2.50	0.0050	0.0050			
	2.75	0.0080	0.0080			
	2.50	0.0050	0.0050			
	2.80	0.0080	0.0080			
	2.10	0.0033	0.0033			
	2.50	0.0050	0.0050			
	2.10	0.0033	0.0033			
	5.60	0.0685	0.0685			
	2.80	0.0080	0.0080			
	6.40	0.1100				
	1.90	0.0025	0.0025			
	1.60	0.0015	0.0015			
	2.70	0.0069	0.0069			
	2.00	0.0029	0.0029			
	6.50	0.1150				
	2.00	0.0029	0.0029			
	2.20	0.0037	0.0037			
	2.10	0.0033	0.0033			
	6.10	0.0950				
	2.50	0.0050	0.0050			
	2.00	0.0029	0.0029			
	7.00	0.1440				
	6.00	0.0900				
	2.10	0.0033	0.0033			
	2.75	0.0080	0.0080			
	2.60	0.0058	0.0058			
	5.40	0.0600	0.0600			
	2.30	0.0042	0.0042			
	6.00	0.0900				
	7.10	0.1510				
	2.50	0.0050	0.0050			
	2.50	0.0050	0.0050			
	2.40	0.0046	0.0046			
	2.30	0.0042	0.0042			
Total	**154.05**	**1.5027**	**0.2737**			
lbs/acre		**23.75**	**4.33**			

Table 6. Site #2 trout survey on Bear Run. Brook trout 98% abundance.

	Length	Weight	<5.9"	Date	8/9/2005	
	inches	lbs	lbs	Stream Width	6ft	1.8288 Meters
	2.75	0.0080	0.0080	Stream Length	394ft	120 Meters
	5.60	0.0685	0.0685	m^2	219.456	
	2.80	0.0080	0.0080	acres	4046.856	
	2.60	0.0058	0.0058			
	5.40	0.0600	0.0600			
	6.40	0.1100				
	2.10	0.0029	0.0029			
	6.40	0.1100				
	2.75	0.0080	0.0080			
	2.30	0.0042	0.0042			
	2.00	0.0029	0.0029			
	2.50	0.0050	0.0050			
	1.90	0.0025	0.0025			
	2.10	0.0033	0.0033			
	6.00	0.0900				
	6.00	0.0900				
	2.10	0.0033	0.0033			
	1.60	0.0015	0.0015			
	6.00	0.0900				
	7.10	0.1510				
	6.00	0.0900				
	2.80	0.0080	0.0080			
	2.70	0.0069	0.0069			
	7.00	0.1440				
	2.50	0.0050	0.0050			
	2.50	0.0050	0.0050			
	2.00	0.0029	0.0029			
	2.00	0.0029	0.0029			
	2.50	0.0050	0.0050			
	1.20	0.0007	0.0007			
	2.75	0.0080	0.0080			
	6.50	0.1150				
	2.50	0.0050	0.0050			
	2.40	0.0046	0.0046			
	7.00	0.1140				
	2.50	0.0050	0.0050			
	2.00	0.0029	0.0029			
	6.10	0.0950				
	2.30	0.0042	0.0042			
	2.40	0.0046	0.0046			
	2.20	0.0037	0.0037			
	2.10	0.0033	0.0033			
Total	148.35	1.4606	0.2616			
lbs/acre		26.93	4.82			

Art Hamley

Figure 41. A Bear Run native brook trout.

Debbie Heggenstaller

Figure 42. A young Bear Run native brook trout.

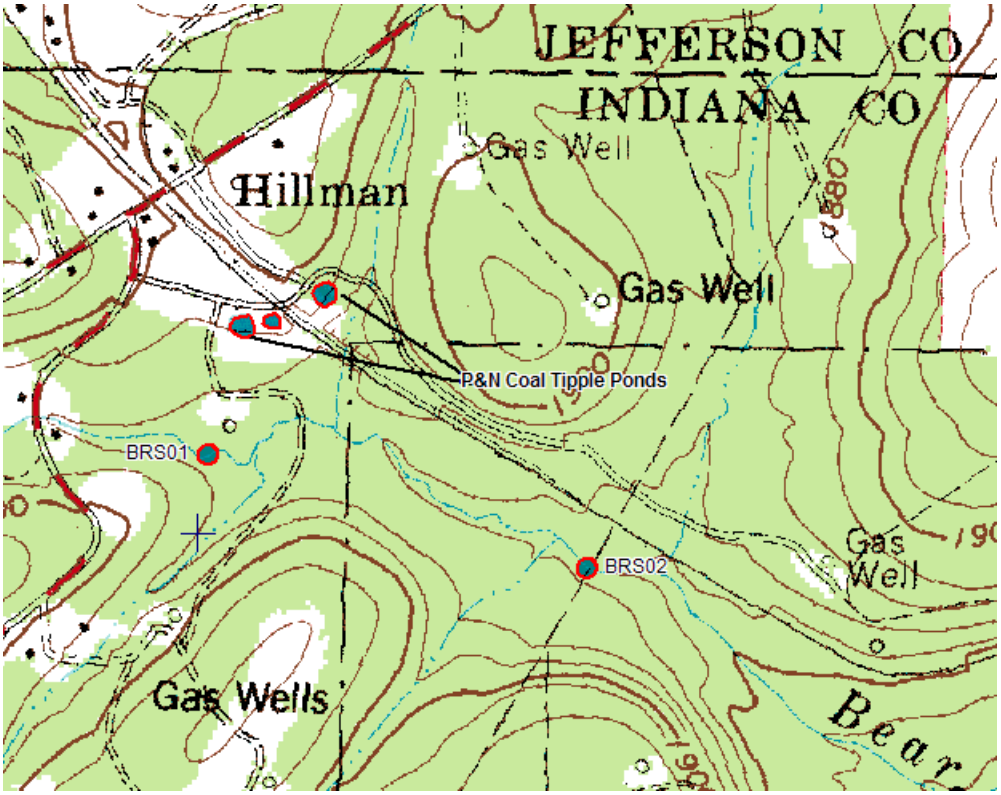


Figure 43. P&N coal tipple pond locations and upstream and downstream sampling stations.

Table 7. The Bear Run water quality upstream and downstream of the P&N coal tipple and upstream of the confluence with the South Branch.

Location	Flow	Lab	Cond	Alk.	Acid.	Fe	Mn	Al	SO4	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
	gpm	pH	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	lb/day	lb/day	lb/day	lb/day	lb/day
BRS01	944.83	6.20	134.25	12.25	1.00	0.23	0.08	0.13	17.75	159.93	1.44	3.82	1.24	2.12
BRS02	681.81	6.17	142.83	11.27	8.00	0.35	0.19	<0.50	37.68	108.10	63.15	3.03	1.37	4.10
BRS03	1863.67	6.75	198.50	18.97	0.27	0.31	0.11	<0.50	51.23	325.12	2.21	6.73	2.27	11.46

sampled upstream and downstream of the tipple and show slight AMD pollution loading increases and elevated sulfate concentrations (Table 7).

The PA DEP should be notified to make certain that the ponds onsite are functioning properly and if they are in need of any maintenance or expansion.

Urban Impacts

Sedimentation loading is the largest impact to the integrity of Bear Run upstream of the South Branch. This loading comes from three general sources, un-maintained culverts along the Mahaffey-Hilman spur of the RJ Corman Pennsylvania Division

Railroad, gas well roadways and headwater agricultural impacts, which will be discussed later.

Four unnamed tributaries of Bear Run flow underneath the RJ Corman Railroad through stone culverts (Figure 44). As assessment work was completed on this section of Bear Run it was noticed that the stream banks of these tributary streams were eroded upstream and downstream of the stone culverts. Upon further examination it was discovered that these culverts were partially blocked with limbs, sticks and detritus. More then likely, during heavy precipitation events, stream water backs up behind the culvert, causing the erosion here. With pooling comes more pressure and energy, which is more than likely causing the erosion downstream of the culverts, i.e. elevated stream velocities.

The RJ Corman Railroad Company should be contacted as to the maintenance needed on these culverts. After maintenance is completed, stream bank stabilization measures could be installed to lessen the amount of erosion upstream and downstream of the culverts. This will drastically reduce the sedimentation into Bear Run, improving on the reproductive success of the native brook trout.

According to the USGS Topographic Maps, there are 68 gas wells in this section of the Bear Run watershed, or 14.2 per square mile. Most of these gas wells have roadways to them that are rarely maintained. Bear Run restoration project partners should combine efforts with the local gas companies and the PGC to initiate a low cost, large-scale gas well roadway sedimentation reduction project utilizing mine conveyor belts to divert gas line roadway water off the road and into vegetative strips. The ICCD has successfully completed these types of projects elsewhere and should be utilized for consultation. An informational brochure constructed by the ICCD as to how to install these mine conveyor belt diversions can be found in Appendix D of this restoration plan.

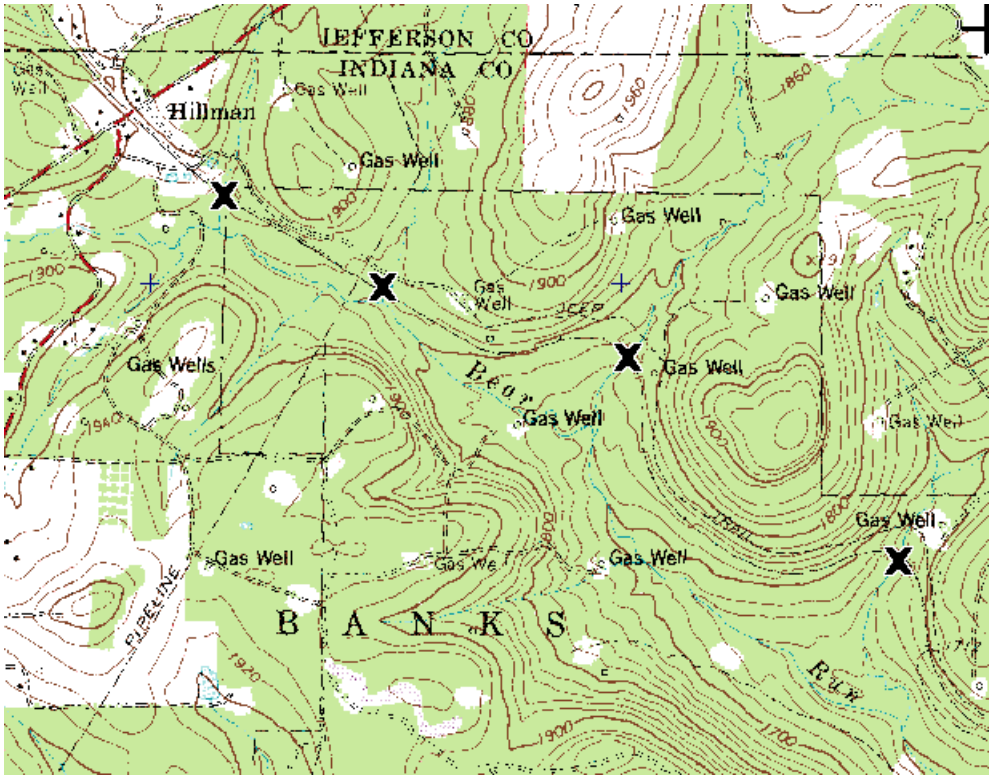


Figure 44. The railroad culvert locations in the Bear Run watershed upstream of the South Branch.

No illegal dumping activity was identified in this section of the Bear Run watershed.

Agricultural Impacts

Agricultural impacts are more numerous in this section of the Bear Run watershed than in the South Branch, especially in around the three most headwater forks of Bear Run near the towns of Hillman and Flora (Figure 45). The partners involved in the Bear Run restoration efforts should contact the ICCD Agricultural and Nutrient Management Specialist to determine what conservation practices can be installed to minimize the pollution loadings from these agricultural sites.

If needed, these conservation practices could be completed through a cost-share grant program, possibly in combination with the needs identified in the headwaters of the South Branch, submitted to the PA DEP Growing Greener Program by the ICCD.

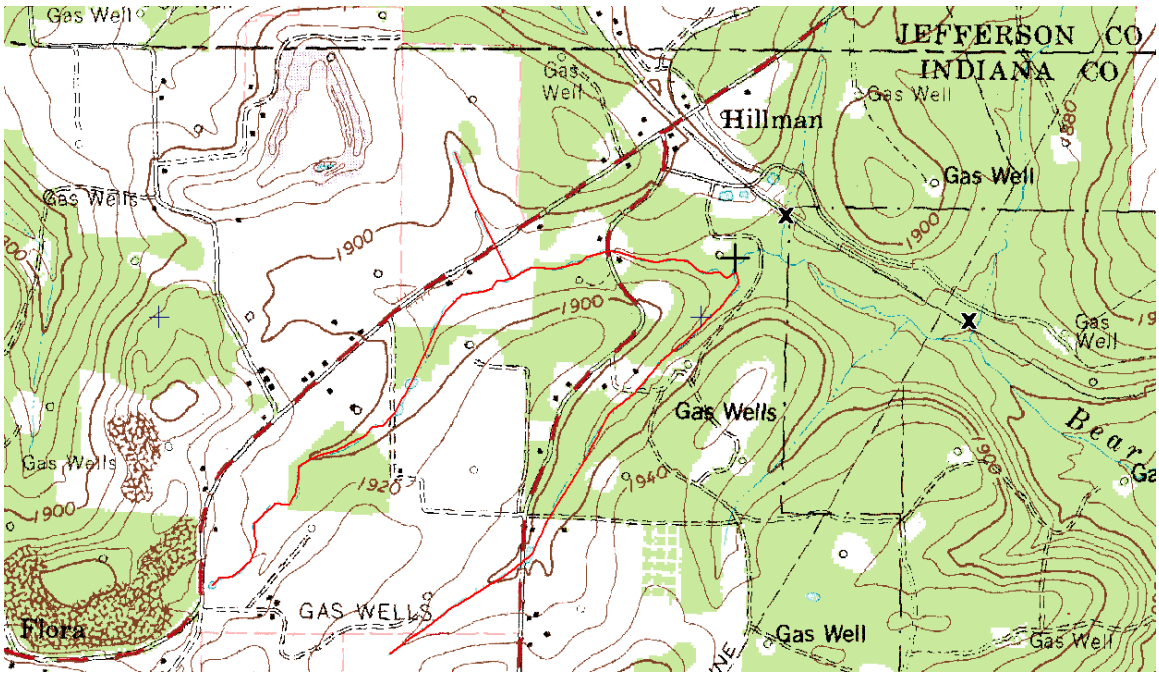


Figure 45. Three headwater forks of Bear Run with numerous agricultural impacts.

Overall Recommendations for Bear Run Upstream of the South Branch

1. **Petition the PFBC and PA DEP to reclassify Bear Run to its confluence with the South Branch as Class A Wild Trout Water and either High Quality or Exceptional Value respectively. This section may also be suitable for Wilderness or Heritage Trout Status.**

2. **Contact the PA DEP to discuss maintenance or expansion of the P&N Coal Company tipple and coal processing plant sedimentation ponds which seem to have a slight impact to the water quality of Bear Run.**

3. **Assist the Indiana County Conservation District Agricultural and Nutrient Management Technician with a possible agricultural best management practice cost-share installation program focused on the headwaters of Bear Run. A PA DEP Growing Greener Grant Proposal may be submitted if conservation practices need to be installed.**

4. **Form a partnership with the local gas companies and the Pennsylvania Game Commission on a large scale, low cost gas line road sedimentation reduction project utilizing mine conveyor belt diversions to divert water off the roadway and into vegetative strips. An information brochure describing this process can be found in Appendix D.**

5. **Contact RJ Corman Railroad to discuss maintenance that is needed on four culverts transporting Bear Run tributaries underneath their railroad. These culverts are impacting Bear Run with sedimentation loading during precipitation events. Complete stream back restoration post maintenance.**

Bear Run Downstream of the South Branch

Sub Watershed Characteristics

The portion of the Bear Run watershed downstream of the South Branch accounts for nearly 23% of the Bear Run watershed area, with a drainage basin of 4.5 square miles comprised of approximately 10.7 stream miles. This section begins at the confluence of Bear Run with the South Branch and extends 3.17 miles downstream, where Bear Run confluences with the West Branch of the Susquehanna.

A majority of this section is located in Clearfield County and since this grant was obtained by the Indiana County Conservation District and the main pollution impact is the South Branch, totally within Indiana County, this section of Bear Run downstream of the South Branch was not the focus of this assessment. However, most of the area was investigated and water quality samples were collected at each surface water input site to document where possible pollution problems are located.

AMD Impacts

As mentioned previously, Bear Run is significantly impacted by the South Branch and then remains quite static to its mouth. There are generally two areas of impact in this section of Bear Run, a small flow, highly acidic discharge which impacts UNT27036 and a string of diverse water quality discharges just upslope of the RJ Corman Railroad.

BRD02

BRD02 (BRD01 is the small discharge entering Bear Run just upstream of its confluence with the South Branch) is a small flow drift mine discharge with an elevated concentration of acidity and aluminum (Table 8 and Figure 46). It seems to impact UNT27036 just enough to possibly cause biological impairment since the stream is slightly net acidic on average and can have Al concentrations > 1.0mg/l

Table 8. The average water quality of BRD02 and UNT27036 at its mouth.

Location	Flow	Lab	Cond	Alk.	Acid.	Fe	Mn	Al	SO4	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
	gpm	pH	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	lb/day	lb/day	lb/day	lb/day	lb/day
BR02	7.5	3.1	634	0	105.5	4.65	1.05	8.41	136	0.00	9.14	0.41	0.09	0.69
UNT27036	2367.08	6.1	116.5	10.07	12.97	0.45	0.27	0.69	34.04	265.79	357.06	15.07	10.33	22.67

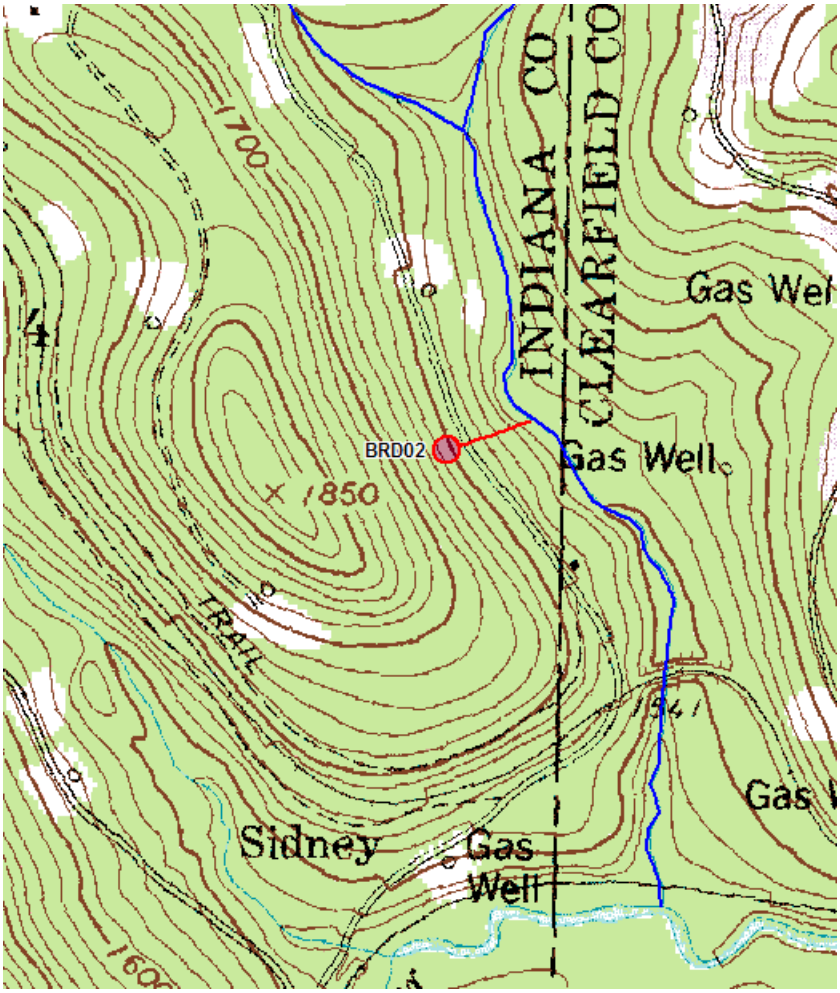


Figure 46. The location of the BRD02 discharge.

This discharge was only sampled twice during low and high flow conditions. Once the pollution sources of the South Branch are remedied, monthly water quality and quantity samples should be taken at this discharge to better estimate the pollution loading that enters UNT27036.

Even though this is only a small flow discharge that impacts the Bear Run watershed only slightly, it seems to impact UNT27036 just enough that it may cause

biological impairment. In addition, UNT27036 is an approximately 1.5 square mile sub watershed that may have the best fish habitat of any of the other slightly impacted tributaries of Bear Run due to a stream slope of nearly 4%. With the elimination/treatment of the BRD02 discharge, this tributary could have a brook trout population reestablished. The recommended conceptual treatment system design for this discharge can be found in Appendix A of this restoration plan.

If treatment of BRD02 is unfeasible, UNT27036 may benefit like the others from headwaters limestone sand dosing. Utilizing the same equation, 112 tons would be needed the first year with 56 tons/year thereafter. The cost of this project can also be found in Appendix A of this restoration plan.

BRD03-BRD08

The only other area of AMD impact is a string of surface mine discharges that originate just upslope of the RJ Corman Railroad. All of these discharges use the upslope railroad ditch as transportation to either Bear Run tributaries or Bear Run itself, causing sedimentation loading which may be an even greater impact than the actual AMD as combined these six discharges only input 13 tons/year of acidity and 3 tons/year of Mn. Fe and Al are inconsequential (Table 9).

Table 9. The average water quality of BRD03-BRD08 as well as their cumulative impacts to Bear Run.

Location	Flow	Lab	Cond	Alk.	Acid.	Fe	Mn	Al	SO4	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
	gpm	pH	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	lb/day	lb/day	lb/day	lb/day	lb/day
BRD03	66.02	3.70	283.50	0.00	27.00	1.16	2.20	2.02	65.00	0.00	16.12	0.24	1.34	1.33
BRD04	33.87	6.00	264.50	7.00	6.50	0.39	3.39	1.00	92.50	2.85	2.71	0.19	1.62	0.48
BRD05	20.89	5.95	738.50	16.50	20.50	9.46	11.19	0.07	311.00	2.77	9.79	3.60	4.24	0.02
BRD06	35.59	3.50	781.00	0.00	40.00	1.52	11.50	1.03	300.00	0.00	17.11	0.65	4.92	0.44
BRD07	30.52	5.15	438.00	7.50	10.00	0.43	6.30	0.60	166.00	2.34	4.50	0.13	2.49	0.26
BRD08	271.34	5.30	187.50	5.50	6.00	0.27	1.38	0.39	61.00	19.14	19.57	0.64	2.06	0.83
									Total	**27.10**	**69.80**	**5.44**	**16.67**	**3.36**
									Tons/Year	**5**	**13**	**1**	**3**	**1**

As mentioned, what may be even more of an impact is the sedimentation loading these discharges, particularly BRD03, BRD04 and BRD08, input to UNT27034, Bear Run and UNT27033 respectively (Figure 47). As it is probably impossible to convince the railroad to allow more culverts underneath their railroad to place these discharges into vegetative strips to reduce the sedimentation into Bear Run, it may be possible to complete some stabilization work along the railroad ditch so that erosion is minimized. In addition, by using limestone rip rap for this stabilization, slight treatment will occur in the ditches, particularly to the slightly acidic discharges.

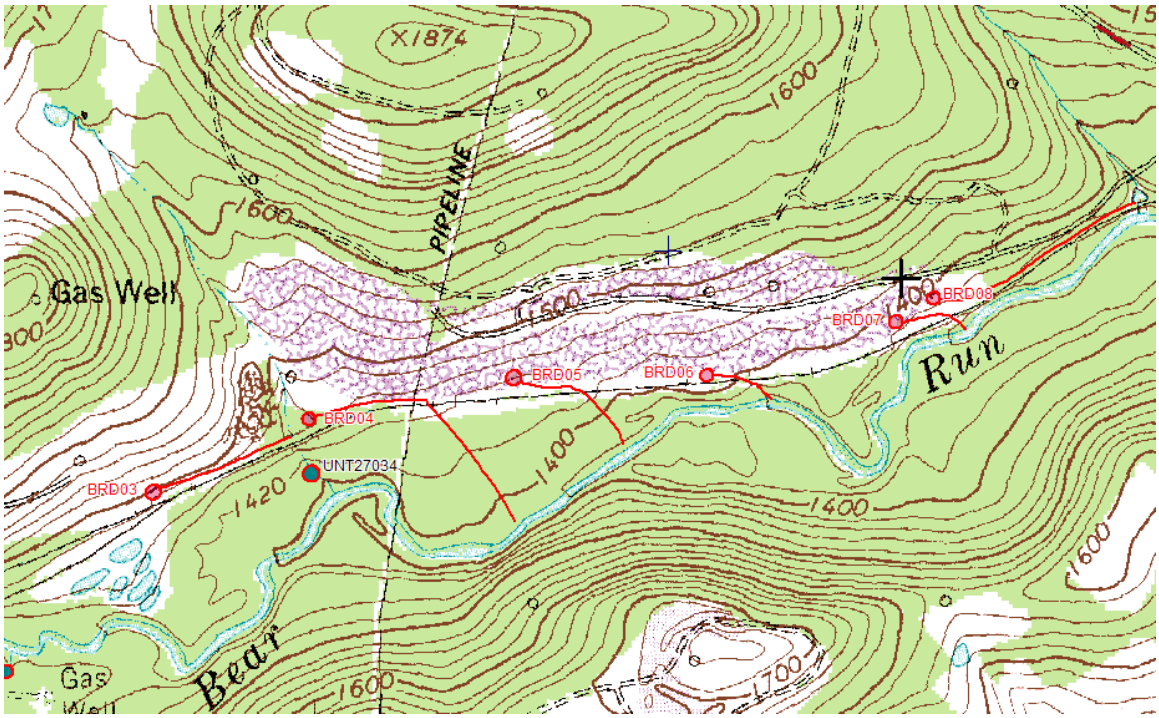


Figure 47. The location and flow patters of BRD03-BRD08. Notice the length of railroad ditch traveled by BRD03, BRD04 and BRD08.

Urban Impacts

There are three main urban impacts to Bear Run downstream of the South Branch. These include dirt and gravel roadways, gas line roads, and a former bridge crossing site that is eroding into Bear Run.

First a majority of Township Road 0974, which is dirt and gravel, is located in Indiana County and is verified as a dirt and gravel road worksite (Figure 36). The ICCD should continue their annual dirt and gravel road funding to Banks Township as their projects completed previously in the Bear Run watershed have been a success at reducing sedimentation loading.

Other dirt and gravel roadways in the Bear Run watershed downstream of the South Branch are in Bell Township, Clearfield County (Figure 48). The Clearfield County Conservation District should be encouraged to fund dirt and gravel road projects in the Bear Run watershed section of Bell Township since improvements in the South Branch are likely to lead to a tremendous brook trout fishery in Bear Run to its confluence with the West Branch of the Susquehanna. Minimizing sedimentation pollution will increase the reproductive success of these fish, possibly making stocking unnecessary.

According to the USGS Topographic Maps, there are 51 gas wells in this section of the Bear Run watershed, or 11.3 per square mile. Most of these gas wells have roadways to them that are rarely maintained. Bear Run restoration project partners should combine efforts with the local gas companies and the PGC to initiate a low cost, large-scale gas well roadway sedimentation reduction project utilizing mine conveyor belts to divert gas line roadway water off the road and into vegetative strips. The ICCD has successfully completed these types of projects elsewhere and should be utilized for consultation, as should the Clearfield County Conservation District. An informational brochure constructed by the ICCD as to how to install these mine conveyor belt diversions can be found in Appendix D of this restoration plan.

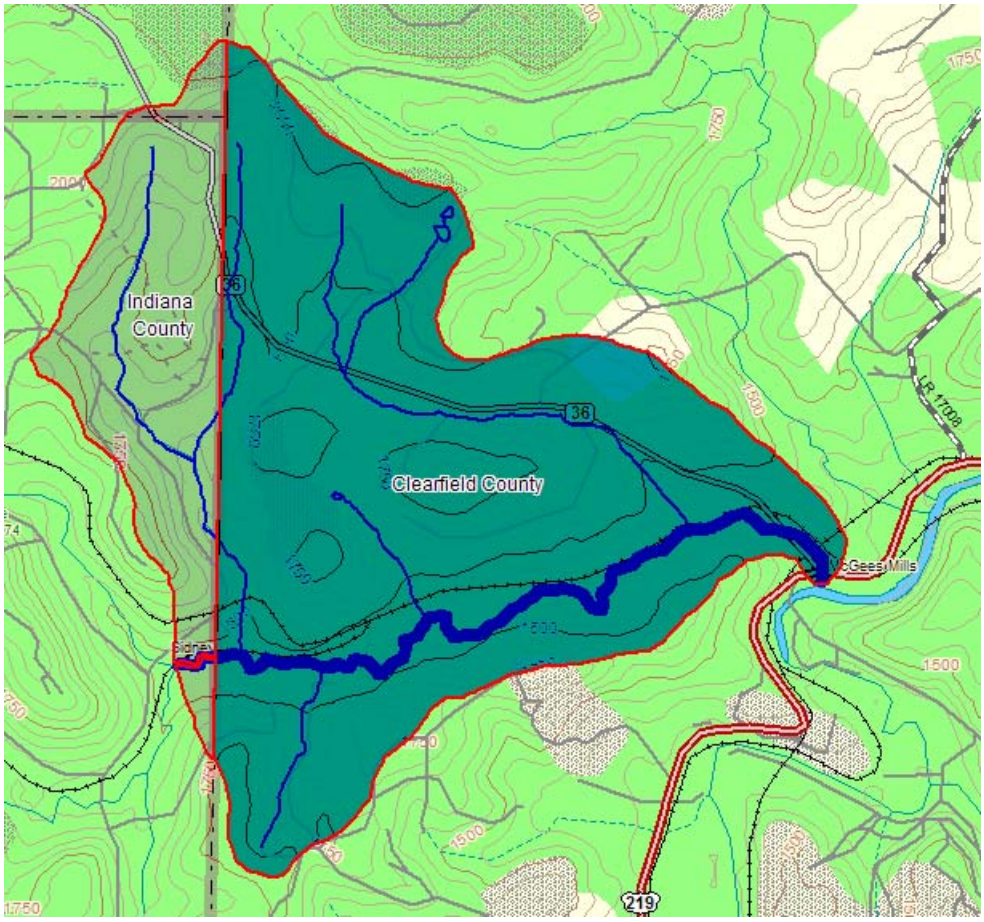


Figure 48. The county separated sections of the Bear Run watershed downstream of the South Branch confluence. Clearfield County accounts for nearly 80% of this section.

The final urban impact is a former stream crossing for a past surface mining operation (Figure 49). The crossing has been removed, however, no stream bank stabilization measures were installed post removal and the culverts that carried Bear Run underneath the bridge are still present in the stream bed and more than likely assist in the erosion occurring on both banks.

As this impact is in Clearfield County, the Clearfield County Conservation District should be contacted once work on the project becomes attractive (i.e. once Bear Run is restored of AMD impacts). Work would involve excavation of the stream banks to stable slopes, approximately 200 ft of stream bank stabilization and the removal and disposal of the former stream culverts.

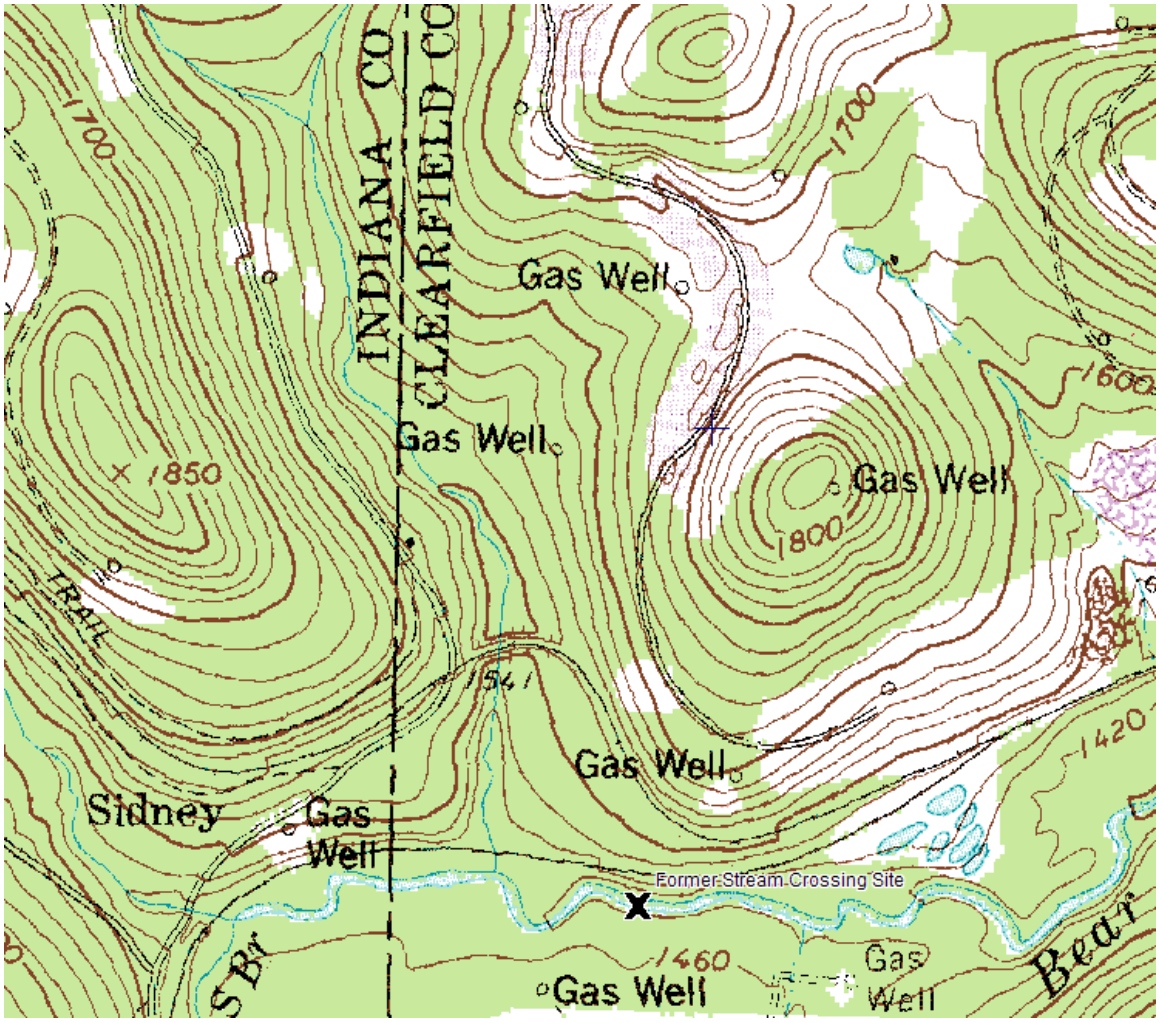


Figure 49. Location of the former stream crossing on Bear Run in need of stream bank restoration.

Agricultural Impacts

Two areas were identified as agricultural impacts in this section of Bear Run, one particular farm in the headwaters of UNT27036 and the headwaters area of UNT27033 (Figure 50).

The agricultural site on UNT27036 is a livestock pasture with animal access to approximately 625 ft of the tributary. This site is in Clearfield County; hence the Clearfield County Conservation District should be notified of the problem area so that their Agricultural and Nutrient Management Specialist could approach the farmer

concerning installation of stream fencing and possible other conservation practices to reduce erosion and nutrient loading.

If the ICCD submits a cost-share grant program for the agricultural sites identified as problem areas in the Indiana County section of the watershed, the Clearfield County Conservation District should be contacted to gauge interest in including this project and others that may be needed in the headwaters of UNT27033.

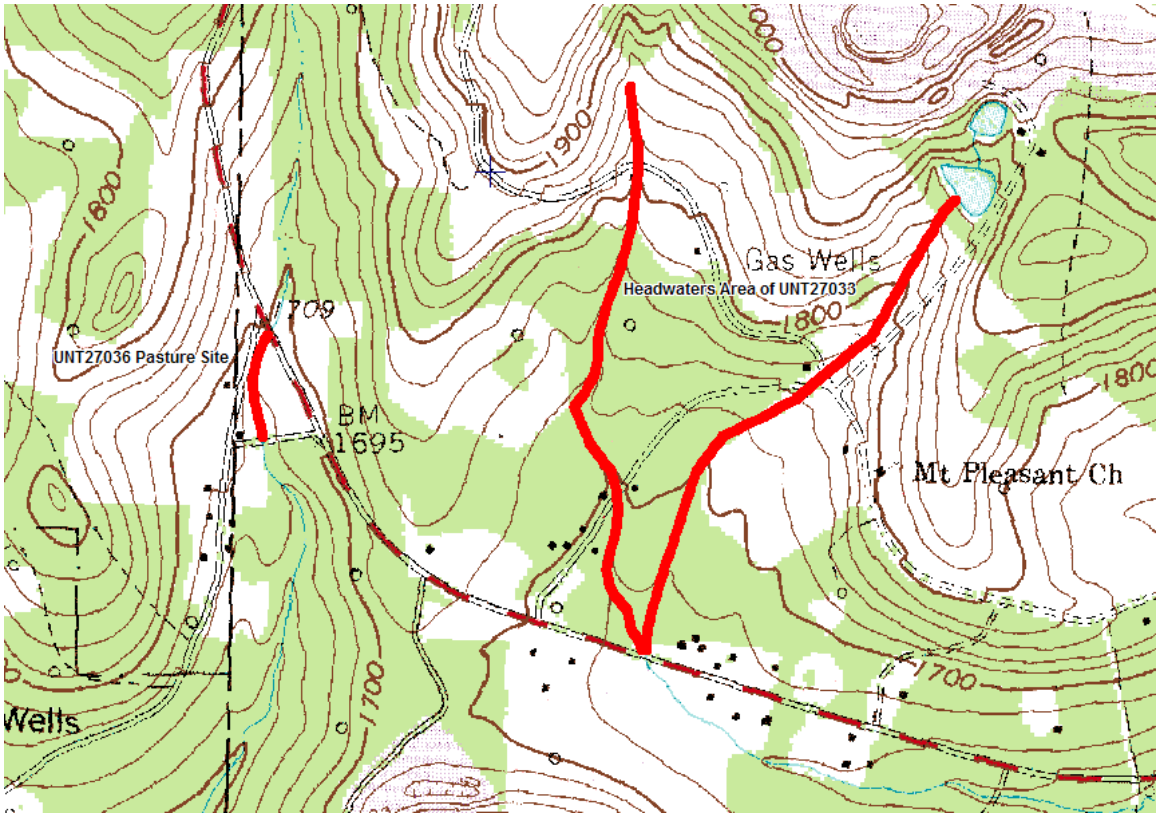


Figure 50. Agricultural impact areas in the Bear Run watershed downstream of the South Branch confluence.

Overall Recommendations for Bear Run Downstream of the South Branch

1. **Obtain funding to design, permit and construct a treatment system for the BRD02 discharge and/or apply limestone sand to the headwaters of UNT27036. Use the conceptual plan in Appendix A as a first, but not only, means of a restoration strategy.**

2. **Complete a ditch stabilization project on the railroad ditches that transport discharges BRD03 – BRD08 to reduce the amount of sedimentation loading to Bear Run, the main impact of these discharges. Utilizing limestone rip rap will also remedy the slight acidity loading (13 tons/year) of these discharges.**

3. **Continue to support Banks Township's efforts in completing dirt and gravel road projects on TR 0974. Encourage the Clearfield County Conservation District to support other dirt and gravel road projects in the Bear Run section of Bell Township.**

4. **Form a partnership with the local gas companies and the Pennsylvania Game Commission on a large scale, low cost gas line road sedimentation reduction project utilizing mine conveyor belt diversions to divert water off the roadway and into vegetative strips. An information brochure describing this process can be found in Appendix D.**

5. **Contact the Clearfield County Conservation District concerning the two agricultural impact areas noted on UNT27036 and UNT27033. If the ICCD eventually submits an agricultural BMP cost-share grant proposal, contact the CCCD to gauge the interest in including these sites in the project.**

6. **Complete a stream bank stabilization project at the former Bear Run stream crossing site noted in Figure 49.**

Possible Rails to Trails Project

The Lochvale - Sidney spur of the RJ Corman Railroad has been previously abandoned. Just recently, all of the rails and railroad ties have been removed leaving a nearly four mile trail bordering the South Branch and Bear Run from Lochvale to where the Lochvale - Sidney spur meets the Hilman - McGees Mills spur (Figure 51).

The restoration of this trail into the Bear Run Rail Trail may become very attractive once the watershed is clear of most of the AMD impacts. This trail not only travels through a very scenic part of Indiana and Clearfield County, but it also will allow for great stream and SGL access.

If feasible, the Indiana County Parks and Trails should be contacted about interest and consultation.

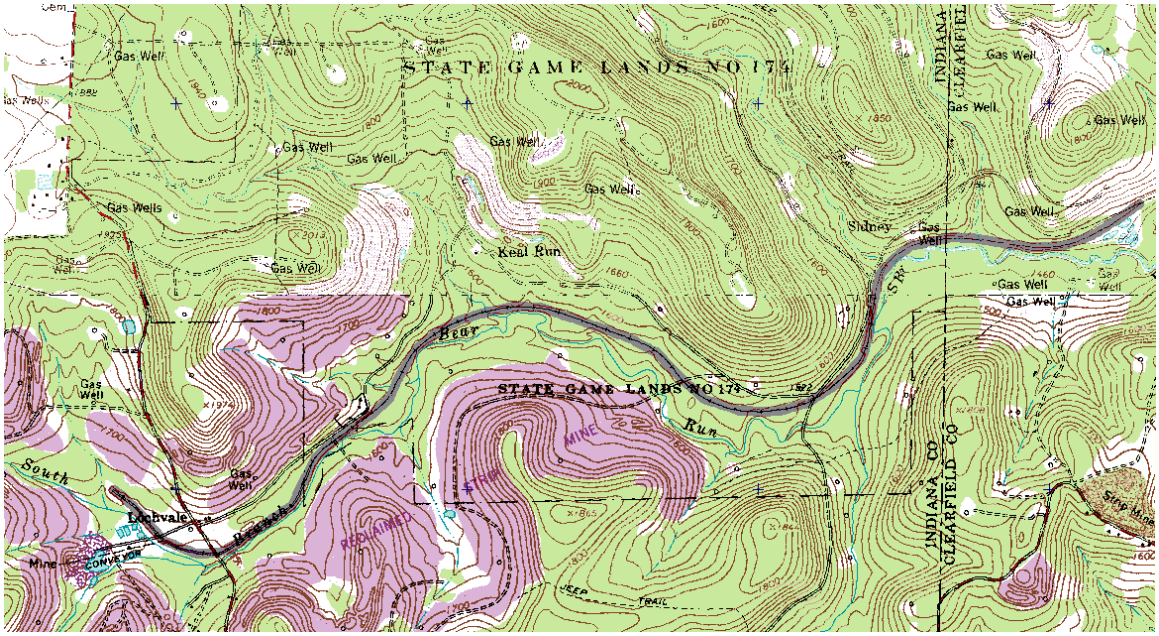


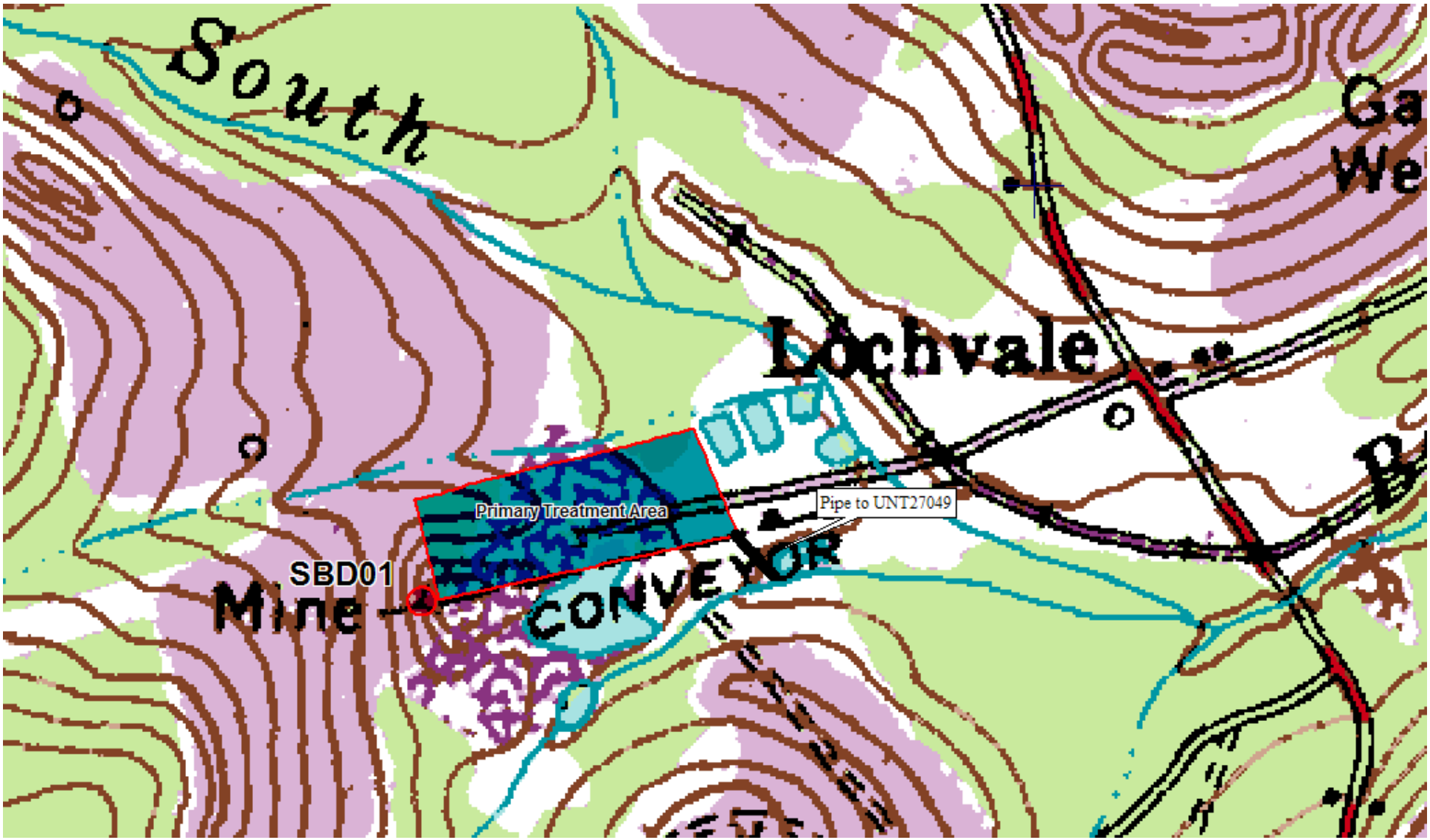
Figure 51. The abandoned RJ Corman Railroad that could be converted into a rail trail.

Appendix A

AMD Conceptual Treatment System Designs

(Estimates were determined using the AMDTreat 3.1c software from the Office of Surface Mining.)

SBD01

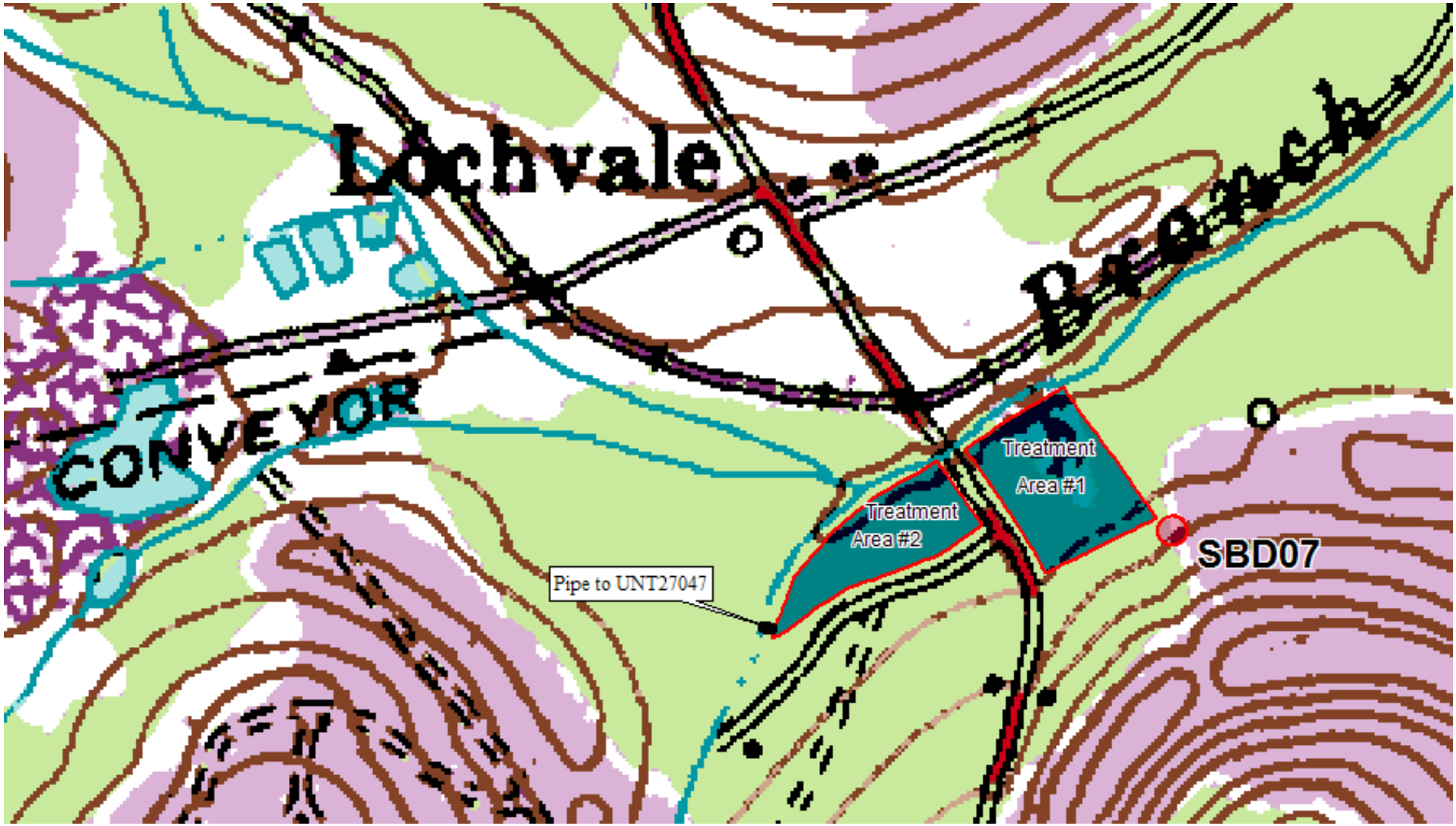

South
Lochvale
Primary Treatment Area
Pipe to UNT27049
SBD01
Mine
CONVEYOR

Comments:

As mentioned in this restoration plan, the SBD01 discharge is the first impact to the South Branch. It can be easily treated with retention and oxygen utilizing settling ponds. In the design phase, prior sedimentation ponds from the coal processing plant still onsite should be analyzed for possible usage, hence decreasing the construction cost estimate. A portion of the treated water should also be transported to UNT27049 for in-stream treatment as discussed in the restoration plan.

Total Design, Permitting and Construction ~ $200,000

SBD07

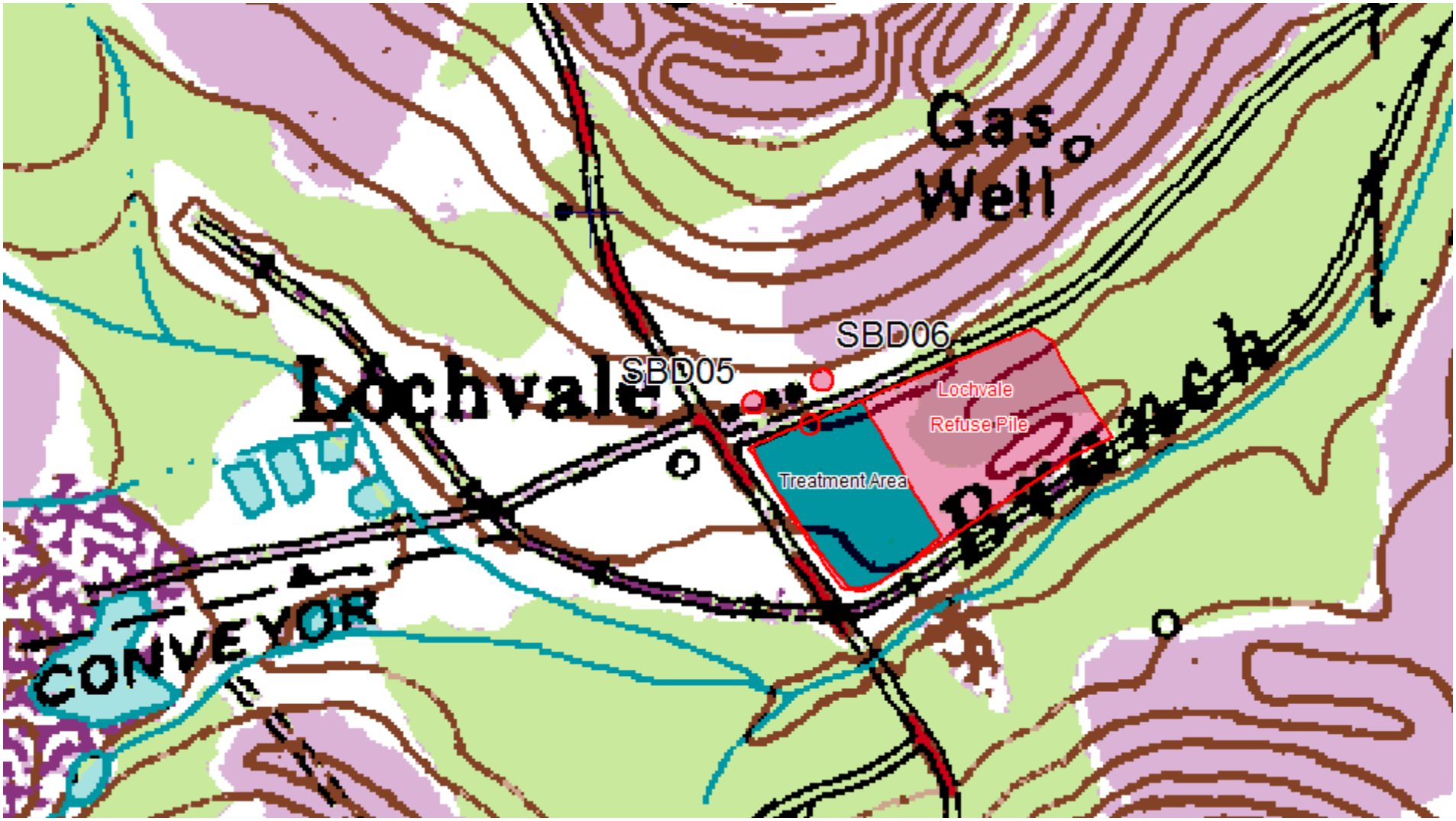

Lochvale
CONVEYOR
Treatment Area #1
Treatment Area #2
SBD07
Pipe to UNT27047

Comments:

SBD07 is the largest producer of Fe in the entire Bear Run watershed. Much like SBD01, it can be easily treated with retention and oxygen utilizing settling ponds. Just as SBD01 as well, a portion of the treated water should be transported to UNT27049 for in-stream treatment as discussed in the restoration plan. The Pennsylvania Department of Transportation will need to be contacted as a culvert needs to be installed underneath one of their roadways to transport SBD07 to Treatment Area #2.

Total Design, Permitting and Construction ~ $235,000

SBD05 & SBD06


Gas
Well
SBD06
SBD05
Lochvale
Lochvale
Refuse Pile
Treatment Area
CONVEYOR

Comments:

The treatment of Lochvale Coal Refuse Discharges will be difficult for one reason; the Lochvale Coal Refuse Pile must be removed (A removal strategy is discussed in this restoration plan). Once removed, SBD05, SBD06, and the un-sampled discharge need placed in the same channel so that quality and quantity can be more exactly measured once per month for one year. This could not be accomplished through the assessment as the un-sampled discharge is artesian and is lost in the refuse pile as soon as it materializes.

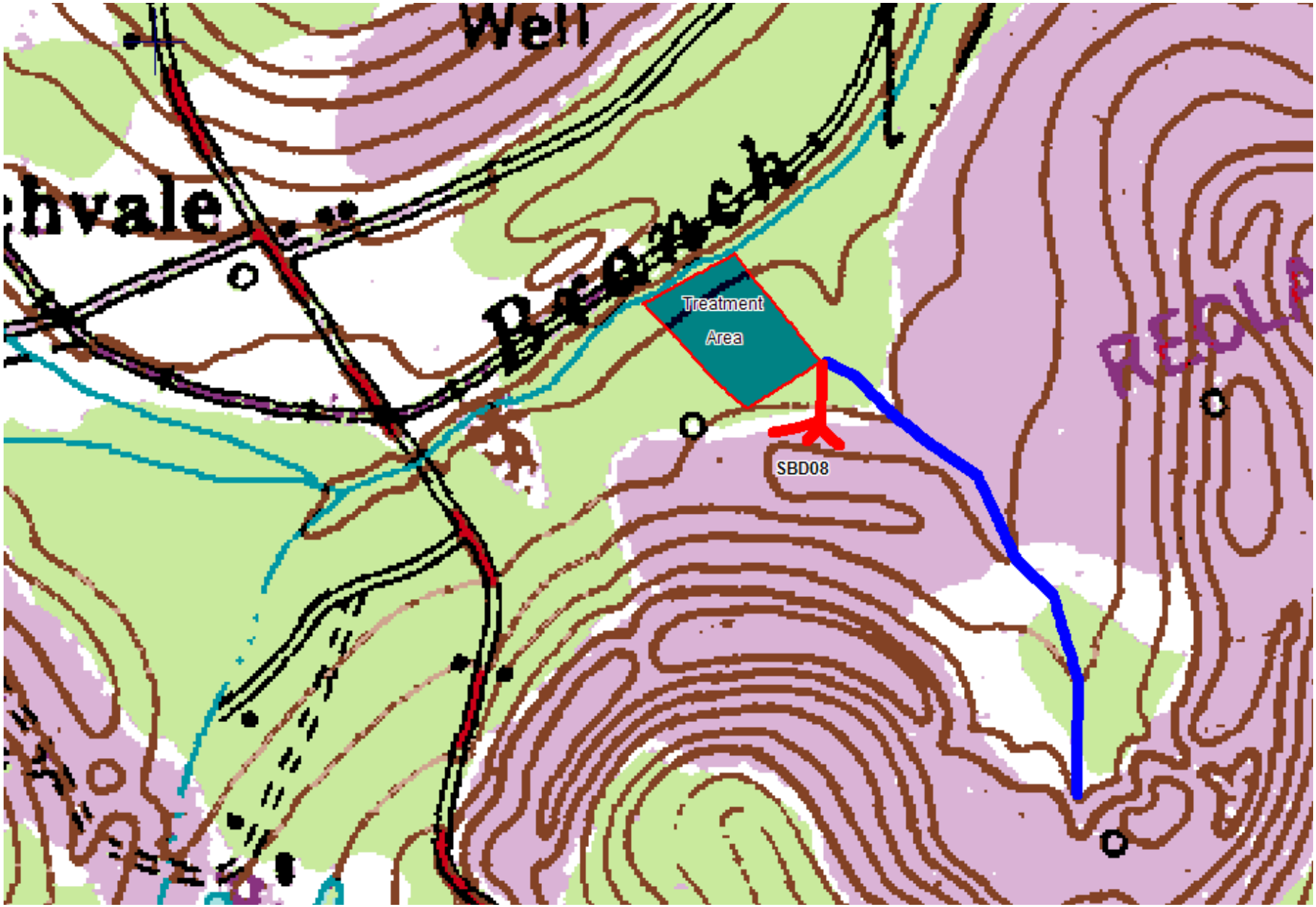
The collected water qualities tend to favor a vertical flow wetland and settling pond. The following cost is a clear estimate as a total flow could not be analyzed properly. The removal of the Lochvale Coal Refuse Pile is an additional cost that could not be estimated at this time.

The PGC and Cal Lind, owner of the Johnstown Coal and Coke Property owns all land that will be used for treatment.

Total Channel Construction and Monitoring ~ $7,000

Total Treatment System Design, Permitting and Construction ~ $225,000

SBD08



Comments:

SBD08 may be the most difficult discharge to treat in the entire Bear Run watershed, not because of water quality, but because of the type of discharge SBD08 is and the area where treatment can occur. SBD08 is a large seep area with no single discernable discharge point. SBD08 effluents to an unnamed and unmarked tributary of Bear Run. I believe that the only way to treat this successfully is to transport the tributary, after it is already impacted by SBD08, to a treatment system.

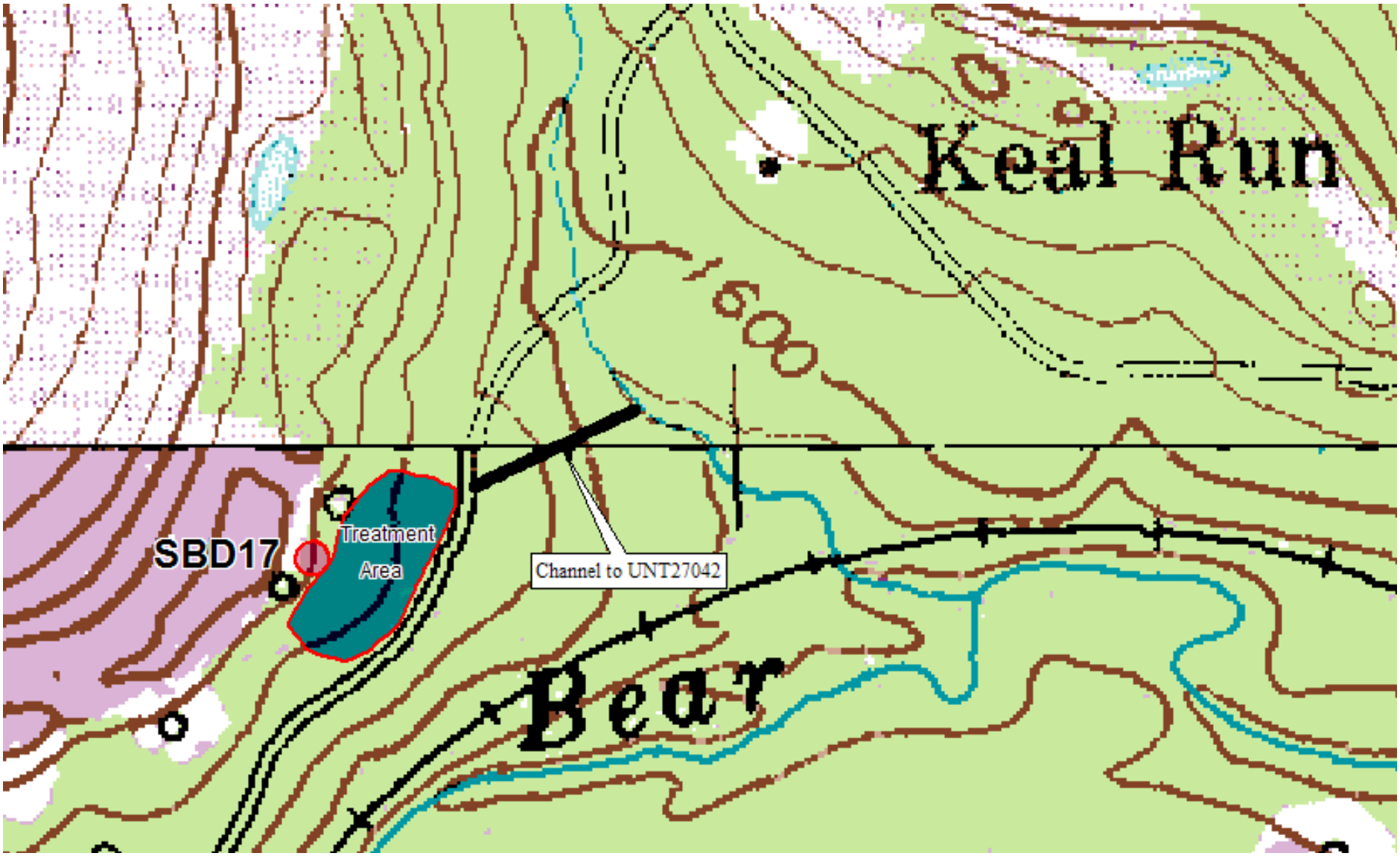
Three possible problems exist with this treatment. First, the unnamed and unmarked tributary may have more than 100 acres of drainage which may make permitting the collection of it difficult. Second, during times of high flow, storm water will have to be allowed to travel down the original channel and not into the treatment system (i.e. treatment system needs a finite flow capacity). And last, the area where we are suggesting the treatment system be built, and the only area I believe it can be built, may be considered a wetland with permitting issues to follow. If these permitting hassles materialize, the cost of this system may be substantially more than the current estimate.

Analyzing the water quality, a vertical flow wetland with accompanying settling pond seems to be the treatment system of choice.

The PGC owns all land that will be used for treatment.

Total Design, Permitting and Construction ~$220,000

SBD17


Keal Run
1600
SBD17
Treatment
Area
Channel to UNT27042
Bear

Comments:

SBD17 may be the easiest treat out of all the Bear Run discharges. Flows are not variable and acidity and metal concentrations are not extremely elevated. However, the treatment of this discharge may have the best overall impact to improving the water quality on Bear Run.

The recommended treatment is a flushable oxic limestone drain and a small accompanying settling pond or wetland. Effluent of the SBD17 treatment system should have an outfall to UNT27042 to in-stream treat the acid rain impacted water quality of this tributary.

In addition, applying limestone sand in the headwaters of UNT27042 is recommended to entirely restore it to a high quality cold water fishery. We are assuming a limestone cost and delivery charge of $25.00.

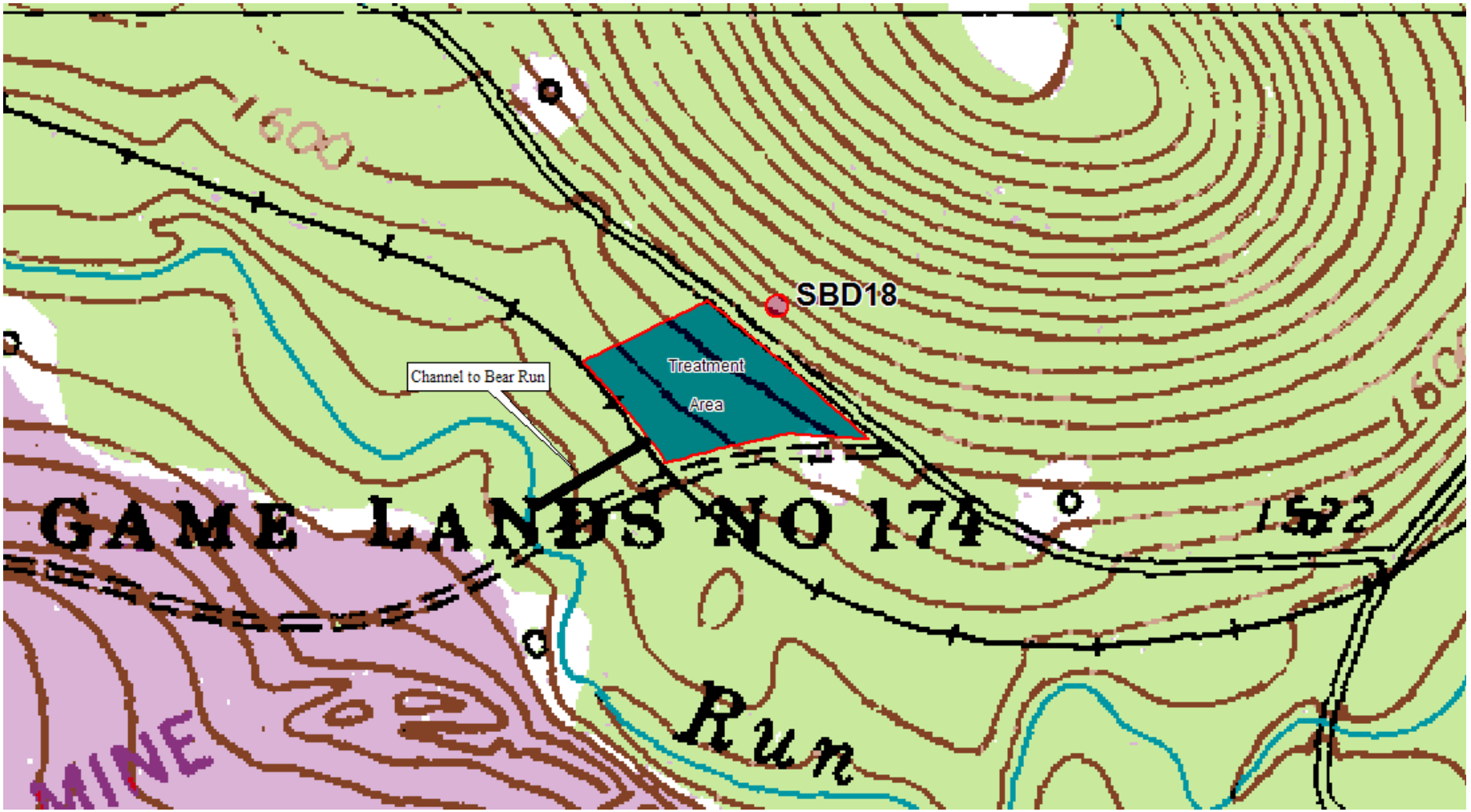
The PGC owns all land that will be used for treatment.

Total Treatment System Design, Permitting and Construction ~ $135,000

Total First Year Limestone Sand Dosing Cost ~ $1,600

Total Limestone Sand Dosing Cost Every Year After ~ $800

SBD18


SBD18
Treatment
Area
Channel to Bear Run
GAME LANDS NO 174
1600
1522
Run
MINE

Comments:

As mentioned in this restoration plan, SBD18 may be difficult to treat passively as the flow is quite variable measured from 0 GPM to >500 GPM during spring melt. We suggest first obtaining a grant to study the mine pool of the discharge to determine if surface water is infiltrating, where that surface water is infiltrating and if it can be minimized or eliminated.

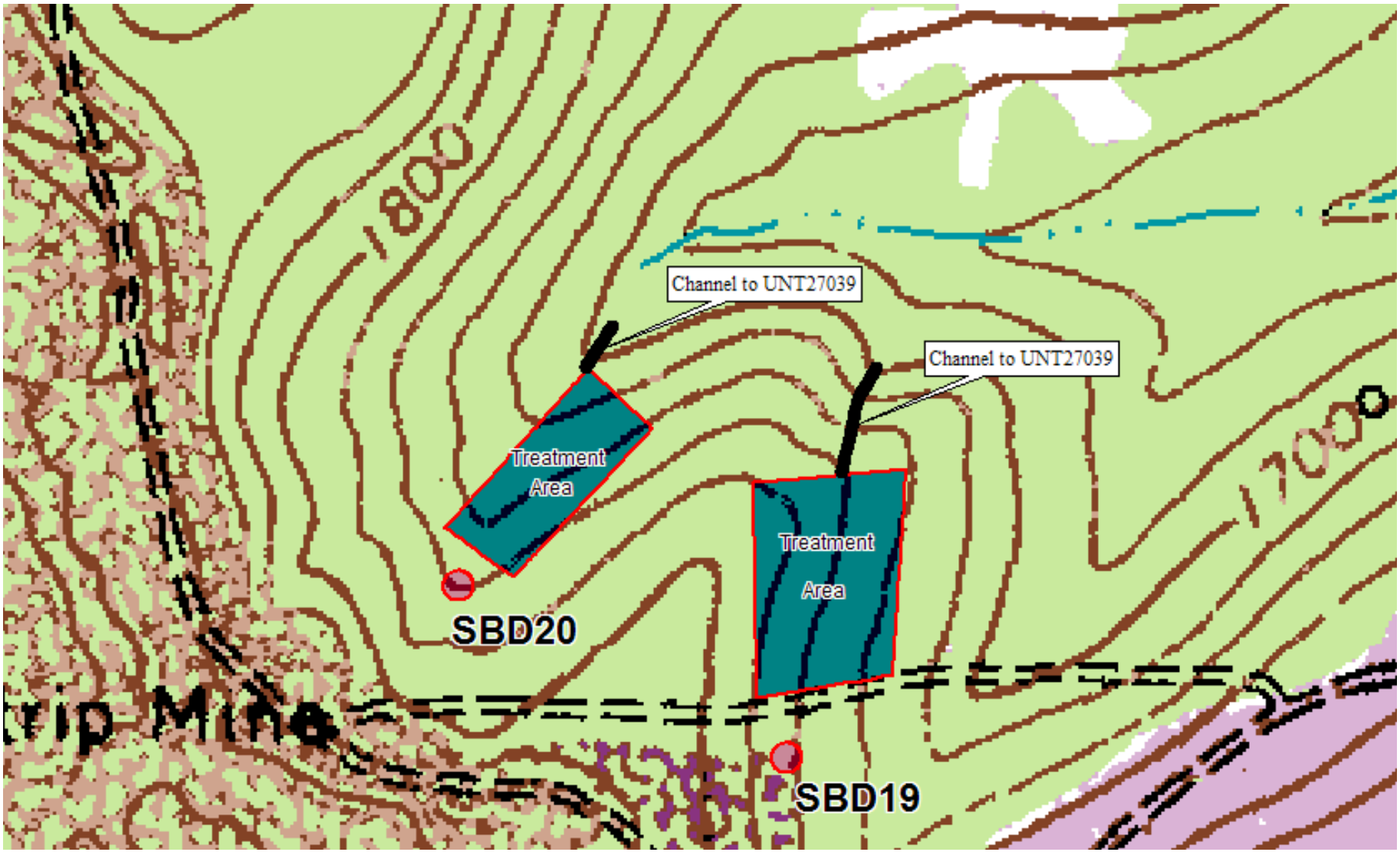
If the flow variability cannot be remedied, then I suggest a limestone dosing silo and an accompanying sedimentation pond. If the flow variability can be remedied, a vertical flow wetland and accompanying settling pond should work well. The PGC owns all land that will be used for treatment.

Total Design, Permitting and Construction of Lime Silo System ~$205,000

Annual Limestone Cost ~$2,500

Total Design, Permitting and Construction of the VFW ~$290,000

SBD19 and SBD20



Comments:

As mentioned in this restoration plan**,** there are two options for these two discharges which impact UNT27039. First, treat both discharges passively with vertical flow wetlands (may be difficult because of elevated acidity and Al concentrations) and limestone sand dose the south fork of UNT27039. Second is to treat neither and limestone dose the north and south forks of UNT27039. The costs of both options are estimated. Property owners that may have to be contacted include Kraynak Coal Co. out of Mahaffey, Clearfield County, Mears Enterprises Inc. out of Clymer, PA and Gene Shields of Superior, Colorado.

Option #1

Total Design, Permitting and Construction of SBD19 ~ $250,000

Total Design, Permitting and Construction of SBD20 ~ $130,000

Total First Year Limestone Sand Dosing Cost ~ $1,100

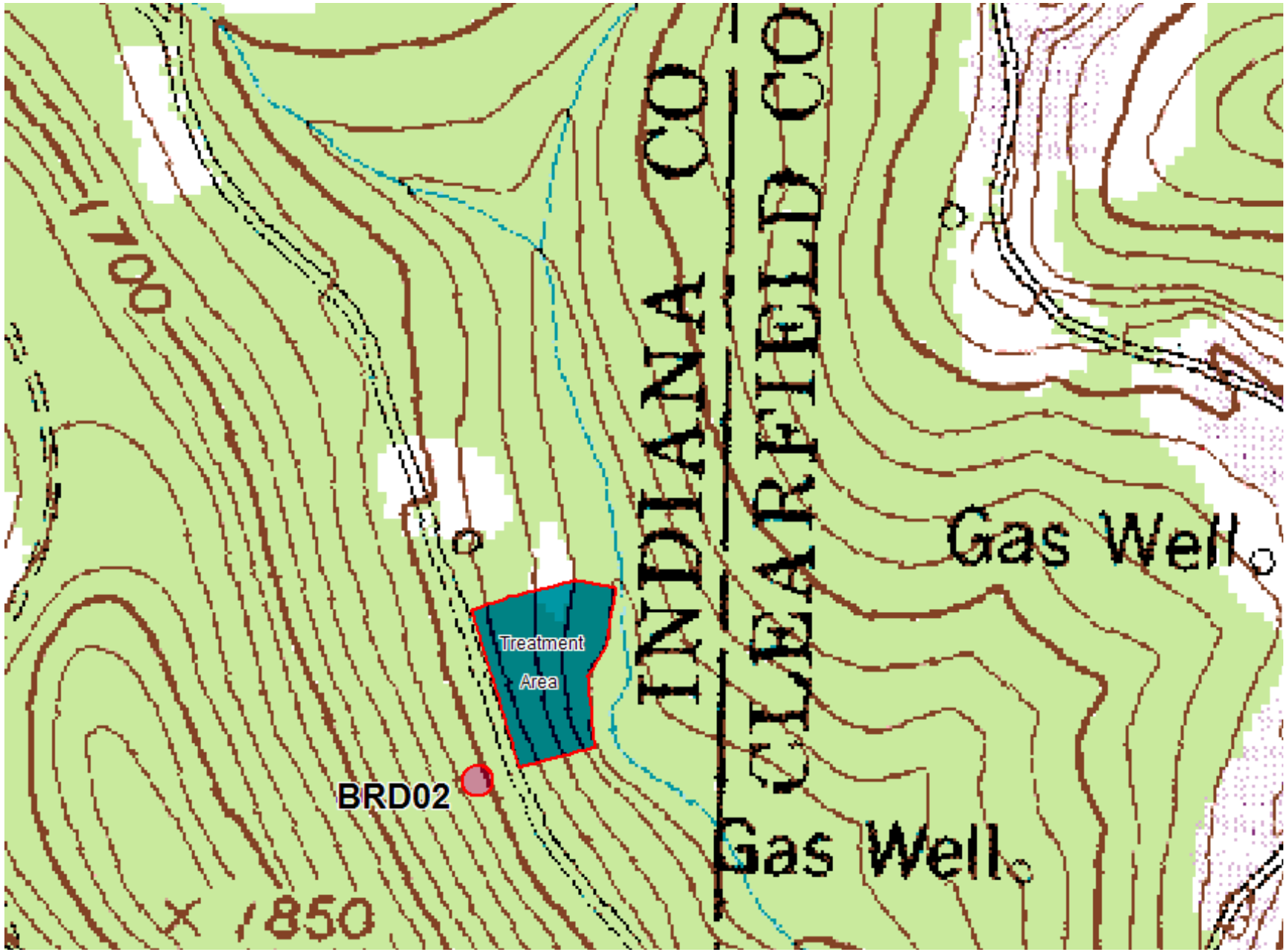
Total Limestone Sand Dosing Cost Every Year After ~ $550

Option #2

Total First Year Limestone Sand Dosing Cost ~ $3,900

Total Limestone Sand Dosing Cost Every Year After ~ $1,950

BRD02


INDIANA CO
CLEARFIELD CO
Gas Well
Gas Well
Treatment
Area
BRD02
1700
1850

Comments:

Just like SBD19 and SBD20, there are two options here for the mitigation of BRD02. First is passively treating BRD02 using a small vertical flow wetland. The second is applying limestone sand to the headwaters of UNT27036 for in-stream treatment. More sampling also needs completed on this discharge as it was only sampled twice during this assessment.

Total Monitoring, Design, Permitting and Construction of the VFW ~$30,000

Total First Year Limestone Sand Dosing Cost ~ $2,800

Total Limestone Sand Dosing Cost Every Year After ~ $1,400

Appendix B

Bear Run Water Quality Samples

South Branch Water Quality Samples

Location	Date	Flow	Lab	TDS	Cond	Alk.	Field Acid.	Acid.	Fe	Mn	Al	Ca	Mg	SO4	TSS	Temp	DO	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
		gpm	pH	ppm	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	F/C	mg/l	lb/day	lb/day	lb/day	lb/day	lb/day
SBS01	7/7/2004	178.53	6.40	60.00	106.00	15.00	nd	0.00	0.33	0.05	0.07	nd	nd	15.00	<5.7	63.40	nd	32.19	0.00	0.71	0.11	0.15
	11/10/2004	716.28	6.70	60.00	99.00	14.00	nd	0.00	0.25	0.06	0.05	nd	nd	18.00	<5.7	40.10	nd	120.54	0.00	2.15	0.52	0.43
	2/15/2005	8894.14	6.10	60.00	112.00	12.00	nd	2.00	0.48	0.13	0.42	nd	nd	15.00	8.60	36.90	nd	1282.89	213.82	51.32	13.90	44.90
	11/17/2005	626.31	6.40	80.00	162.00	9.00	nd	3.00	0.10	0.03	0.05	nd	nd	21.00	7.10	47.30	nd	67.75	22.58	0.75	0.23	0.38
	Min	178.53	6.10	60.00	99.00	9.00	nd	0.00	0.10	0.03	0.05	nd	nd	15.00	<5.7	36.90	nd	32.19	0.00	0.71	0.11	0.15
	Ave	**2603.82**	**6.40**	**65.00**	**119.75**	**12.50**	**nd**	**1.25**	**0.29**	**0.07**	**0.15**	**nd**	**nd**	**17.25**	**nd**	**46.93**	**nd**	**375.84**	**59.10**	**13.73**	**3.69**	**11.46**
	Max	8894.14	6.70	80.00	162.00	15.00	nd	3.00	0.48	0.13	0.42	nd	nd	21.00	8.60	63.40	nd	1282.89	213.82	51.32	13.90	44.90
SBD01	7/7/2004	746.73	5.90	180.00	279.00	51.00	nd	0.00	14.60	2.11	0.05	nd	nd	60.00	7.10	51.30	nd	457.76	0.00	131.05	18.94	0.45
	8/17/2004	490.09	6.60	180.00	266.00	56.00	nd	0.00	13.20	2.19	0.05	nd	nd	59.00	<5.7	54.70	nd	329.89	0.00	77.76	12.90	0.29
	9/27/2004	554.66	6.50	180.00	284.00	58.00	nd	0.00	13.40	1.86	0.05	nd	nd	54.00	10.00	51.20	nd	386.69	0.00	89.34	12.40	0.33
	11/10/2004	451.90	6.50	190.00	282.00	60.00	nd	0.00	15.30	2.40	0.05	nd	nd	67.00	10.00	49.70	nd	325.91	0.00	83.11	13.04	0.27
	11/21/2004	493.87	6.50	190.00	273.00	55.00	nd	-40.00	14.00	2.14	0.05	nd	nd	63.00	5.70	49.30	nd	326.50	-237.45	83.11	12.70	0.30
	1/10/2005	436.85	6.30	190.00	260.00	52.00	nd	-39.00	16.40	2.43	0.05	nd	nd	62.00	7.10	48.30	nd	273.05	-204.79	86.12	12.76	0.26
	1/28/2005	560.88	6.60	200.00	275.00	52.00	nd	-35.00	13.80	2.18	0.05	nd	nd	66.00	14.30	46.40	nd	350.57	-235.96	93.04	14.70	0.34
	2/15/2005	448.39	6.40	170.00	265.00	58.00	nd	-44.00	9.19	1.62	0.05	nd	nd	70.00	8.60	50.50	nd	312.60	-237.14	49.53	8.73	0.27
	4/6/2005	581.48	6.20	200.00	255.00	53.00	nd	-41.00	25.90	2.21	0.05	nd	nd	53.00	21.40	50.20	nd	370.44	-286.56	181.03	15.45	0.35
	5/25/2005	326.95	6.30	160.00	309.00	61.00	nd	-42.00	15.20	2.34	0.18	nd	nd	52.00	7.10	50.40	nd	239.73	-165.06	59.74	9.20	0.71
	7/20/2005	387.92	6.80	180.00	272.00	61.00	nd	-46.00	16.10	2.12	0.05	nd	nd	57.00	7.10	51.70	nd	284.43	-214.49	75.07	9.89	0.23
	8/3/2005	275.05	6.60	150.00	300.00	64.00	nd	-44.00	16.80	2.31	0.05	nd	nd	56.00	8.60	50.70	nd	211.59	-145.47	55.54	7.64	0.17
	Min	275.05	5.90	150.00	255.00	51.00	nd	-46.00	9.19	1.62	0.05	nd	nd	52.00	<5.7	46.40	nd	211.59	-286.56	49.53	7.64	0.17
	Ave	**479.56**	**6.43**	**180.83**	**276.67**	**56.75**	**nd**	**-27.58**	**15.32**	**2.16**	**0.06**	**nd**	**nd**	**59.92**	**nd**	**50.37**	**nd**	**322.43**	**-143.91**	**88.70**	**12.36**	**0.33**
	Max	746.73	6.80	200.00	309.00	64.00	nd	0.00	25.90	2.43	0.18	nd	nd	70.00	21.40	54.70	nd	457.76	0.00	181.03	18.94	0.71
UNT27049 Upstream	7/5/1991	175.00	6.8	nd	245	36.00	nd	28.00	0.64	0.23	nd	nd	nd	63.00	15.00	nd	nd	75.73	58.90	1.35	0.48	nd
	10/2/1991	20.00	7.0	nd	382	78.00	nd	6.00	0.91	0.48	nd	nd	nd	84.00	1.00	nd	nd	18.75	1.44	0.22	0.12	nd
	2/6/1992	250.00	6.5	nd	300	32.00	nd	12.00	0.21	0.08	nd	nd	nd	53.00	2.00	nd	nd	96.16	36.06	0.63	0.24	nd
	5/4/1992	300.00	6.5	nd	266	28.00	nd	12.00	0.18	0.04	nd	nd	nd	84.00	2.00	nd	nd	100.97	43.27	0.65	0.14	nd
	7/6/1992	250.00	6.8	nd	258	32.00	nd	4.00	0.26	0.09	nd	nd	nd	53.00	2.00	nd	nd	96.16	12.02	0.78	0.27	nd
	12/21/1992	986.00	7.0	nd	218	24.40	nd	2.50	0.22	0.10	nd	nd	nd	48.80	14.00	2.00	nd	289.18	29.63	2.61	1.19	nd
	2/22/1993	612.00	7.0	nd	241	35.80	nd	3.00	0.30	0.11	nd	nd	nd	63.30	2.00	2.00	nd	263.35	22.07	2.21	0.81	nd
	5/20/1993	816.00	6.8	nd	258	40.10	nd	20.90	0.35	0.13	nd	nd	nd	62.80	20.00	16.00	nd	393.31	204.99	3.43	1.28	nd
	8/10/1993	18.00	7.4	nd	332	67.30	nd	3.40	0.49	0.21	nd	nd	nd	73.40	2.00	17.00	nd	14.56	0.74	0.11	0.05	nd
	12/22/1993	nd	7.6	nd	203	22.80	nd	2.50	0.14	0.06	nd	nd	nd	60.70	2.00	3.00	nd	nd	nd	nd	nd	nd
	3/7/1994	250.00	6.8	nd	222	35.00	nd	2.30	0.14	0.06	nd	nd	nd	64.50	4.00	8.00	nd	105.18	6.91	0.42	0.18	nd

	5/20/1994	nd	6.9	nd	212	28.90	nd	2.00	0.17	0.07	nd	nd	nd	58.50	2.00	9.00	nd	nd	nd	nd	nd	nd
	9/9/1994	nd	6.9	nd	189	29.70	nd	2.50	0.24	0.09	nd	nd	nd	43.90	2.00	13.00	nd	nd	nd	nd	nd	nd
	11/17/1994	nd	6.5	nd	161	20.90	nd	2.80	0.18	0.08	nd	nd	nd	36.10	2.00	8.00	nd	nd	nd	nd	nd	nd
	12/28/1994	nd	6.5	nd	237	30.50	nd	2.40	0.18	0.08	nd	nd	nd	56.80	2.00	10.00	nd	nd	nd	nd	nd	nd
	3/3/1995	nd	6.5	nd	181	18.90	nd	2.30	0.11	0.05	nd	nd	nd	43.50	6.00	7.00	nd	nd	nd	nd	nd	nd
	6/27/1995	nd	7.4	nd	321	61.70	nd	3.20	0.41	0.13	nd	nd	nd	73.00	16.00	20.00	nd	nd	nd	nd	nd	nd
	8/16/1995	nd	7.0	nd	339	69.90	nd	3.60	0.88	0.25	nd	nd	nd	66.30	2.00	20.00	nd	nd	nd	nd	nd	nd
	12/22/1995	350.00	7.3	nd	268	34.70	nd	1.70	0.28	0.44	nd	nd	nd	65.30	2.00	4.00	nd	145.98	7.15	1.18	1.85	nd
	3/25/1996	200.00	6.5	nd	185	16.50	nd	2.30	0.39	0.06	nd	nd	nd	52.80	12.00	7.00	nd	39.67	5.53	0.94	0.14	nd
	6/3/1996	300.00	7.8	nd	350	59.80	nd	2.50	0.24	0.55	nd	nd	nd	93.80	2.00	14.00	nd	215.64	9.02	0.87	1.98	nd
	8/28/1996	100.00	7.5	nd	265	43.90	nd	3.20	0.37	0.14	nd	nd	nd	60.00	2.00	18.00	nd	52.77	3.85	0.44	0.17	nd
	10/8/1996	400.00	7.4	nd	283	36.20	nd	2.50	0.83	0.75	nd	nd	nd	81.60	2.00	14.00	nd	174.05	12.02	3.99	3.61	nd
	1/2/1997	nd	6.7	nd	166	20.30	nd	1.50	0.15	0.07	nd	nd	nd	43.10	2.00	7.00	nd	nd	nd	nd	nd	nd
	4/21/1997	75.00	7.3	nd	242	35.90	nd	5.70	0.04	0.09	nd	nd	nd	65.90	4.00	5.00	nd	32.36	5.14	0.04	0.08	nd
	Min	18.00	6.50	nd	161.00	16.50	nd	1.50	0.04	0.04	nd	nd	nd	36.10	1.00	2.00	nd	14.56	0.74	0.04	0.05	nd
	Ave	**318.88**	**6.97**	**nd**	**252.96**	**37.57**	**nd**	**5.39**	**0.33**	**0.18**	**nd**	**nd**	**nd**	**62.04**	**4.96**	**10.20**	**nd**	**132.11**	**28.67**	**1.24**	**0.79**	**nd**
	Max	986.00	7.75	nd	382.00	78.00	nd	28.00	0.91	0.75	nd	nd	nd	93.80	20.00	20.00	nd	393.31	204.99	3.99	3.61	nd
SBD02	3/6/1985	5.00	2.9	nd	2595	0.00	nd	1228.00	334.60	24.20	nd	nd	nd	1790.00	4.00	nd	nd	0.00	73.80	20.11	1.45	nd
	9/5/1985	1.00	2.6	nd	4050	0.00	nd	1774.00	325.90	60.00	nd	nd	nd	1790.00	1.00	nd	nd	0.00	21.32	3.92	0.72	nd
	12/30/1985	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	2/12/1986	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/29/1986	3.00	2.9	nd	3195	0.00	nd	1362.00	325.60	36.20	nd	nd	nd	840.00	34.00	nd	nd	0.00	49.11	11.74	1.31	nd
	7/22/1986	2.00	2.8	nd	3330	0.00	nd	1223.00	302.80	36.20	nd	nd	nd	1095.00	4.00	nd	nd	0.00	29.40	7.28	0.87	nd
	10/13/1986	5.00	3.0	nd	2210	0.00	nd	997.00	16.80	15.46	nd	nd	nd	1180.00	8.00	nd	nd	0.00	59.92	1.01	0.93	nd
	2/9/1987	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/17/1987	1.00	2.7	nd	2420	0.00	nd	973.00	183.90	24.60	nd	nd	nd	1075.00	3.00	nd	nd	0.00	11.70	2.21	0.30	nd
	8/10/1987	1.00	2.5	nd	3760	0.00	nd	2100.00	343.10	28.80	nd	nd	nd	3159.00	2.00	nd	nd	0.00	25.24	4.12	0.35	nd
	10/22/1987	3.00	2.9	nd	2900	0.00	nd	1140.00	208.20	40.70	nd	nd	nd	2527.00	4.00	nd	nd	0.00	41.11	7.51	1.47	nd
	1/8/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/22/1988	1.00	2.2	nd	3515	0.00	nd	1530.00	222.20	22.60	nd	nd	nd	885.00	2.00	nd	nd	0.00	18.39	2.67	0.27	nd
	7/22/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/14/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	1/27/1989	2.00	3.0	nd	3000	0.00	nd	1364.00	315.40	21.50	nd	nd	nd	1432.00	1.00	nd	nd	0.00	32.79	7.58	0.52	nd
	4/24/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	8/9/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/2/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	1/11/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd

	5/2/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	8/13/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/14/1990	1.00	2.9	nd	2186	0.00	nd	980.00	157.20	13.60	nd	nd	nd	1348.00	1.00	nd	nd	0.00	11.78	1.89	0.16	nd
	1/10/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/11/1991	1.00	2.4	nd	2576	0.00	nd	922.00	139.90	16.60	nd	nd	nd	1474.00	1.00	nd	nd	0.00	11.08	1.68	0.20	nd
	7/5/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/2/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	Min	0.00	2.20	nd	2186.00	0.00	nd	922.00	16.80	13.60	nd	nd	nd	840.00	1.00	nd	nd	0.00	0.00	0.00	0.00	nd
	Ave	**0.96**	**2.72**	**nd**	**2978.08**	**0.00**	**nd**	**1299.42**	**239.63**	**28.37**	**nd**	**nd**	**nd**	**1549.58**	**5.42**	**nd**	**nd**	**0.00**	**14.28**	**2.66**	**0.32**	**nd**
	Max	5.00	3.00	nd	4050.00	0.00	nd	2100.00	343.10	60.00	nd	nd	nd	3159.00	34.00	nd	nd	0.00	73.80	20.11	1.47	nd
SBD03	3/6/1985	12.00	2.8	nd	2795	0.00	nd	1236.00	325.30	24.11	nd	nd	nd	1685.00	4.00	nd	nd	0.00	178.28	46.92	3.48	nd
	9/5/1985	1.00	2.75	nd	2635	0.00	nd	1073.00	299.00	42.30	nd	nd	nd	695.00	59.00	nd	nd	0.00	12.90	3.59	0.51	nd
	12/30/1985	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	2/12/1986	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/29/1986	1.00	3.1	nd	1945	0.00	nd	858.00	63.80	29.40	nd	nd	nd	610.00	23.00	nd	nd	0.00	10.31	0.77	0.35	nd
	7/22/1986	1.00	2.95	nd	2440	0.00	nd	694.00	202.40	35.30	nd	nd	nd	1010.00	15.00	nd	nd	0.00	8.34	2.43	0.42	nd
	10/13/1986	1.00	2.9	nd	2070	0.00	nd	725.00	70.40	18.57	nd	nd	nd	1095.00	0.00	nd	nd	0.00	8.71	0.85	0.22	nd
	2/9/1987	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/17/1987	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	8/10/1987	4.00	2.5	nd	2740	0.00	nd	990.00	46.40	24.90	nd	nd	nd	1012.00	21.00	nd	nd	0.00	47.60	2.23	1.20	nd
	10/22/1987	1.00	2.8	nd	3200	0.00	nd	1040.00	64.20	37.10	nd	nd	nd	3686.00	68.00	nd	nd	0.00	12.50	0.77	0.45	nd
	1/8/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/22/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	7/22/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/14/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	1/27/1989	1.00	3.7	nd	2800	0.00	nd	1320.00	59.20	34.90	nd	nd	nd	970.00	20.00	nd	nd	0.00	15.87	0.71	0.42	nd
	4/24/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	8/9/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/2/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	1/11/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	5/2/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	8/13/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/14/1990	1.00	2.8	nd	2189	0.00	nd	880.00	49.60	14.17	nd	nd	nd	1137.00	1.00	nd	nd	0.00	10.58	0.60	0.17	nd
	1/10/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/11/1991	1.00	2.5	nd	2364	0.00	nd	880.00	35.20	20.30	nd	nd	nd	1474.00	1.00	nd	nd	0.00	10.58	0.42	0.24	nd
	7/5/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/2/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd

	Min	0.00	2.50	nd	1945.00	0.00	nd	694.00	35.20	14.17	nd	nd	nd	610.00	0.00	nd	nd	0.00	0.00	0.00	0.00	nd
	Ave	**0.89**	**2.88**	**nd**	**2517.80**	**0.00**	**nd**	**969.60**	**121.55**	**28.11**	**nd**	**nd**	**nd**	**1337.40**	**21.20**	**nd**	**nd**	**0.00**	**11.69**	**2.20**	**0.28**	**nd**
	Max	12.00	3.70	nd	3200.00	0.00	nd	1320.00	325.30	42.30	nd	nd	nd	3686.00	68.00	nd	nd	0.00	178.28	46.92	3.48	nd
SBD04	3/6/1985	10.00	2.85	nd	2660	0.00	nd	1217.00	346.70	22.56	nd	nd	nd	1790.00	13.00	nd	nd	0.00	146.28	41.67	2.71	nd
	9/5/1985	2.00	2.55	nd	4725	0.00	nd	2164.00	468.00	55.70	nd	nd	nd	3055.00	5.00	nd	nd	0.00	52.02	11.25	1.34	nd
	12/30/1985	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	2/12/1986	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/29/1986	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	7/22/1986	3.00	2.7	nd	4105	0.00	nd	2180.00	527.10	30.40	nd	nd	nd	1930.00	4.00	nd	nd	0.00	78.61	19.01	1.10	nd
	10/13/1986	7.00	2.75	nd	3380	0.00	nd	923.00	200.10	17.32	nd	nd	nd	1260.00	1.00	nd	nd	0.00	77.66	16.84	1.46	nd
	2/9/1987	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/17/1987	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	8/10/1987	5.00	2.4	nd	4104	0.00	nd	1792.00	255.90	36.30	nd	nd	nd	590.00	2.00	nd	nd	0.00	107.70	15.38	2.18	nd
	10/22/1987	5.00	2.6	nd	5800	0.00	nd	2500.00	634.00	35.90	nd	nd	nd	4739.00	10.00	nd	nd	0.00	150.25	38.10	2.16	nd
	1/8/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/22/1988	5.00	2.2	nd	3700	0.00	nd	1520.00	342.90	17.90	nd	nd	nd	1264.00	1.00	nd	nd	0.00	91.35	20.61	1.08	nd
	7/22/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/14/1988	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	1/27/1989	5.00	3.5	nd	4400	0.00	nd	1900.00	502.00	25.80	nd	nd	nd	1135.00	8.00	nd	nd	0.00	114.19	30.17	1.55	nd
	4/24/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	8/9/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/2/1989	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	1/11/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	5/2/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	8/13/1990	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/14/1990	2.00	2.6	nd	3401	0.00	nd	1426.00	234.30	14.25	nd	nd	nd	1474.00	1.00	nd	nd	0.00	34.28	5.63	0.34	nd
	1/10/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	4/11/1991	3.00	2.5	nd	2710	0.00	nd	824.00	152.20	21.80	nd	nd	nd	1516.00	2.00	nd	nd	0.00	29.71	5.49	0.79	nd
	7/5/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	10/2/1991	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	nd
	Min	0.00	2.20	nd	2660.00	0.00	nd	824.00	152.20	14.25	nd	nd	nd	590.00	1.00	nd	nd	0.00	0.00	0.00	0.00	nd
	Ave	**1.74**	**2.67**	**nd**	**3898.50**	**0.00**	**nd**	**1644.60**	**366.32**	**27.79**	**nd**	**nd**	**nd**	**1875.30**	**4.70**	**nd**	**nd**	**0.00**	**32.67**	**7.56**	**0.54**	nd
	Max	10.00	3.50	nd	5800.00	0.00	nd	2500.00	634.00	55.70	nd	nd	nd	4739.00	13.00	nd	nd	0.00	150.25	41.67	2.71	nd
UNT27049 Downstream	7/5/1991	200.00	6.0	nd	298	2.00	nd	32.00	3.15	1.35	nd	nd	nd	105.00	14.00	nd	nd	4.81	76.93	7.57	3.25	nd
	10/2/1991	35.00	7.0	nd	349	36.00	nd	28.00	0.56	0.43	nd	nd	nd	84.00	1.00	nd	nd	15.15	11.78	0.24	0.18	nd
	2/6/1992	300.00	6.2	nd	347	18.00	nd	12.00	2.10	0.86	nd	nd	nd	63.00	17.00	nd	nd	64.91	43.27	7.57	3.10	nd

	5/4/1992	500.00	5.6	nd	385	8.00	nd	60.00	4.15	1.39	nd	nd	nd	105.00	16.00	nd	nd	48.08	360.60	24.94	8.35	nd
	7/6/1992	500.00	6.0	nd	255	16.00	nd	32.00	1.66	0.67	nd	nd	nd	63.00	14.00	nd	nd	96.16	192.32	9.98	4.03	nd
	12/21/1992	1386.00	3.9	nd	413	0.00	nd	44.90	14.10	2.56	nd	nd	nd	159.80	46.00	7.00	nd	0.00	748.02	234.90	42.65	nd
	2/22/1993	884.00	5.1	nd	212	1.80	nd	10.90	2.11	1.01	nd	nd	nd	71.20	38.00	2.00	nd	19.13	115.82	22.42	10.73	nd
	5/20/1993	898.00	6.7	nd	370	20.30	nd	3.30	2.76	1.51	nd	nd	nd	128.70	24.00	14.00	nd	219.12	35.62	29.79	16.30	nd
	8/10/1993	20.00	8.6	nd	658	92.10	nd	0.00	0.13	0.12	nd	nd	nd	229.20	14.00	18.00	nd	22.14	0.00	0.03	0.03	nd
	12/22/1993	nd	8.5	nd	266	39.50	nd	0.00	0.27	0.11	nd	nd	nd	66.20	4.00	3.00	nd	nd	nd	nd	nd	nd
	3/7/1994	585.00	6.7	nd	248	38.10	nd	2.80	0.94	0.74	nd	nd	nd	73.40	10.00	8.00	nd	267.91	19.69	6.61	5.20	nd
	5/20/1994	nd	6.9	nd	260	31.60	nd	3.30	0.95	0.92	nd	nd	nd	83.20	2.00	8.00	nd	nd	nd	nd	nd	nd
	9/19/1994	nd	6.8	nd	227	22.40	nd	3.10	1.10	0.55	nd	nd	nd	68.70	4.00	16.00	nd	nd	nd	nd	nd	nd
	11/17/1994	nd	6.5	nd	173	23.40	nd	2.40	0.18	0.22	nd	nd	nd	36.50	2.00	8.00	nd	nd	nd	nd	nd	nd
	12/28/1994	nd	6.1	nd	338	13.70	nd	8.40	3.99	1.29	nd	nd	nd	124.60	12.00	10.00	nd	nd	nd	nd	nd	nd
	3/3/1995	nd	6.2	nd	264	10.20	nd	5.20	2.54	1.22	nd	nd	nd	87.10	12.00	8.00	nd	nd	nd	nd	nd	nd
	6/27/1995	nd	6.9	nd	410	30.20	nd	4.90	3.21	1.00	nd	nd	nd	149.00	24.00	20.00	nd	nd	nd	nd	nd	nd
	8/16/1995	nd	6.8	nd	323	32.00	nd	3.30	0.52	0.41	nd	nd	nd	100.20	2.00	19.00	nd	nd	nd	nd	nd	nd
	12/22/1995	500.00	7.0	nd	221	22.40	nd	2.10	0.14	0.04	nd	nd	nd	29.70	2.00	4.00	nd	134.62	12.62	0.84	0.24	nd
	3/25/1996	350.00	6.6	nd	210	19.90	nd	2.30	0.54	0.44	nd	nd	nd	61.20	8.00	7.00	nd	83.72	9.68	2.27	1.85	nd
	6/3/1996	150.00	7.6	nd	304	45.50	nd	2.50	0.26	0.13	nd	nd	nd	80.70	2.00	14.00	nd	82.04	4.51	0.47	0.23	nd
	8/28/1996	150.00	7.4	nd	279	39.40	nd	3.20	0.42	0.57	nd	nd	nd	68.40	60.00	19.00	nd	71.04	5.77	0.76	1.03	nd
	10/8/1996	225.00	7.4	nd	263	39.10	nd	2.70	0.45	0.08	nd	nd	nd	75.30	2.00	14.00	nd	105.75	7.30	1.22	0.22	nd
	1/2/1997	nd	6.7	nd	186	21.70	nd	1.50	0.46	0.41	nd	nd	nd	52.10	2.00	7.00	nd	nd	nd	nd	nd	nd
	4/21/1997	162.00	7.3	nd	258	35.70	nd	6.40	0.15	0.55	nd	nd	nd	74.40	12.00	6.00	nd	69.52	12.46	0.29	1.07	nd
	Min	20.00	3.90	nd	173.00	0.00	nd	0.00	0.13	0.04	nd	nd	nd	29.70	1.00	2.00	nd	0.00	0.00	0.03	0.03	nd
	Ave	**427.81**	**6.65**	**nd**	**300.68**	**26.36**	**nd**	**11.09**	**1.87**	**0.74**	**nd**	**nd**	**nd**	**89.58**	**13.76**	**10.60**	**nd**	**81.50**	**103.52**	**21.87**	**6.15**	**nd**
	Max	1386.00	8.58	nd	658.00	92.10	nd	60.00	14.10	2.56	nd	nd	nd	229.20	60.00	20.00	nd	267.91	748.02	234.90	42.65	nd
UNT27047 Upstream	7/7/2004	111.42	6.1	130	233	12.00	nd	0.00	0.73	0.52	0.13	nd	nd	69.00	<5.7	62.40	nd	16.07	0.00	0.98	0.70	0.17
	11/28/2005	678.59	6.5	100	176	11.00	nd	0.00	0.36	0.21	0.20	nd	nd	34.00	10.00	39.70	nd	89.72	0.00	2.94	1.71	1.63
	Ave	**395.01**	**6.30**	**115.00**	**204.50**	**11.50**	**nd**	**0.00**	**0.55**	**0.37**	**0.17**	**nd**	**nd**	**51.50**	**nd**	**51.05**	**nd**	**52.90**	**0.00**	**1.96**	**1.20**	**0.90**
UNT27047 Downstream	7/7/2004	117.14	3.4	210	382	0.00	nd	36.00	2.47	1.56	2.42	nd	nd	100.00	5.70	63.50	nd	0.00	50.69	3.48	2.20	3.41
	11/28/2005	784.12	5.5	100	181	6.00	nd	7.00	1.00	0.47	0.87	nd	nd	38.00	<6.2	39.70	nd	56.55	65.98	9.43	4.43	8.20
	Ave	**450.63**	**4.45**	**155.00**	**281.50**	**3.00**	**nd**	**21.50**	**1.74**	**1.02**	**1.65**	**nd**	**nd**	**69.00**	**nd**	**51.60**	**nd**	**28.28**	**58.33**	**6.45**	**3.31**	**5.80**
SBS02	12/12/2002	2293.82	5.8	nd	202	14.20	8.00	39.80	2.00	0.66	1.22	16.40	5.81	64.50	24.00	1.00	nd	391.52	220.57	55.14	18.20	33.64
	1/22/2003	1851.43	6.0	nd	237	11.20	18.00	47.40	2.90	1.07	1.76	20.30	7.55	88.05	7.00	0.10	10.80	249.25	400.58	64.54	23.81	39.17
	4/3/2003	3613.92	5.0	nd	201	7.60	14.00	47.80	1.68	0.62	1.32	14.00	5.21	53.70	3.00	10.30	8.70	330.14	608.15	72.98	26.93	57.34
	5/28/2003	2150.2	6.4	nd	209	11.60	6.00	31.40	1.37	0.62	0.79	15.20	5.58	47.80	4.00	12.90	10.00	299.81	155.07	35.41	16.02	20.42

	7/1/2003	829.52	6.5	nd	298	18.60	10.00	0.00	1.52	1.09	0.88	21.90	8.16	103.20	3.00	16.90	8.71	185.46	99.71	15.16	10.87	8.77
	7/29/2003	3465.18	6.6	nd	173	13.60	8.00	0.00	1.16	0.49	0.64	11.50	4.03	40.50	8.00	15.80	9.61	566.46	333.21	48.32	20.41	26.66
	Min	829.52	5.00	nd	173.00	7.60	6.00	0.00	1.16	0.49	0.64	11.50	4.03	40.50	3.00	0.10	8.70	185.46	99.71	15.16	10.87	8.77
	Ave	**2367.35**	**6.05**	**nd**	**220.00**	**12.80**	**10.67**	**27.73**	**1.77**	**0.76**	**1.10**	**16.55**	**6.06**	**66.29**	**8.17**	**9.50**	**9.56**	**337.10**	**302.88**	**48.59**	**19.37**	**31.00**
	Max	3613.92	6.60	nd	298.00	18.60	18.00	47.80	2.90	1.09	1.76	21.90	8.16	103.20	24.00	16.90	10.80	566.46	608.15	72.98	26.93	57.34
SBD05	7/28/2004	32.30	3.2	460	927	0.00	nd	81.00	21.50	7.95	4.77	nd	nd	320.00	8.60	57.60	nd	0.00	31.45	8.35	3.09	1.85
	8/17/2004	41.29	3.1	470	888	0.00	nd	94.00	24.30	8.57	4.75	nd	nd	348.00	<5.7	57.10	nd	0.00	46.65	12.06	4.25	2.36
	9/27/2004	58.91	3.3	430	706	0.00	nd	67.00	15.60	6.60	3.10	nd	nd	286.00	<5.7	60.30	nd	0.00	47.44	11.05	4.67	2.20
	11/10/2004	47.61	3.3	430	733	0.00	nd	74.00	17.90	7.61	3.43	nd	nd	300.00	5.70	50.90	nd	0.00	42.35	10.24	4.35	1.96
	11/21/2004	60.21	3.3	450	809	0.00	nd	67.00	17.30	7.18	3.18	nd	nd	295.00	<5.7	49.80	nd	0.00	48.49	12.52	5.20	2.30
	1/10/2005	63.18	3.6	320	557	0.00	nd	40.00	7.89	5.80	2.70	nd	nd	222.00	<5.7	46.20	nd	0.00	30.38	5.99	4.40	2.05
	1/28/2005	261.97	3.1	650	1170	0.00	nd	143.00	23.40	8.04	10.80	nd	nd	414.00	11.40	47.50	nd	0.00	450.29	73.68	25.32	34.01
	4/6/2005	114.26	3.3	430	835	0.00	nd	74.00	10.40	5.66	4.28	nd	nd	292.00	<5.7	56.40	nd	0.00	101.63	14.28	7.77	5.88
	5/25/2005	34.91	3.4	460	765	0.00	nd	80.00	14.90	5.74	3.99	nd	nd	276.00	10.00	53.90	nd	0.00	33.57	6.25	2.41	1.67
	7/20/2005	9.76	3.1	420	934	0.00	nd	85.00	38.30	9.83	5.26	nd	nd	383.00	<6.2	62.00	nd	0.00	9.97	4.49	1.15	0.62
	8/3/2005	20.76	3.5	530	919	0.00	nd	139.00	50.30	9.89	6.97	nd	nd	433.00	<6.2	62.10	nd	0.00	34.69	12.55	2.47	1.74
	11/28/2005	5.00	3.2	520	851	0.00	nd	93.00	12.50	7.94	5.07	nd	nd	363.00	<6.2	47.40	nd	0.00	5.59	0.75	0.48	0.30
	Min	5.00	3.10	320.00	557.00	0.00	nd	40.00	7.89	5.66	2.70	nd	nd	222.00	<5.7	46.20	nd	0.00	5.59	0.75	0.48	0.30
	Ave	**62.51**	**3.28**	**464.17**	**841.17**	**0.00**	**nd**	**86.42**	**21.19**	**7.57**	**4.86**	**nd**	**nd**	**327.67**	**nd**	**54.27**	**nd**	**0.00**	**73.54**	**14.35**	**5.46**	**4.75**
	Max	261.97	3.60	650.00	1170.00	0.00	nd	143.00	50.30	9.89	10.80	nd	nd	433.00	11.40	62.10	nd	0.00	450.29	73.68	25.32	34.01
SBD06	7/7/2004	72.57	3.1	430	799	0.00	nd	70.00	6.15	4.42	3.73	nd	nd	269.00	<5.7	62.00	nd	0.00	61.06	5.36	3.86	3.25
	8/17/2004	30.16	3.1	500	815	0.00	nd	92.00	6.24	4.74	4.89	nd	nd	312.00	<5.7	69.40	nd	0.00	33.35	2.26	1.72	1.77
	9/27/2004	43.00	3.3	420	701	0.00	nd	68.00	17.70	4.74	4.26	nd	nd	255.00	7.10	50.80	nd	0.00	35.15	9.15	2.45	2.20
	11/10/2004	30.54	3.6	480	664	0.00	nd	74.00	22.30	4.98	4.02	nd	nd	287.00	<5.7	49.90	nd	0.00	27.16	8.19	1.83	1.48
	11/21/2004	34.11	3.3	410	754	0.00	nd	71.00	21.80	4.65	3.95	nd	nd	276.00	<5.7	49.40	nd	0.00	29.11	8.94	1.91	1.62
	1/10/2005	52.17	3.4	400	655	0.00	nd	63.00	18.10	4.98	3.43	nd	nd	255.00	<5.7	49.00	nd	0.00	39.51	11.35	3.12	2.15
	1/28/2005	106.50	3.0	610	1240	0.00	nd	163.00	56.20	7.90	14.70	nd	nd	422.00	11.40	49.30	nd	0.00	208.66	71.94	10.11	18.82
	4/6/2005	56.90	3.3	370	744	0.00	nd	67.00	25.50	5.20	4.04	nd	nd	276.00	<5.7	50.70	nd	0.00	45.82	17.44	3.56	2.76
	5/25/2005	28.18	3.6	400	666	0.00	nd	80.00	25.10	4.61	4.54	nd	nd	275.00	<6.2	49.90	nd	0.00	27.10	8.50	1.56	1.54
	7/20/2005	13.46	2.9	580	1420	0.00	nd	184.00	71.40	7.06	16.50	nd	nd	462.00	7.10	50.60	nd	0.00	29.77	11.55	1.14	2.67
	8/3/2005	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	0.00
	11/28/2005	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	0.00
	Min	0.00	2.90	370.00	655.00	0.00	nd	63.00	6.15	4.42	3.43	nd	nd	255.00	<5.7	49.00	nd	0.00	0.00	0.00	0.00	0.00
	Ave	**38.97**	**3.26**	**460.00**	**845.80**	**0.00**	**nd**	**93.20**	**27.05**	**5.33**	**6.41**	**nd**	**nd**	**308.90**	**nd**	**53.10**	**nd**	**0.00**	**44.72**	**12.89**	**2.60**	**3.19**
	Max	106.50	3.60	610.00	1420.00	0.00	nd	184.00	71.40	7.90	16.50	nd	nd	462.00	11.40	69.40	nd	0.00	208.66	71.94	10.11	18.82

SBD07	7/7/2004	365.70	5.5	440	670	23.00	nd	0.00	47.10	4.67	0.10	nd	nd	295.00	12.90	53.20	nd	101.10	0.00	207.04	20.53	0.44
	8/17/2004	276.39	6.0	450	647	26.00	nd	0.00	45.80	4.65	0.06	nd	nd	301.00	30.00	55.80	nd	86.38	0.00	152.16	15.45	0.20
	9/27/2004	417.38	6.2	430	690	41.00	nd	4.00	41.30	4.70	0.35	nd	nd	293.00	35.70	54.20	nd	205.69	20.07	207.20	23.58	1.76
	11/10/2004	232.24	6.2	460	702	50.00	nd	0.00	51.50	5.18	0.07	nd	nd	318.00	15.70	49.40	nd	139.58	0.00	143.76	14.46	0.20
	11/21/2004	167.61	6.0	460	700	37.00	nd	-8.00	42.90	4.37	0.06	nd	nd	313.00	<5.7	48.90	nd	74.54	-16.12	86.43	8.80	0.12
	1/10/2005	385.25	6.2	430	678	53.00	nd	8.00	41.30	5.16	1.21	nd	nd	307.00	28.60	48.60	nd	245.43	37.05	191.25	23.89	5.60
	1/28/2005	286.50	5.8	450	623	23.00	nd	-9.00	41.40	4.77	0.20	nd	nd	289.00	14.30	48.10	nd	79.21	-30.99	142.57	16.43	0.69
	4/6/2005	388.40	5.9	430	604	31.00	nd	-11.00	38.10	4.29	0.38	nd	nd	260.00	8.60	54.00	nd	144.73	-51.35	177.87	20.03	1.77
	5/25/2005	144.56	6.3	410	682	59.00	nd	-14.00	37.10	3.82	0.06	nd	nd	250.00	8.60	53.20	nd	102.52	-24.33	64.47	6.64	0.10
	7/20/2005	59.81	6.3	400	625	39.00	nd	-24.00	43.10	4.16	0.05	nd	nd	273.00	8.60	54.90	nd	28.04	-17.25	30.99	2.99	0.04
	8/3/2005	49.94	6.4	420	670	50.00	nd	-24.00	44.70	4.49	0.05	nd	nd	275.00	10.00	55.80	nd	30.01	-14.41	26.83	2.70	0.03
	11/28/2005	96.51	6.2	430	640	37.00	nd	-14.00	33.20	3.78	0.05	nd	nd	244.00	14.30	47.60	nd	42.92	-16.24	38.51	4.38	0.06
	Min	49.94	5.50	400.00	604.00	23.00	nd	-24.00	33.20	3.78	0.05	nd	nd	244.00	<5.7	47.60	nd	28.04	-51.35	26.83	2.70	0.03
	Ave	**239.19**	**6.08**	**434.17**	**660.92**	**39.08**	**nd**	**-7.67**	**42.29**	**4.50**	**0.22**	**nd**	**nd**	**284.83**	**nd**	**51.98**	**nd**	**106.68**	**-9.46**	**122.42**	**13.32**	**0.92**
	Max	417.38	6.40	460.00	702.00	59.00	nd	8.00	51.50	5.18	1.21	nd	nd	318.00	35.70	55.80	nd	245.43	37.05	207.20	23.89	5.60
SBS3	12/12/2002	2572.21	5.6	nd	268	10.80	12.00	32.20	2.80	1.10	1.51	22.90	7.83	88.70	16.00	1.30	nd	333.91	371.02	86.57	34.01	46.69
	1/22/2003	2052.81	5.4	nd	367	8.80	26.00	51.40	6.18	2.03	2.15	35.10	12.10	151.40	4.00	0.10	nd	217.14	641.54	152.49	50.09	53.05
	4/3/2003	4069.13	5.0	nd	262	7.80	20.00	48.00	3.27	1.14	1.49	20.80	7.53	82.40	3.00	10.60	7.90	381.51	978.22	159.94	55.76	72.88
	5/28/2003	2694.06	5.7	nd	294	8.20	12.00	35.60	2.78	1.24	1.11	23.80	8.48	87.40	6.00	12.80	9.80	265.54	388.59	90.02	40.15	35.94
	7/1/2003	1247.84	5.9	nd	449	11.30	20.00	45.40	4.63	2.11	1.41	35.40	12.45	180.75	7.50	17.20	8.36	169.49	299.98	69.45	31.65	21.15
	7/29/2003	3529.32	6.0	nd	231	10.60	14.00	39.40	2.31	0.90	0.90	17.60	6.11	61.10	6.00	16.20	9.36	449.68	593.91	98.00	38.18	38.18
	Min	1247.84	5.00	nd	231.00	7.80	12.00	32.20	2.31	0.90	0.90	17.60	6.11	61.10	3.00	0.10	7.90	169.49	299.98	69.45	31.65	21.15
	Ave	**2694.23**	**5.60**	**nd**	**311.83**	**9.58**	**17.33**	**42.00**	**3.66**	**1.42**	**1.43**	**25.93**	**9.08**	**108.63**	**7.08**	**9.70**	**8.86**	**302.88**	**545.54**	**109.41**	**41.64**	**44.65**
	Max	4069.13	6.00	nd	449.00	11.30	26.00	51.40	6.18	2.11	2.15	35.40	12.45	180.75	16.00	17.20	9.80	449.68	978.22	159.94	55.76	72.88
SBD08	7/28/2004	180.42	3.4	220	501	0.00	nd	30.00	14.90	3.49	0.16	nd	nd	138.00	21.40	62.50	nd	0.00	65.06	32.31	7.57	0.35
	8/17/2004	75.17	3.0	450	902	0.00	nd	74.00	25.70	6.48	0.22	nd	nd	337.00	<5.7	59.60	nd	0.00	66.86	23.22	5.85	0.20
	9/27/2004	142.87	4.4	320	547	4.00	nd	47.00	20.40	4.45	0.13	nd	nd	245.00	<5.7	57.60	nd	6.87	80.71	35.03	7.64	0.22
	11/10/2004	132.25	3.7	370	610	0.00	nd	50.00	23.70	5.76	0.17	nd	nd	275.00	5.70	46.80	nd	0.00	79.48	37.67	9.16	0.27
	11/21/2004	113.23	3.3	400	733	0.00	nd	44.00	20.50	5.35	0.15	nd	nd	274.00	<5.7	46.90	nd	0.00	59.89	27.90	7.28	0.20
	1/10/2005	343.32	4.9	230	365	6.00	nd	23.00	8.35	2.06	0.13	nd	nd	164.00	<5.7	41.60	nd	24.76	94.91	34.46	8.50	0.54
	4/6/2005	233.85	3.6	250	476	0.00	nd	22.00	9.88	2.80	0.13	nd	nd	166.00	<5.7	52.60	nd	0.00	61.84	27.77	7.87	0.37
	5/25/2005	80.43	3.5	410	689	0.00	nd	54.00	17.00	5.59	0.19	nd	nd	272.00	7.10	55.10	nd	0.00	52.21	16.44	5.40	0.18
	7/20/2005	53.01	3.2	480	945	0.00	nd	59.00	20.00	7.91	0.31	nd	nd	307.00	10.00	63.60	nd	0.00	37.59	12.74	5.04	0.20
	8/3/2005	37.87	3.3	470	826	0.00	nd	107.00	19.80	8.30	0.34	nd	nd	318.00	10.00	62.10	nd	0.00	48.71	9.01	3.78	0.15
	11/28/2005	126.79	3.4	340	613	0.00	nd	34.00	10.70	4.09	0.28	nd	nd	183.00	10.00	43.70	nd	0.00	51.82	16.31	6.23	0.43
	Min	37.87	3.00	220.00	365.00	0.00	nd	22.00	8.35	2.06	0.13	nd	nd	138.00	<5.7	41.60	nd	0.00	37.59	9.01	3.78	0.15

	Ave	**138.11**	**3.61**	**358.18**	**655.18**	**0.91**	**nd**	**49.45**	**17.36**	**5.12**	**0.20**	**nd**	**nd**	**243.55**	**nd**	**53.83**	**nd**	**2.88**	**63.55**	**24.81**	**6.76**	**0.28**
	Max	343.32	4.90	480.00	945.00	6.00	nd	107.00	25.70	8.30	0.34	nd	nd	337.00	21.40	63.60	nd	24.76	94.91	37.67	9.16	0.54
SBD09	8/24/2004	73.15	3.1	480	756	0.00	nd	78.00	3.48	9.19	1.51	nd	nd	276.00	<5.7	62.90	nd	0.00	68.58	3.06	8.08	1.33
	11/10/2004	36.00	3.3	480	759	0.00	nd	50.00	3.77	9.70	1.89	nd	nd	274.00	<5.7	43.90	nd	0.00	21.64	1.63	4.20	0.82
	1/28/2005	83.38	3.4	460	695	0.00	nd	46.00	3.46	7.79	1.77	nd	nd	228.00	8.60	32.60	nd	0.00	46.10	3.47	7.81	1.77
	Ave	**64.18**	**3.27**	**473.33**	**736.67**	**0.00**	nd	**58.00**	**3.57**	**8.89**	**1.72**	nd	nd	**259.33**	**nd**	**46.47**	nd	**0.00**	**45.44**	**2.72**	**6.70**	**1.31**
SBD10	8/24/2004	40.00	2.8	690	1150	0.00	nd	212.00	74.00	12.00	4.65	nd	nd	431.00	<5.7	66.80	nd	0.00	101.93	35.58	5.77	2.24
	11/11/2004	20.00	3.2	560	973	0.00	nd	204.00	76.60	11.70	3.12	nd	nd	391.00	7.10	50.00	nd	0.00	49.04	18.41	2.81	0.75
	Ave	**30.00**	**3.00**	**625.00**	**1061.50**	**0.00**	nd	**208.00**	**75.30**	**11.85**	**3.89**	nd	nd	**411.00**	**nd**	**58.40**	nd	**0.00**	**75.49**	**27.00**	**4.29**	**1.49**
SBD11	8/24/2004	15.00	3.4	290	503	0.00	nd	42.00	2.50	5.91	1.67	nd	nd	177.00	<5.7	nd	nd	0.00	7.57	0.45	1.07	0.30
	11/11/2004	15.86	3.7	280	453	0.00	nd	36.00	1.67	5.32	2.33	nd	nd	175.00	5.70	43.70	nd	0.00	6.86	0.32	1.01	0.44
	Ave	**15.43**	**3.55**	**285.00**	**478.00**	**0.00**	nd	**39.00**	**2.09**	**5.62**	**2.00**	nd	nd	**176.00**	**nd**	**43.70**	nd	**0.00**	**7.22**	**0.38**	**1.04**	**0.37**
SBD12	8/24/2004	18.00	2.8	700	1200	0.00	nd	176.00	40.60	14.90	1.95	nd	nd	432.00	<5.7	79.10	nd	0.00	38.08	8.78	3.22	0.42
	11/11/2004	9.35	3.1	680	1060	0.00	nd	172.00	46.30	13.50	2.16	nd	nd	414.00	5.70	52.00	nd	0.00	19.33	5.20	1.52	0.24
	Ave	**13.68**	**2.95**	**690.00**	**1130.00**	**0.00**	nd	**174.00**	**43.45**	**14.20**	**2.06**	nd	nd	**423.00**	**nd**	**65.55**	nd	**0.00**	**28.70**	**6.99**	**2.37**	**0.33**
SBS4	12/12/2002	2717.17	4.90	nd	309	8.20	24.00	52.80	4.29	1.78	1.82	25.00	9.36	111.90	16.00	1.20	nd	267.82	783.85	140.11	58.14	59.44
	1/22/2003	1720.16	5.00	nd	405	8.60	34.00	55.40	7.07	2.56	2.18	34.50	13.00	177.40	3.00	0.10	11.90	177.82	702.99	146.18	52.93	45.07
	4/3/2003	4533.28	4.80	nd	286	7.60	22.00	47.90	3.87	1.48	1.61	21.70	8.37	91.65	5.50	9.00	8.40	414.12	1198.78	210.88	80.65	87.73
	5/28/2003	2429.53	5.00	nd	330	6.40	14.00	42.60	3.88	1.74	1.26	25.20	9.70	111.30	6.00	13.20	9.60	186.90	408.84	113.31	50.81	36.80
	7/1/2003	1485.53	4.90	nd	496	7.20	26.00	59.80	6.03	2.81	1.40	35.70	13.80	209.80	3.00	15.90	9.01	128.56	464.26	107.67	50.18	25.00
	7/29/2003	4069.9	5.30	nd	258	8.00	12.00	34.20	3.00	1.31	0.94	18.70	7.04	74.50	12.00	16.10	9.47	391.36	587.04	146.76	64.09	45.98
	Min	1485.53	4.80	nd	258.00	6.40	12.00	34.20	3.00	1.31	0.94	18.70	7.04	74.50	3.00	0.10	8.40	128.56	408.84	107.67	50.18	25.00
	Ave	**2825.93**	**4.98**	**nd**	**347.33**	**7.67**	**22.00**	**48.78**	**4.69**	**1.95**	**1.54**	**26.80**	**10.21**	**129.43**	**7.58**	**9.25**	**9.68**	**261.10**	**690.96**	**144.15**	**59.46**	**50.00**
	Max	4533.28	5.30	nd	496.00	8.60	34.00	59.80	7.07	2.81	2.18	35.70	13.80	209.80	16.00	16.10	11.90	414.12	1198.78	210.88	80.65	87.73
SBD13	7/28/2004	37.51	3.3	370	617	0.00	nd	65.00	2.91	7.12	4.71	nd	nd	187.00	11.40	64.00	nd	0.00	29.31	1.31	3.21	2.12
	11/28/2005	10.00	3.4	450	724	0.00	nd	62.00	3.89	9.07	3.91	nd	nd	247.00	8.60	44.90	nd	0.00	7.45	0.47	1.09	0.47
	Ave	**23.76**	**3.35**	**410.00**	**670.50**	**0.00**	**nd**	**63.50**	**3.40**	**8.10**	**4.31**	**nd**	**nd**	**217.00**	**10.00**	**54.45**	**nd**	**0.00**	**18.38**	**0.89**	**2.15**	**1.30**
SBD14	8/24/2004	35.00	2.7	910	1330	0.00	nd	258.00	30.90	16.10	4.86	nd	nd	478.00	7.10	78.70	nd	0.00	108.54	13.00	6.77	2.04
	11/11/2004	34.56	2.9	800	1210	0.00	nd	226.00	26.70	15.40	6.87	nd	nd	431.00	<5.7	49.50	nd	0.00	93.88	11.09	6.40	2.85
	Ave	**34.78**	**2.80**	**855.00**	**1270.00**	**0.00**	**nd**	**242.00**	**28.80**	**15.75**	**5.87**	**nd**	**nd**	**454.50**	**nd**	**64.10**	**nd**	**0.00**	**101.21**	**12.05**	**6.59**	**2.45**

SBD15	8/24/2004	32.65	3.2	490	789	0.00	nd	116.00	2.98	12.40	10.20	nd	nd	332.00	<5.7	nd	nd	0.00	45.52	1.17	4.87	4.00
	11/11/2004	18.92	3.4	500	754	0.00	nd	245.00	1.47	11.10	8.42	nd	nd	323.00	<5.7	47.60	nd	0.00	55.72	0.33	2.52	1.91
	Ave	**25.79**	**3.30**	**495.00**	**771.50**	**0.00**	**nd**	**180.50**	**2.23**	**11.75**	**9.31**	**nd**	**nd**	**327.50**	**nd**	**47.60**	**nd**	**0.00**	**50.62**	**0.75**	**3.70**	**2.96**
SBD16	8/24/2004	43.01	3.2	470	764	0.00	nd	104.00	2.71	8.00	6.67	nd	nd	308.00	5.70	64.50	nd	0.00	53.77	1.40	4.14	3.45
	11/11/2004	22.39	3.5	450	736	0.00	nd	71.00	2.30	7.47	6.58	nd	nd	243.00	5.70	43.10	nd	0.00	19.11	0.62	2.01	1.77
	Ave	**32.70**	**3.35**	**460.00**	**750.00**	**0.00**	**nd**	**87.50**	**2.51**	**7.74**	**6.63**	**nd**	**nd**	**275.50**	**5.70**	**53.80**	**nd**	**0.00**	**36.44**	**1.01**	**3.07**	**2.61**
UNT27046	8/24/2004	17.95	4.3	90	152	4.00	nd	12.00	0.12	0.87	0.49	nd	nd	51.00	<5.7	58.80	nd	0.86	2.59	0.03	0.19	0.11
	12/5/2005	51.61	4.7	100	151	4.00	nd	12.00	0.31	0.60	0.68	nd	nd	35.00	8.60	33.20	nd	2.48	7.44	0.19	0.37	0.42
	Ave	**34.78**	**4.50**	**95.00**	**151.50**	**4.00**	**nd**	**12.00**	**0.22**	**0.74**	**0.59**	**nd**	**nd**	**43.00**	**nd**	**46.00**	**nd**	**1.67**	**5.02**	**0.11**	**0.28**	**0.26**
UNT27045	7/28/2004	175.03	4.7	50	65	4.00	nd	8.00	0.39	0.33	0.35	nd	nd	17.00	5.70	61.40	nd	8.42	16.83	0.82	0.69	0.74
	11/28/2005	137.44	5.0	50	90	5.00	nd	7.00	0.12	0.22	0.25	nd	nd	22.00	<6.2	39.90	nd	8.26	11.56	0.20	0.36	0.41
	Ave	**156.24**	**4.85**	**50.00**	**77.50**	**4.50**	**nd**	**7.50**	**0.26**	**0.28**	**0.30**	**nd**	**nd**	**19.50**	**5.70**	**50.65**	**nd**	**8.34**	**14.20**	**0.51**	**0.53**	**0.57**
SBD17	7/7/2004	175.55	3.3	250	486	0.00	nd	46.00	3.31	3.12	3.47	nd	nd	132.00	<5.7	50.40	nd	0.00	97.07	6.98	6.58	7.32
	8/17/2004	172.34	3.3	270	442	0.00	nd	54.00	2.41	2.80	3.11	nd	nd	140.00	<5.7	50.50	nd	0.00	111.86	4.99	5.80	6.44
	9/27/2004	150.76	3.5	360	563	0.00	nd	56.00	3.00	5.56	4.95	nd	nd	198.00	<5.7	52.70	nd	0.00	101.48	5.44	10.08	8.97
	11/11/2004	137.43	3.3	280	439	0.00	nd	44.00	1.92	3.11	3.63	nd	nd	142.00	<5.7	50.50	nd	0.00	72.68	3.17	5.14	6.00
	11/21/2004	115.39	3.5	270	447	0.00	nd	44.00	1.57	2.57	3.39	nd	nd	134.00	<5.7	48.90	nd	0.00	61.03	2.18	3.56	4.70
	1/10/2005	237.60	3.4	360	560	0.00	nd	73.00	4.40	4.07	5.67	nd	nd	183.00	5.70	48.70	nd	0.00	208.48	12.57	11.62	16.19
	1/28/2005	187.68	3.4	320	575	0.00	nd	59.00	2.32	3.94	4.89	nd	nd	191.00	<5.7	48.20	nd	0.00	133.10	5.23	8.89	11.03
	4/6/2006	180.42	3.6	280	451	0.00	nd	39.00	1.59	3.71	3.30	nd	nd	122.00	<5.7	52.30	nd	0.00	84.58	3.45	8.05	7.16
	5/25/2005	105.02	3.6	270	454	0.00	nd	42.00	1.98	2.60	3.40	nd	nd	113.00	<6.2	49.70	nd	0.00	53.02	2.50	3.28	4.29
	7/20/2005	21.92	3.4	250	492	0.00	nd	137.00	1.26	2.34	4.39	nd	nd	129.00	<6.2	52.90	nd	0.00	36.10	0.33	0.62	1.16
	8/3/2005	23.11	3.4	270	477	0.00	nd	116.00	1.19	2.35	5.27	nd	nd	122.00	<6.2	53.60	nd	0.00	32.22	0.33	0.65	1.46
	11/28/2005	51.44	3.6	250	403	0.00	nd	36.00	0.69	2.44	2.83	nd	nd	99.00	<6.2	48.90	nd	0.00	22.26	0.43	1.51	1.75
	Min	21.92	3.30	250.00	403.00	0.00	nd	36.00	0.69	2.34	2.83	nd	nd	99.00	<5.7	48.20	nd	0.00	22.26	0.33	0.62	1.16
	Ave	**129.89**	**3.44**	**285.83**	**482.42**	**0.00**	**nd**	**62.17**	**2.14**	**3.22**	**4.03**	**nd**	**nd**	**142.08**	**nd**	**50.61**	**nd**	**0.00**	**84.49**	**3.97**	**5.48**	**6.37**
	Max	237.60	3.60	360.00	575.00	0.00	nd	137.00	4.40	5.56	5.67	nd	nd	198.00	<6.2	53.60	nd	0.00	208.48	12.57	11.62	16.19
SBS05	12/12/2002	3399.3	4.8	nd	311	8.00	26.00	51.00	4.79	2.23	1.86	25.10	10.10	117.00	12.00	1.50	nd	326.88	1062.35	195.72	91.12	76.00
	1/22/2003	3096.45	4.8	nd	419	7.40	40.00	60.00	7.33	3.06	2.51	33.00	13.60	178.90	4.00	0.10	11.90	275.42	1488.77	272.82	113.89	93.42
	4/2/2003	6850.53	4.4	nd	274	5.20	26.00	33.20	2.64	1.26	1.33	15.20	6.47	85.00	3.00	10.20	10.30	428.19	2140.93	217.39	103.75	109.52
	5/28/2003	2944.67	4.7	nd	354	5.80	22.00	50.40	3.98	2.20	1.52	25.20	10.50	117.60	4.00	13.20	9.20	205.29	778.69	140.87	77.87	53.80
	7/1/2003	1412.6	4.1	nd	531	3.20	34.00	60.20	5.24	3.45	1.76	35.00	14.80	209.00	3.00	16.80	8.12	54.33	577.30	88.97	58.58	29.88
	7/29/2003	4115.5	4.8	nd	274	7.00	16.00	37.60	3.26	1.72	1.12	19.10	7.83	80.30	4.00	15.60	9.49	346.28	791.49	161.27	85.09	55.40

	Min	1412.60	4.10	nd	274.00	3.20	16.00	33.20	2.64	1.26	1.12	15.20	6.47	80.30	3.00	0.10	8.12	54.33	577.30	88.97	58.58	29.88
	Ave	**3636.51**	**4.60**	**nd**	**360.50**	**6.10**	**27.33**	**48.73**	**4.54**	**2.32**	**1.68**	**25.43**	**10.55**	**131.30**	**5.00**	**9.57**	**9.80**	**272.73**	**1139.92**	**179.51**	**88.38**	**69.67**
	Max	6850.53	4.80	nd	531.00	8.00	40.00	60.20	7.33	3.45	2.51	35.00	14.80	209.00	12.00	16.80	11.90	428.19	2140.93	272.82	113.89	109.52
UNT27042	12/12/2002	653.09	5.1	nd	87	8.00	8.00	27.20	0.30	0.33	0.50	5.32	2.25	29.70	4.00	2.00	nd	62.80	213.52	2.36	2.59	3.93
	1/22/2003	469.22	5.2	nd	85	7.60	10.00	28.20	0.30	0.27	0.50	4.48	1.92	24.50	3.00	0.10	12.20	42.86	159.05	1.69	1.52	2.82
	4/2/2003	1498.78	5.3	nd	75	8.20	8.00	18.00	0.30	0.15	0.50	3.34	1.35	20.00	3.00	9.40	9.60	147.73	324.28	5.40	2.70	9.01
	5/28/2003	755.06	5.3	nd	74	6.00	6.00	16.40	0.30	0.19	0.50	4.08	1.72	20.00	3.00	12.30	8.80	54.45	148.84	2.72	1.72	4.54
	7/1/2003	194.33	5.4	nd	96	7.40	10.00	17.40	0.30	0.28	0.50	4.48	1.93	39.10	3.00	17.10	7.97	17.29	40.64	0.70	0.65	1.17
	7/29/2003	890.51	5.8	nd	75	8.00	8.00	31.60	0.32	0.22	0.50	4.58	1.76	22.40	10.00	15.60	9.57	85.63	338.24	3.43	2.35	5.35
	Min	194.33	5.10	nd	74.00	6.00	6.00	16.40	0.30	0.15	0.50	3.34	1.35	20.00	3.00	0.10	7.97	17.29	40.64	0.70	0.65	1.17
	Ave	**743.50**	**5.35**	**nd**	**82.00**	**7.53**	**8.33**	**23.13**	**0.30**	**0.24**	**0.50**	**4.38**	**1.82**	**25.95**	**4.33**	**9.42**	**9.63**	**68.46**	**204.10**	**2.72**	**1.92**	**4.47**
	Max	1498.78	5.80	nd	96.00	8.20	10.00	31.60	0.32	0.33	0.50	5.32	2.25	39.10	10.00	17.10	12.20	147.73	338.24	5.40	2.70	9.01
SBD18	7/7/2004	33.02	2.9	590	1030	0.00	nd	176.00	3.86	1.49	18.10	nd	nd	317.00	5.70	49.80	nd	0.00	69.85	1.53	0.59	7.18
	8/17/2004	53.86	2.9	650	1010	0.00	nd	202.00	5.02	1.69	20.00	nd	nd	401.00	<5.7	49.70	nd	0.00	130.77	3.25	1.09	12.95
	9/27/2004	168.83	3.3	590	631	0.00	nd	95.00	4.85	1.30	8.43	nd	nd	192.00	<5.7	49.70	nd	0.00	192.79	9.84	2.64	17.11
	11/11/2004	33.81	3.1	610	998	0.00	nd	196.00	4.08	1.36	16.60	nd	nd	361.00	<5.7	49.60	nd	0.00	79.65	1.66	0.55	6.75
	11/21/2004	11.36	3.1	630	1070	0.00	nd	174.00	4.66	1.58	18.50	nd	nd	325.00	<5.7	49.10	nd	0.00	23.76	0.64	0.22	2.53
	1/10/2005	567.28	3.4	370	571	0.00	nd	84.00	4.09	1.35	8.66	nd	nd	170.00	<5.7	48.70	nd	0.00	572.77	27.89	9.21	59.05
	1/28/2005	100.16	3.2	470	735	0.00	nd	108.00	3.57	1.29	12.00	nd	nd	213.00	<5.7	48.70	nd	0.00	130.02	4.30	1.55	14.45
	4/6/2005	341.96	3.2	400	682	0.00	nd	97.00	3.26	1.29	10.50	nd	nd	184.00	<5.7	49.30	nd	0.00	398.70	13.40	5.30	43.16
	5/25/2005	25.36	3.1	590	1000	0.00	nd	166.00	3.85	1.44	18.50	nd	nd	359.00	<6.2	49.10	nd	0.00	50.60	1.17	0.44	5.64
	7/20/2005	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	0.00
	8/3/2005	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	0.00
	11/28/2005	0.00	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00	0.00	0.00	0.00	0.00
	Min	0.00	2.90	370.00	571.00	0.00	nd	84.00	3.26	1.29	8.43	nd	nd	170.00	<5.7	48.70	nd	0.00	0.00	0.00	0.00	0.00
	Ave	**111.30**	**3.13**	**544.44**	**858.56**	**0.00**	**nd**	**144.22**	**4.14**	**1.42**	**14.59**	**nd**	**nd**	**280.22**	**nd**	**49.30**	**nd**	**0.00**	**137.41**	**5.31**	**1.80**	**14.07**
	Max	567.28	3.40	650.00	1070.00	0.00	nd	202.00	5.02	1.69	20.00	nd	nd	401.00	<6.2	49.80	nd	0.00	572.77	27.89	9.21	59.05
UNT27041	8/24/2004	93.52	3.7	120	222	0.00	nd	20.00	0.82	2.24	0.42	nd	nd	66	<5.7	58.3	nd	0.00	22.48	0.92	2.52	0.47
	12/5/2005	137.33	4.2	110	174	2.00	nd	2.00	0.95	1.69	0.45	nd	nd	52	<6.2	37.1	nd	3.30	3.30	1.57	2.79	0.74
	Ave	**115.43**	**3.95**	**115.00**	**198.00**	**1.00**	**nd**	**11.00**	**0.89**	**1.97**	**0.44**	**nd**	**nd**	**59.00**	**nd**	**47.70**	**nf**	**1.65**	**12.89**	**1.24**	**2.65**	**0.61**
SBS6	12/12/2002	4183.53	4.8	nd	282	8.00	22.00	53.60	3.75	2.05	1.53	21.40	8.94	100.30	10.00	0.30	nd	402.29	1106.29	188.57	103.09	76.94
	1/23/2003	1702.48	4.7	nd	385	7.60	42.00	52.20	5.55	2.94	1.99	28.10	12.20	172.40	3.00	0.10	11.50	155.52	859.48	113.57	60.16	40.72
	4/2/2003	11877.58	4.4	nd	235	5.00	22.00	27.40	1.91	1.14	1.09	12.85	5.71	70.65	3.00	6.20	9.50	713.84	3140.91	272.69	162.76	155.62
	5/28/2003	7215.63	4.5	nd	306	5.80	20.00	40.00	2.79	2.03	1.19	21.10	9.21	100.30	4.00	11.60	10.20	503.04	1734.64	241.98	176.07	103.21

	7/1/2003	2777.85	3.9	nd	498	0.00	28.00	45.20	2.65	3.22	1.50	29.80	13.20	188.20	3.00	17.70	8.16	0.00	934.91	88.48	107.52	50.08
	7/29/2003	7393.4	4.7	nd	245	6.60	14.00	33.80	2.41	1.63	0.93	16.55	7.07	70.30	8.00	16.60	9.53	586.53	1244.16	214.17	144.86	82.65
	Min	1702.48	3.90	nd	235.00	0.00	14.00	27.40	1.91	1.14	0.93	12.85	5.71	70.30	3.00	0.10	8.16	0.00	859.48	88.48	60.16	40.72
	Ave	**5858.41**	**4.50**	**nd**	**325.17**	**5.50**	**24.67**	**42.03**	**3.18**	**2.17**	**1.37**	**21.63**	**9.39**	**117.03**	**5.17**	**8.75**	**9.78**	**393.54**	**1503.40**	**186.58**	**125.74**	**84.87**
	Max	11877.58	4.80	nd	498.00	8.00	42.00	53.60	5.55	3.22	1.99	29.80	13.20	188.20	10.00	17.70	11.50	713.84	3140.91	272.69	176.07	155.62
SBD19	11/11/2004	22.25	2.6	1260	2170	0.00	nd	360.00	23.50	1.10	18.40	nd	nd	586.00	<5.7	48.00	nd	0.00	96.28	6.28	0.29	4.92
	11/21/2004	18.89	2.6	nd	2160	0.00	nd	361.00	28.80	1.56	17.10	nd	nd	612.00	<5.7	nd	nd	0.00	81.97	6.54	0.35	3.88
	1/10/2004	254.22	2.7	1060	1610	0.00	nd	253.00	18.10	0.89	16.30	nd	nd	411.00	<5.7	47.10	nd	0.00	773.10	55.31	2.72	49.81
	4/6/2005	113.10	2.7	950	1710	0.00	nd	234.00	14.10	0.85	12.10	nd	nd	427.00	<5.7	57.00	nd	0.00	318.11	19.17	1.16	16.45
	5/25/2005	33.46	2.6	1080	1920	0.00	nd	311.00	21.40	1.25	16.80	nd	nd	535.00	<6.2	55.10	nd	0.00	125.08	8.61	0.50	6.76
	7/20/2005	5.00	2.6	1110	1900	0.00	nd	386.00	44.20	1.84	23.00	nd	nd	670.00	<6.2	71.90	nd	0.00	23.20	2.66	0.11	1.38
	8/3/2005	2.00	2.7	1070	1880	0.00	nd	403.00	50.10	2.08	23.70	nd	nd	687.00	7.10	75.20	nd	0.00	9.69	1.20	0.05	0.57
	12/5/2005	32.07	2.6	1220	1760	0.00	nd	327.00	19.60	1.13	17.80	nd	nd	540.00	<6.2	38.90	nd	0.00	126.05	7.56		6.86
	Min	2.00	2.60	950.00	1610.00	0.00	nd	234.00	14.10	0.85	12.10	nd	nd	411.00	<5.7	38.90	nd	0.00	9.69	1.20	0.05	0.57
	Ave	**60.12**	**2.64**	**1107.14**	**1888.75**	**0.00**	**nd**	**329.38**	**27.48**	**1.34**	**18.15**	**nd**	**nd**	**558.50**	**nd**	**56.17**	**nd**	**0.00**	**194.19**	**13.42**	**0.74**	**11.33**
	Max	254.22	2.70	1260.00	2170.00	0.00	nd	403.00	50.10	2.08	23.70	nd	nd	687.00	7.10	75.20	nd	0.00	773.10	55.31	2.72	49.81
SBD20	11/11/2004	46.23	3.1	660	1100	0.00	nd	187.00	2.32	4.17	20.40	nd	nd	370.00	<5.7	49.30	nd	0.00	103.91	1.29	2.32	11.34
	11/21/2004	52.59	3.1	nd	1050	0.00	nd	180.00	2.11	3.92	20.30	nd	nd	363.00	5.70	nd	nd	0.00	113.78	1.33	2.48	12.83
	1/10/2005	230.71	3.2	540	810	0.00	nd	134.00	1.44	2.59	14.90	nd	nd	271.00	<5.7	42.80	nd	0.00	371.60	3.99	7.18	41.32
	4/6/2005	106.71	3.1	500	916	0.00	nd	141.00	1.72	3.48	18.90	nd	nd	296.00	<5.7	51.20	nd	0.00	180.85	2.21	4.46	24.24
	5/25/2005	30.69	3.1	630	1110	0.00	nd	188.00	2.20	3.76	21.70	nd	nd	389.00	<6.2	49.50	nd	0.00	69.35	0.81	1.39	8.00
	7/20/2005	10.00	3.0	690	1260	0.00	nd	209.00	9.37	4.87	21.10	nd	nd	480.00	<6.2	63.50	nd	0.00	25.12	1.13	0.59	2.54
	8/3/2005	5.00	3.1	nd	1250	0.00	nd	223.00	11.30	5.67	22.50	nd	nd	518.00	<6.2	nd	nd	0.00	13.40	0.68	0.34	1.35
	12/5/2005	27.30	3.2	600	865	0.00	nd	136.00	1.39	4.04	15.20	nd	nd	348.00	7.10	39.20	nd	0.00	44.63	0.46	1.33	4.99
	Min	5.00	3.00	500.00	810.00	0.00	nd	134.00	1.39	2.59	14.90	nd	nd	271.00	<5.7	39.20	nd	0.00	13.40	0.46	0.34	1.35
	Ave	**63.65**	**3.11**	**603.33**	**1045.13**	**0.00**	nd	**174.75**	**3.98**	**4.06**	**19.38**	nd	nd	**379.38**	**nd**	**49.25**	nd	**0.00**	**115.33**	**1.49**	**2.51**	**13.33**
	Max	230.71	3.20	690.00	1260.00	0.00	nd	223.00	11.30	5.67	22.50	nd	nd	518.00	<6.2	63.50	nd	0.00	371.60	3.99	7.18	41.32
UNT27039 South Branch	7/28/2004	937.60	4.1	120	209	1.00	nd	21.00	0.51	2.39	2.12	nd	nd	57.00	17.10	58.20	nd	11.27	236.67	5.75	26.94	23.89
	11/10/2004	167.58	4.2	170	270	2.00	nd	26.00	0.40	4.24	3.37	nd	nd	100.00	<5.7	41.60	nd	4.03	52.37	0.81	8.54	6.79
	3/22/2005	644.50	4.3	170	301	3.00	nd	27.00	0.37	3.89	3.89	nd	nd	85.00	<5.7	36.70	nd	23.24	209.17	2.87	30.14	30.14
	11/17/2005	124.27	3.7	170	301	0.00	nd	51.00	0.45	3.68	3.83	nd	nd	84.00	<6.2	47.60	nd	0.00	76.18	0.67	5.50	5.72
	Min	124.27	3.70	120.00	209.00	0.00	nd	21.00	0.37	2.39	2.12	nd	nd	57.00	<5.7	36.70	nd	0.00	52.37	0.67	5.50	5.72
	Ave	**468.49**	**4.08**	**157.50**	**270.25**	**1.50**	**nd**	**31.25**	**0.43**	**3.55**	**3.30**	**nd**	**nd**	**81.50**	**nd**	**46.03**	**nd**	**9.63**	**143.60**	**2.52**	**17.78**	**16.63**
	Max	937.60	4.30	170.00	301.00	3.00	nd	51.00	0.51	4.24	3.89	nd	nd	100.00	17.10	58.20	nd	23.24	236.67	5.75	30.14	30.14

UNT27039 North Branch	7/28/2004	1297.50	3.5	180	289	0.00	nd	43.00	2.24	0.80	2.95	nd	nd	61.00	10.00	58.60	nd	0.00	670.63	34.93	12.48	46.01
	11/10/2004	237.58	3.4	250	399	0.00	nd	56.00	3.50	1.05	4.84	nd	nd	118.00	<5.7	39.50	nd	0.00	159.92	9.99	3.00	13.82
	3/22/2005	997.46	3.5	230	363	0.00	nd	47.00	1.89	1.00	4.94	nd	nd	90.00	<5.7	34.90	nd	0.00	563.51	22.66	11.99	59.23
	11/17/2005	91.56	3.5	190	335	0.00	nd	41.00	1.81	1.15	2.51	nd	nd	74.00	<6.2	47.40	nd	0.00	45.12	1.99	1.27	2.76
	Min	91.56	3.40	180.00	289.00	0.00	nd	41.00	1.81	0.80	2.51	nd	nd	61.00	<5.7	34.90	nd	0.00	45.12	1.99	1.27	2.76
	Ave	**656.03**	**3.48**	**212.50**	**346.50**	**0.00**	**nd**	**46.75**	**2.36**	**1.00**	**3.81**	**nd**	**nd**	**85.75**	**nd**	**45.10**	**nd**	**0.00**	**359.79**	**17.40**	**7.18**	**30.46**
	Max	1297.50	3.50	250.00	399.00	0.00	nd	56.00	3.50	1.15	4.94	nd	nd	118.00	10.00	58.60	nd	0.00	670.63	34.93	12.48	59.23
UNT27039	12/12/2002	682.58	4.1	nd	279	4.00	36.00	59.80	0.64	1.44	2.91	17.20	8.19	76.10	6.00	0.40	nd	32.82	490.64	5.25	11.81	23.88
	1/23/2003	660.1	3.9	nd	385	0.00	64.00	59.40	1.21	1.95	4.81	20.10	10.30	152.40	3.00	0.10	nd	0.00	471.30	9.60	15.47	38.16
	4/2/2003	1533.68	3.6	nd	376	0.00	56.00	57.00	1.53	1.46	4.27	13.50	7.96	115.80	3.00	6.80	8.60	0.00	1050.79	28.21	26.91	78.72
	5/28/2003	1038.34	3.8	nd	290	0.00	32.00	51.40	0.82	1.05	2.44	12.40	6.64	77.30	3.00	11.10	9.20	0.00	641.52	10.23	13.10	30.45
	7/1/2003	291.41	3.7	nd	455	0.00	54.00	59.60	1.13	1.85	4.03	20.00	10.30	145.50	3.00	16.30	8.23	0.00	208.76	3.96	6.48	14.12
	7/29/2003	1143.81	3.8	nd	291	0.00	36.00	30.60	1.04	1.24	2.30	11.50	6.19	68.80	3.00	16.00	9.71	0.00	420.71	14.30	17.05	31.62
	Min	291.41	3.60	nd	279.00	0.00	32.00	30.60	0.64	1.05	2.30	11.50	6.19	68.80	3.00	0.10	8.23	0.00	208.76	3.96	6.48	14.12
	Ave	**891.65**	**3.82**	**nd**	**346.00**	**0.67**	**46.33**	**52.97**	**1.06**	**1.50**	**3.46**	**15.78**	**8.26**	**105.98**	**3.50**	**8.45**	**8.94**	**5.47**	**547.29**	**11.92**	**15.14**	**36.16**
	Max	1533.68	4.10	nd	455.00	4.00	64.00	59.80	1.53	1.95	4.81	20.10	10.30	152.40	6.00	16.30	9.71	32.82	1050.79	28.21	26.91	78.72
SBS7	12/11/2002	1658.36	4.7	nd	325	8.20	32.00	55.00	3.90	2.53	1.79	25.00	10.80	129.20	3.00	0.20	nd	163.45	637.87	77.74	50.43	35.68
	1/21/2003	3971.61	4.5	nd	354	6.60	42.00	50.00	5.27	2.82	2.57	27.90	12.20	134.80	3.00	0.10	11.70	315.08	2005.03	251.58	134.62	122.69
	4/1/2003	7665.14	4.1	nd	331	2.60	40.00	45.00	4.18	1.91	2.33	19.00	9.12	116.40	3.00	5.40	nd	239.55	3685.40	385.12	175.98	214.67
	5/28/2003	6898.73	4.2	nd	301	3.90	22.00	49.10	1.84	1.73	1.40	18.35	8.23	96.45	3.00	11.40	10.20	323.40	1824.30	152.58	143.46	116.09
	6/30/2003	3272.16	3.8	nd	479	0.00	32.00	47.60	1.48	2.91	1.87	27.60	12.40	163.20	4.00	17.10	9.12	0.00	1258.60	58.21	114.45	73.55
	7/28/2003	14043.76	4.5	nd	205	7.60	14.00	45.00	1.34	1.09	0.93	11.70	5.11	57.70	8.00	18.60	9.33	1282.93	2363.28	226.20	184.00	156.99
	Min	1658.36	3.80	nd	205.00	0.00	14.00	45.00	1.34	1.09	0.93	11.70	5.11	57.70	3.00	0.10	9.12	0.00	637.87	58.21	50.43	35.68
	Ave	**6251.63**	**4.30**	**nd**	**332.50**	**4.82**	**30.33**	**48.62**	**3.00**	**2.17**	**1.82**	**21.59**	**9.64**	**116.29**	**4.00**	**8.80**	**10.09**	**387.40**	**1962.41**	**191.91**	**133.82**	**119.95**
	Max	14043.76	4.70	nd	479.00	8.20	42.00	55.00	5.27	2.91	2.57	27.90	12.40	163.20	8.00	18.60	11.70	1282.93	3685.40	385.12	184.00	214.67

Bear Run Upstream of the South Branch Water Quality Samples

Location	Date	Flow	Lab	TDS	Cond	Alk.	Field Acid.	Acid.	Fe	Mn	Al	Ca	Mg	SO4	TSS	Temp	DO	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
		gpm	pH	ppm	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	F	mg/l	lb/day	lb/day	lb/day	lb/day	lb/day
BRS01	7/28/2004	1989.35	6.4	70	123	17.00	nd	0.00	0.47	0.14	0.24	nd	nd	17.00	7.10	56.20	nd	406.50	0.00	11.24	3.35	5.74
	11/10/2004	288.80	5.5	70	113	10.00	nd	2.00	0.10	0.04	0.05	nd	nd	18.00	<5.7	44.90	nd	34.71	6.94	0.35	0.14	0.17
	3/22/2005	1150.58	6.5	80	143	11.00	nd	-1.00	0.24	0.09	0.17	nd	nd	16.00	<5.7	43.00	nd	152.13	-13.83	3.32	1.24	2.35
	11/17/2005	350.60	6.4	90	158	11.00	nd	3.00	0.09	0.05	0.05	nd	nd	20.00	<6.2	49.30	nd	46.36	12.64	0.38	0.21	0.21
	Min	288.80	5.50	70.00	113.00	10.00	nd	-1.00	0.09	0.04	0.05	nd	nd	16.00	<5.7	43.00	nd	34.71	-13.83	0.35	0.14	0.17
	Ave	**944.83**	**6.20**	**77.50**	**134.25**	**12.25**	**nd**	**1.00**	**0.23**	**0.08**	**0.13**	**nd**	**nd**	**17.75**	**nd**	**48.35**	**nd**	**159.93**	**1.44**	**3.82**	**1.24**	**2.12**
	Max	1989.35	6.50	90.00	158.00	17.00	nd	3.00	0.47	0.14	0.24	nd	nd	20.00	7.10	56.20	nd	406.50	12.64	11.24	3.35	5.74
BRS02	12/11/2002	472.54	5.7	nd	122	11.40	6.00	48.40	0.35	0.21	0.50	8.68	2.66	38.80	3.00	2.10	nd	64.75	34.08	2.00	1.19	2.84
	1/21/2003	401.05	5.9	nd	131	9.00	16.00	48.00	0.31	0.22	0.50	8.40	2.58	24.60	3.00	0.50	12.20	43.39	77.13	1.49	1.06	2.41
	4/1/2003	732.36	6.0	nd	136	8.80	6.00	42.60	0.37	0.17	0.50	7.71	2.29	31.90	3.00	6.90	nd	77.47	52.82	3.25	1.50	4.40
	5/27/2003	758.07	6.4	nd	199	9.70	6.00	33.90	0.30	0.16	0.50	10.50	2.37	53.85	9.00	13.30	7.80	88.39	54.67	2.73	1.46	4.56
	6/30/2003	243.52	6.4	nd	143	9.20	6.00	34.20	0.30	0.24	0.50	7.88	2.45	45.40	3.00	15.30	9.39	26.93	17.56	0.88	0.70	1.46
	7/28/2003	1483.33	6.6	nd	126	19.50	8.00	0.00	0.44	0.13	0.50	8.59	2.33	31.50	6.00	17.40	9.38	347.68	142.64	7.85	2.32	8.91
	Min	243.52	5.70	nd	122.00	8.80	6.00	0.00	0.30	0.13	0.50	7.71	2.29	24.60	3.00	0.50	7.80	26.93	17.56	0.88	0.70	1.46
	Ave	**681.81**	**6.17**	**nd**	**142.83**	**11.27**	**8.00**	**34.52**	**0.35**	**0.19**	**0.50**	**8.63**	**2.45**	**37.68**	**4.50**	**9.25**	**9.69**	**108.10**	**63.15**	**3.03**	**1.37**	**4.10**
	Max	1483.33	6.60	nd	199.00	19.50	16.00	48.40	0.44	0.24	0.50	10.50	2.66	53.85	9.00	17.40	12.20	347.68	142.64	7.85	2.32	8.91
BRS03	12/11/2002	690.12	6.2	nd	223	24.00	8.00	1.60	0.30	0.09	0.50	18.60	6.00	72.00	3.00	0.20	nd	199.09	13.27	2.49	0.75	4.15
	1/21/2003	559.25	7.1	nd	238	22.40	12.00	0.00	0.30	0.11	0.50	19.20	6.04	55.10	3.00	0.10	11.50	150.58	0.00	2.02	0.74	3.36
	4/1/2003	1435.58	6.5	nd	202	15.80	6.00	0.00	0.30	0.15	0.59	13.50	4.63	48.60	3.00	7.70	nd	272.64	0.00	5.18	2.59	10.18
	5/27/2003	1022.9	7.0	nd	171	13.40	2.00	0.00	0.30	0.12	0.50	10.40	3.80	32.00	8.00	13.50	8.10	164.76	0.00	3.69	1.48	6.15
	6/30/2003	202.59	7.2	nd	263	25.60	4.00	0.00	0.33	0.09	0.50	17.50	5.63	71.50	10.00	16.40	9.26	62.34	0.00	0.80	0.22	1.22
	7/28/2003	7271.59	6.5	nd	94	12.60	4.00	0.00	0.30	0.09	0.50	6.20	2.32	28.20	3.00	17.90	9.46	1101.30	0.00	26.22	7.87	43.70
	Min	202.59	6.20	nd	94.00	12.60	2.00	0.00	0.30	0.09	0.50	6.20	2.32	28.20	3.00	0.10	8.10	62.34	0.00	0.80	0.22	1.22
	Ave	**1863.67**	**6.75**	**nd**	**198.50**	**18.97**	**6.00**	**0.27**	**0.31**	**0.11**	**0.52**	**14.23**	**4.74**	**51.23**	**5.00**	**9.30**	**9.58**	**325.12**	**2.21**	**6.73**	**2.27**	**11.46**
	Max	7271.59	7.20	nd	263.00	25.60	12.00	1.60	0.33	0.15	0.59	19.20	6.04	72.00	10.00	17.90	11.50	1101.30	13.27	26.22	7.87	43.70
BRD01	8/17/2004	22.89	4.50	120.00	217.00	4.00	nd	16.00	3.69	0.96	1.23	nd	nd	73.00	5.70	60.20	nd	1.10	2.21	9.95	3.22	0.34
	11/28/2005	85.83	4.70	130.00	224.00	5.00	nd	17.00	1.65	0.82	1.60	nd	nd	64.00	8.60	45.80	nd	5.16	2.53	10.63	3.30	1.65
	Ave	54.36	4.60	125.00	220.50	4.50	nd	16.50	2.67	0.89	1.42	nd	nd	68.50	7.15	53.00	nd	3.13	2.37	10.29	3.26	0.99

Bear Run Downstream of the South Branch Water Quality Samples

Location	Date	Flow	Lab	TDS	Cond	Alk.	Field Acid.	Acid.	Fe	Mn	Al	Ca	Mg	SO4	TSS	Temp	DO	Alk Load	Acid Load	Fe Load	Mn Load	Al Load
		gpm	pH	ppm	mS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	F	mg/l	lb/day	lb/day	lb/day	lb/day	lb/day
BRS04	7/21/2004	6554.28	4.4	130	218	2.00	nd	2.00	1.57	1.44	0.77	nd	nd	65.00	7.10	61.10	nd	157.56	157.56	123.69	113.45	60.66
	11/10/2004	8116.73	4.7	130	205	6.00	nd	14.00	2.47	1.59	0.83	nd	nd	76.00	5.70	39.80	nd	585.38	1365.88	240.98	155.13	80.98
	3/22/2005	24907.14	4.8	100	167	5.00	nd	10.00	1.25	0.88	0.81	nd	nd	41.00	5.70	38.10	nd	1496.92	2993.84	374.23	263.46	242.50
	11/17/095	7006.24	4.6	150	254	4.00	nd	12.00	0.90	1.22	0.56	nd	nd	65.00	<6.2	47.30	nd	336.86	1010.58	75.79	102.74	47.16
	Min	6554.28	4.40	100.00	167.00	2.00	nd	2.00	0.90	0.88	0.56	nd	nd	41.00	5.70	38.10	nd	157.56	157.56	75.79	102.74	47.16
	Ave	**11646.10**	**4.63**	**127.50**	**211.00**	**4.25**	**nd**	**9.50**	**1.55**	**1.28**	**0.74**	**nd**	**nd**	**61.75**	**6.17**	**46.58**	**nd**	**644.18**	**1381.97**	**203.67**	**158.69**	**107.83**
	Max	24907.14	4.80	150.00	254.00	6.00	nd	14.00	2.47	1.59	0.83	nd	nd	76.00	7.10	61.10	nd	1496.92	2993.84	374.23	263.46	242.50
BRD02	7/7/2004	5.00	3.0	420	690	0.00	nd	118.00	4.99	1.31	10.70	nd	nd	178.00	<5.7	47.80	nd	0.00	7.09	0.30	0.08	0.64
	11/28/2005	10.00	3.2	350	578	0.00	nd	93.00	4.30	0.78	6.11	nd	nd	94.00	8.60	47.00	nd	0.00	11.18	0.52	0.09	0.73
	Ave	**7.50**	**3.10**	**385.00**	**634.00**	**0.00**	**nd**	**105.50**	**4.65**	**1.05**	**8.41**	**nd**	**nd**	**136.00**	**nd**	**47.40**	**nd**	**0.00**	**9.14**	**0.41**	**0.09**	**0.69**
UNT27036	12/11/2002	1485.71	5.60	nd	107.00	9.60	6.00	17.80	0.30	0.08	0.50	7.54	2.97	36.10	3.00	0.20	nd	171.44	317.88	5.36	1.43	8.93
	1/21/2003	1908.39	5.80	nd	111.00	8.40	6.00	20.80	0.30	0.09	0.50	7.87	3.11	29.25	3.00	0.20	11.40	192.69	477.13	6.88	2.06	11.47
	4/1/2003	4280.61	5.70	nd	124.00	6.80	6.00	11.80	0.30	0.12	0.50	7.32	3.02	32.40	3.00	6.30	nd	349.88	607.14	15.44	6.17	25.73
	5/27/2003	3666.79	6.30	nd	95.00	7.60	4.00	13.60	1.19	1.10	1.65	0.68	0.53	21.90	3.00	13.10	8.50	334.97	599.42	52.45	48.48	72.72
	6/30/2003	848.83	6.30	nd	114.00	9.40	4.00	13.80	0.30	0.07	0.50	6.44	2.50	49.70	6.00	16.60	9.19	95.91	140.80	3.06	0.71	5.10
	7/28/2003	2012.15	6.90	nd	148.00	18.60	4.00	0.00	0.30	0.13	0.50	8.90	3.04	34.90	16.00	18.30	9.46	449.86	0.00	7.26	3.14	12.09
	Min	848.83	5.60	nd	95.00	6.80	4.00	0.00	0.30	0.07	0.50	0.68	0.53	21.90	3.00	0.20	8.50	95.91	0.00	3.06	0.71	5.10
	Ave	**2367.08**	**6.10**	**nd**	**116.50**	**10.07**	**5.00**	**12.97**	**0.45**	**0.27**	**0.69**	**6.46**	**2.53**	**34.04**	**5.67**	**9.12**	**9.64**	**265.79**	**357.06**	**15.07**	**10.33**	**22.67**
	Max	4280.61	6.90	nd	148.00	18.60	6.00	20.80	1.19	1.10	1.65	8.90	3.11	49.70	16.00	18.30	11.40	449.86	607.14	52.45	48.48	72.72
UNT27035	7/21/2004	27.74	5.4	30	64	2.00	nd	7.00	0.34	0.19	0.09	nd	nd	18.00	10.00	62.90	nd	0.67	2.33	0.11	0.06	0.03
	Ave	**27.74**	**5.40**	**30.00**	**64.00**	**2.00**	**nd**	**7.00**	**0.34**	**0.19**	**0.09**	**nd**	**nd**	**18.00**	**10.00**	**62.90**	**nd**	**0.67**	**2.33**	**0.11**	**0.06**	**0.03**
BRD03	7/21/2004	3.00	3.4	180	311	0.00	nd	34.00	2.05	2.74	2.38	nd	nd	71.00	45.70	73.10	nd	0.00	1.23	0.07	0.10	0.09
	12/1/2005	129.03	4.0	160	256	0.00	nd	20.00	0.26	1.66	1.66	nd	nd	59.00	<6.2	42.00	nd	0.00	31.02	0.40	2.57	2.57
	Ave	**66.02**	**3.70**	**170.00**	**283.50**	**0.00**	**nd**	**27.00**	**1.16**	**2.20**	**2.02**	**nd**	**nd**	**65.00**	**45.70**	**57.55**	**nd**	**0.00**	**16.12**	**0.24**	**1.34**	**1.33**
UNT27034	7/21/2004	25.67	4.2	80	151	2.00	nd	14.00	0.07	1.86	0.59	nd	nd	44.00	7.10	64.30	nd	0.62	4.32	0.02	0.57	0.18
	12/1/2005	296.21	4.70	60.00	107.00	5.00	nd	9.00	0.07	0.66	0.30	nd	nd	25.00	<6.2	41.10	nd	17.80	32.04	0.25	2.35	1.07
	Ave	**160.94**	**4.45**	**70.00**	**129.00**	**3.50**	**nd**	**11.50**	**0.07**	**1.26**	**0.45**	**nd**	**nd**	**34.50**	**7.10**	**52.70**	**nd**	**9.21**	**18.18**	**0.14**	**1.46**	**0.63**

BRD04	7/28/2004	43.80	5.9	190	338	7.00	nd	7.00	0.63	5.38	1.59	nd	nd	133.00	10.00	66.70	nd	3.69	3.69	0.33	2.83	0.84
	12/1/2005	23.94	6.1	120	191	7.00	nd	6.00	0.15	1.40	0.41	nd	nd	52.00	<6.2	40.30	nd	2.01	1.73	0.04	0.40	0.12
	Ave	**33.87**	**6.00**	**155.00**	**264.50**	**7.00**	nd	**6.50**	**0.39**	**3.39**	**1.00**	nd	nd	**92.50**	**10.00**	**53.50**	nd	**2.85**	**2.71**	**0.19**	**1.62**	**0.48**
BRD05	7/21/2004	31.77	5.1	600	1120	6.00	nd	56.00	18.80	22.10	0.08	nd	nd	512.00	11.40	69.20	nd	2.29	21.39	7.18	8.44	0.03
	12/1/2005	10.00	6.8	230	357	27.00	nd	-15.00	0.12	0.27	0.05	nd	nd	110.00	<6.2	41.40	nd	3.25	-1.80	0.01	0.03	0.01
	Ave	**20.89**	**5.95**	**415.00**	**738.50**	**16.50**	**nd**	**20.50**	**9.46**	**11.19**	**0.07**	**nd**	**nd**	**311.00**	**11.40**	**55.30**	**nd**	**2.77**	**9.79**	**3.60**	**4.24**	**0.02**
BRD06	7/21/2004	35.59	3.5	400	781	0.00	nd	40.00	1.52	11.50	1.03	nd	nd	300.00	5.70	62.40	nd	0.00	17.11	0.65	4.92	0.44
BRD07	7/21/2004	40.39	4.0	300	521	4.00	nd	17.00	0.23	7.84	0.91	nd	nd	212.00	<5.70	84.30	nd	1.94	8.25	0.11	3.81	0.44
	12/1/2005	20.64	6.3	220	355	11.00	nd	3.00	0.62	4.76	0.29	nd	nd	120.00	<6.2	37.80	nd	2.73	0.74	0.15	1.18	0.07
	Ave	**30.52**	**5.15**	**260.00**	**438.00**	**7.50**	**nd**	**10.00**	**0.43**	**6.30**	**0.60**	**nd**	**nd**	**166.00**	**nd**	**61.05**	**nd**	**2.34**	**4.50**	**0.13**	**2.49**	**0.26**
BRD08	7/21/2004	70.55	5.1	170	285	5.00	nd	6.00	0.36	2.39	0.56	nd	nd	99.00	7.10	74.40	nd	4.24	5.09	0.31	2.03	0.47
	12/1/2005	472.12	5.5	50	90	6.00	nd	6.00	0.17	0.37	0.21	nd	nd	23.00	7.10	40.30	nd	34.05	34.05	0.96	2.10	1.19
	Ave	**271.34**	**5.30**	**110.00**	**187.50**	**5.50**	**nd**	**6.00**	**0.27**	**1.38**	**0.39**	**nd**	**nd**	**61.00**	**7.10**	**57.35**	**nd**	**19.14**	**19.57**	**0.64**	**2.06**	**0.83**
UNT27033	12/11/2002	384.31	6.3	nd	372	32.00	8.00	0.00	0.30	0.05	0.50	36.60	10.90	139.60	4.00	0.40	nd	147.82	0.00	1.39	0.23	2.31
	1/21/2003	324.08	7.2	nd	399	29.00	8.00	0.00	0.30	0.05	0.50	41.40	12.20	149.00	3.00	0.20	11.70	112.97	0.00	1.17	0.19	1.95
	4/1/2003	577.52	6.7	nd	381	26.20	6.00	0.00	0.30	0.05	0.50	32.40	9.68	122.60	3.00	3.30	nd	181.87	0.00	2.08	0.35	3.47
	5/27/2003	553.1	7.4	nd	296	29.40	2.00	0.00	0.30	0.05	0.50	25.70	7.71	68.70	16.00	13.30	8.00	195.46	0.00	1.99	0.33	3.32
	7/1/2003	92.09	7.4	nd	447	43.00	6.00	0.00	0.40	0.11	0.50	36.10	10.60	145.20	3.00	14.50	9.30	47.60	0.00	0.44	0.12	0.55
	7/28/2003	997.01	7.3	nd	261	39.40	6.00	0.00	0.30	0.05	0.50	23.20	6.66	65.10	14.00	18.20	9.36	472.17	0.00	3.60	0.60	5.99
	Min	92.09	6.30	nd	261.00	26.20	2.00	0.00	0.30	0.05	0.50	23.20	6.66	65.10	3.00	0.20	8.00	47.60	0.00	0.44	0.12	0.55
	Ave	**488.02**	**7.05**	**nd**	**359.33**	**33.17**	**6.00**	**0.00**	**0.32**	**0.06**	**0.50**	**32.57**	**9.63**	**115.03**	**7.17**	**8.32**	**9.59**	**192.98**	**0.00**	**1.78**	**0.30**	**2.93**
	Max	997.01	7.40	nd	447.00	43.00	8.00	0.00	0.40	0.11	0.50	41.40	12.20	149.00	16.00	18.20	11.70	472.17	0.00	3.60	0.60	5.99
BRS5	7/16/2002	2643.88	3.9	nd	503	0.00	36.00	nd	1.58	5.22	2.76	46.50	21.30	225.00	2.00	19.90	5.37	0.00	nd	50.21	165.89	87.71
	12/11/2002	5247.46	5.1	nd	271	8.20	18.00	50.00	2.91	1.89	1.02	21.50	8.91	100.20	6.00	0.70	nd	517.21	1135.34	183.55	119.21	64.34
	12/11/2002	5247.46	5.0	nd	271	8.20	18.00	42.60	2.96	1.92	1.02	21.80	9.09	104.80	4.00	0.70	nd	517.21	1135.34	186.70	121.10	64.34
	1/21/2003	6118.00	5.0	nd	291	8.20	26.00	36.80	3.32	2.07	1.47	23.60	9.87	102.90	3.00	0.10	10.70	603.01	1912.00	244.15	152.22	108.10
	4/1/2003	12547.82	4.7	nd	263	6.20	22.00	34.30	1.96	1.40	1.35	16.75	7.60	85.50	3.00	2.20	nd	935.11	3318.15	295.62	211.15	203.61
	5/27/2003	13887.85	4.9	nd	215	5.80	12.00	33.60	1.08	1.14	0.75	14.40	6.29	51.30	3.00	14.60	8.70	968.21	2003.18	180.29	190.30	125.20
	7/1/2003	3963.17	4.4	nd	374	5.20	16.00	58.60	0.82	2.33	1.22	24.00	10.50	131.50	3.00	14.80	9.29	247.71	762.20	39.06	110.99	58.12
	7/28/2003	23583.09	5.7	nd	165	9.60	8.00	47.00	1.09	0.73	0.61	11.30	4.57	40.40	16.00	19.00	9.29	2721.30	2267.75	308.98	206.93	172.92
	12/5/2005	nd	5.7		165	5.00	nd	-1.00	1.13	0.77	0.43	nd	nd	50.00	<6.2		nd	nd	nd	nd	nd	nd
	Min	2643.88	3.90	nd	165.00	0.00	8.00	-1.00	0.82	0.73	0.43	11.30	4.57	40.40	2.00	0.10	5.37	0.00	762.20	39.06	110.99	58.12

	Ave	**9154.84**	**4.93**	**nd**	**279.78**	**6.27**	**19.50**	**37.74**	**1.87**	**1.94**	**1.18**	**22.48**	**9.77**	**99.07**	**5.00**	**9.00**	**8.67**	**813.72**	**1790.56**	**186.07**	**159.73**	**110.54**
	Max	23583.09	5.70	nd	503.00	9.60	36.00	58.60	3.32	5.22	2.76	46.50	21.30	225.00	16.00	19.90	10.70	2721.30	3318.15	308.98	211.15	203.61

Appendix C

Bear Run Macroinvertebrate Study

Macroinvertebrates were collected on December 22nd, 2005 at five of the stream stations in the Bear Run watershed, SBS01 (South Branch upstream of the Johnstown Coal and Coke property, i.e. the South Branch control), SBS07 (mouth of the South Branch), BRS03 (Bear Run upstream of the South Branch, i.e. the Bear Run control), BRS04 (Bear Run downstream of the South Branch), BRS05 (mouth of Bear Run).

Naturally, BRS03 had the best population with 12.7 macroinvertebrates collected per square foot consisting of nine different taxa, eight of which from the Ephemeroptera (Mayfly), Plecoptera (Stonefly) or Tricoptera (Caddisfly) Orders, generally considered the most pollution sensitive.

SBS01 was the next best as expected. We collected 4.0 macroinvertebrates per square foot consisting of seven different taxa, four of which from the EPT Orders. We expected SBS01 to have a very similar population to BRS03, however, the quality of the habitat was not as great due to the embeddedness of the rocks at SBS01 from sedimentation more than likely originating from upstream agricultural lands.

The population at SBS07 was substantially reduced due to the heavy AMD loading entering the South Branch upstream. We only collected 1.3 macroinvertebrates per square foot consisting of three different taxa, two of them from the Tricoptera Order. Comparing these results to the control (SBS01), there is a nearly 68% reduction in total macroinvertebrate individuals and a 67% reduction in the amount of taxa.

The population at BRS04 was substantially reduced due to the heavy AMD loading entering Bear Run from the South Branch. We only collected 1.5 macroinvertebrates per square foot consisting of four different taxa, two of which from the EPT Orders. Comparing these

results to the control (BRS03), there is a 88% reduction in the total macroinvertebrate individuals and a 56% reduction in the amount of taxa.

We were surprised at the lack of macroinvertebrates collected at BRS05 since Bear Run is not impacted by much pollution downstream of its confluence with the South Branch. Only one unknown from the Plecoptera Order was collected. We think this may be due to the lack of recolonization. Consequently, upon the restoration of the South Branch, this area may be slow to improve in terms of macroinvertebrates.

Location	Taxa	#	Location	Taxa	#
SBS01	Tipulidae	1	BRS04	Tipulidae	1
	Oligochaeta	1		Hydropsychidae	2
	Leuctridae	2		Chironomidae	1
	Baetidae	2		Unknown Stonefly	2
	Dytiscidae	1		**Total Individuals**	**6**
	Decapoda (Crayfish)	1		**Total Taxa**	**4**
	Unknown Stonefly	4	BRS05	Unknown Stonefly	1
	Total Individuals	**12**		**Total Individuals**	**1**
	Total Taxa	**7**		**Total Taxa**	**1**
SBS07	Hydropsychidae	1			
	Chironomidae	2			
	Unknown Caddisfly Case	1			
	Total Individuals	**4**			
	Total Taxa	**3**			
BRS03	Heptageniidae	5			
	Hydropsychidae	6			
	Philopotamidae	3			
	Perlidae	4			
	Perlodidae	3			
	Leuctridae	1			
	Ephemerellidae	2			
	Chironomidae	1			
	Unknown Stonefly	13			
	Total Individuals	**38**			
	Total Taxa	**9**			

Appendix D

Instruction for Installation of Mine Belt Roadway Diversions

Controlling runoff from unimproved roads can be a challenge. Road traffic during wet conditions can destroy waterbars and the road crown. Open top culverts can clog with sediments and require regular maintenance. Soon the road surface is rutted and impassable as the uncontrolled runoff is carrying road material downhill.

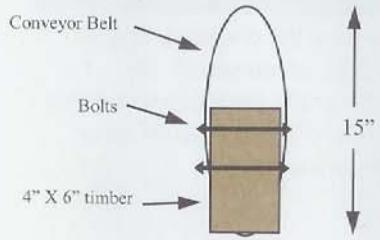
The conveyor belt diversion can control this runoff by diverting water from the road surface while still permitting vehicles to easily pass. The belt diversion gives under tire pressure then springs back to its original position. Unlike waterbars the belt diversion will remain stable during wet road conditions and will still function when the road crown is lost provided that the belt diversions are properly spaced.

Recommended Spacing

Road Grade	Distance
2%	250 ft.
5%	135 ft.
10%	80 ft.
15%	60 ft.

Alternative Assembly Method

Conveyor belts thicker than 1/2" are used so that the diversion will return to an upright position after being compressed. If thinner belts are used the following assembly method should be considered.



Determining Road Grade

Grade = R/L times 100

Acknowledgements

PC Exploration Inc. Warrendale, PA. For providing equipment and labor to install the diversions.

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Prepared by Indiana County Conservation District

Conveyor Belt Diversions

An easy to install solution to your road stability problems.

A drivable solution that controls runoff.

Assembling the Diversion

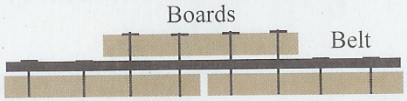
Materials

Conveyor Belt
1/2"X15"X20'
Rot resistant boards
(3) 2"X6"X10'
Stove bolts, washers and nuts
(12) 5/16" dia. 4" long

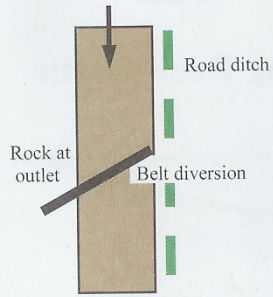
Tools

Utility Knife (sharp)
Drill
Hammer
Wrench

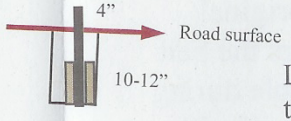
A Closer Look



Make sure the diversion slopes downhill, minimum of 3%. Discharge the diversion to a stable area that will carry runoff away from the road.



Use as narrow a bucket as possible. Depth of the channel should be 10 –12". Stop short of the road ditch.



Place the diversion at the down slope side of the trench and tilt the diversion uphill. Leave 4" of the belt exposed.

Large stones placed at the end of the diversion will control erosion at the road's edge.

Installing the Diversion

Compact the trench fill

Appendix E

The Bear Run Watershed Total Maximum Daily Load Study

Literature Cited

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