IMPLEMENTATION PLAN
FOR
MONTGOMERY CREEK

CLEARFIELD COUNTY, PENNSYLVANIA

PREPARED FOR:

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EXECUTIVE SUMMARY

This implementation plan has been developed for Montgomery Creek, a tributary to the West Branch Susquehanna River, Clearfield County, Pennsylvania. Although the headwaters are virtually un-impacted, extensive surface mining and some deep mining have occurred in the lower reaches of the watershed, leading to the abandoned mine drainage (AMD) impacts that are apparent in the watershed today. Due to the history of mining within the watershed, Montgomery Creek contributes a substantial pollutant load of metals and acidity to the West Branch Susquehanna River.

The Montgomery Run Watershed Association, in conjunction with the Lawrence Township Board of Supervisors, the Clearfield County Conservation District and Clearfield County Senior Environment Corps, recently completed a yearlong stream assessment project on the portion of Montgomery Creek below the Clearfield Reservoir. This assessment and a number of related studies, such as the Montgomery Creek Total Maximum Daily Load (TMDL) completed for the PA Department of Environmental Protection (DEP) in 2003, form the basis for this implementation plan.

The primary pollutant source in the watershed is AMD that originates from past surface and deep mines in the portion of the creek below the Clearfield Reservoir. Mined areas to the east of the stream segment studied seem to produce tributaries with the poorest water quality. In fact, one unnamed tributary has been dubbed the "Killer Trib" because of its impact to the main stem of Montgomery Creek. A Growing Greener grant application has already been submitted for the design and permitting phase of a project to remediate the MON 52A discharge in the headwaters of the Killer Trib. There are at least ten other priority areas to be addressed in the watershed before Montgomery Creek can be considered restored.

This implementation plan prioritizes the major AMD pollution sources in the watershed and establishes the best course of action to remediate those sites. A conceptual design is included for each treatment system that is needed to address a particular source of pollution to the watershed and also help to meet the TMDL guidelines that have been set forth. This plan also discusses any further studies that need to be conducted and makes other recommendations for the protection and restoration of the watershed. This plan also lays out a course of action for continued monitoring of water quality and evaluation and documentation of restoration successes.

1.0 BACKGROUND

The Montgomery Creek watershed is located in Clearfield County, Pennsylvania. A watershed location map is located in Appendix A. Montgomery Creek is known locally as Montgomery Run, hence, the name of the local watershed group, Montgomery Run Watershed Association. The watershed lies within Pike, Pine and Lawrence Townships and in the town of Hyde. The headwaters are located in the Moshannon State Forest, and Montgomery Creek flows from there toward the southeast, entering the West Branch Susquehanna River at Hyde.

The Montgomery Creek watershed is impaired by abandoned mine drainage (AMD) in its lower reaches. The encouraging news is that above the Clearfield Reservoir, the watershed is virtually untouched. Water quality is such that it still supports a native brook trout fishery and Clearfield Borough and surrounding areas use the creek as their primary source of drinking water. The reservoir is maintained by the Clearfield Municipal Authority, which serves approximately 15,000 customers. The main pollutant loadings in Montgomery Creek consist of iron, aluminum, and acidity; however, even in impaired sections, macroinvertebrate populations were noted and could potentially repopulate the stream once water quality is improved.

Montgomery Creek is listed on Pennsylvania's 2006 Integrated List of All Waters. It appears that it was first listed on the 303(d) list in 1996. A TMDL was completed on the stream and approved by EPA in April 2003; however, the stream is not yet attaining its designated use. For this reason, the stream can be found in Category 4a of the Integrated List. The stream is listed because of impairments due to AMD, including acidity and metals such as iron, manganese, and aluminum.

This implementation plan has been developed for the restoration of Montgomery Creek. As stated above, the watershed has been extensively mined in the area below Clearfield Reservoir resulting in a higher pollutant loading of acidity and metals reaching the West Branch Susquehanna River.

1.1 Watershed Characteristics

The Montgomery Creek watershed encompasses a drainage area of 16.5 square miles. A watershed boundary map is provided in Appendix A.

1.1.1 Topography and Land Use

According to the USGS 7.5-minute quadrangle topographic maps of Elliot Park and Clearfield, elevations within the Montgomery Creek watershed range from 1115 feet to 2360 feet above mean sea level. Site topography is provided on the Watershed Boundary Map located in Appendix A. Moderate to steep slopes exist along the hillsides above the Clearfield Reservoir while the topography is more gently sloping along the main stream corridor below the reservoir.

Much of the watershed above the Clearfield Reservoir is within the Moshannon State Forest. The area is very remote, and aside from a few camps and Bureau of Forestry roads, there is little human impact to the watershed. The remainder of the watershed below the reservoir is a combination of forested land, abandoned and reclaimed mine lands, and residential areas. The town of Hyde, near the mouth, is the major population center in the watershed.

1.1.2 Geology

The Montgomery Creek watershed and most of Clearfield County are located in the Pittsburgh Low Plateaus Section of the Appalachian Plateaus physiographic province. Underlying rock formations of the watershed include the Allegheny and Pottsville Groups, as well as, the Burgoon Sandstone and Huntley Mountain Formation. Most of the mining that has occurred in the lower reaches of the watershed has been of the Lower and Middle Kittanning coal seams, some of the Upper Kittanning seam, and some of the underclays. According to the Soil Survey of Clearfield County, PA, general soils in the Montgomery Creek watershed range from the Rayne-Gilpin-Ernest association in the lower reaches of the watershed to the Hazleton-Dekalb association in the middle section of the watershed to the Cookport-Hazleton-Clymer association in the headwaters. In areas where surface mining has occurred, mainly to the southeast of the Clearfield Reservoir, there are areas of Udorthents shale that consist of overburden that was stripped from beds of clay and coal, as well as, backfill material. A soils map can be found in Appendix A. Groundwater contamination is common in this area of the watershed, affecting the stream through natural recharge processes.

1.1.3 Surface Water Resources and Wetlands

The headwaters of Montgomery Run begin in the Moshannon State Forest just south of SR 322 on Rockton Mountain. The stream then flows in a southeastern direction until its confluence with the West Branch Susquehanna River at Hyde. Montgomery Creek has four main tributaries that feed into the stream above Clearfield Reservoir. They are as follows from west to east: Tinker Run, Horn Shanty Branch, West Branch, and North Branch. Below the reservoir the stream is fed by a number of unnamed tributaries, the last of which enters the stream 1.2 miles upstream of the mouth near the bridge on Coal Hill Road.

Most of the wetlands that are found within the watershed are located in the riparian zone along Montgomery Creek and its tributaries. Several small wetland areas are actually formed by acid mine drainage seeps. These degraded wetlands were found along several tributaries in the watershed, most notably along the “Killer Trib.” A map showing the wetlands recognized by the National Wetland Inventory (NWI) can be found in Appendix A.

1.2 Mining History

It should be noted that a search conducted by the U.S. Department of the Interior, Office of Surface Mining, found no recorded deep mines within the Montgomery Creek watershed. Deep mines were, however, noted in DEP surface mining permit files for the watershed. Most of the deep mining in the watershed was probably completed before official records were kept and/or were small drift mines that provided coal for household or other local uses. This deep mining, which took place in the early part of the 20th century, initially impacted the Montgomery Creek watershed. Additional damage caused by pre-Act surface mining in the forties and fifties left the area with severe water quality problems and numerous abandoned mine lands (AML). The AML that affect the Montgomery Creek watershed are apparent on the map provided in Appendix A. Subsequent remining under stricter environmental regulations brought improvements to the area but, unfortunately, the entire area was not re-mined and restored due to economically irretrievable coal in some areas. Thus, mine drainage discharges continue to cause impairment to the Montgomery Creek watershed.

Fortunately, the mining that has occurred and continues to occur within the watershed is limited to that area below the Clearfield Reservoir due to lack of coal in the upper portions of the watershed. Above the reservoir, the North Branch of Montgomery Creek is the only tributary with impacts to water quality due to past mining practices. The entire watershed above the reservoir has since been designated as unsuitable for mining.

1.3 Prior Studies

A Total Maximum Daily Load (TMDL) study was completed on the Montgomery Creek Watershed in 2003 for the PA Department of Environmental Protection (DEP). Specific load reductions that are necessary for Montgomery Creek to meet the TMDL guidelines were reported in the resulting document and will be discussed in greater detail in this Implementation Plan.

Canaan Valley Institute collected water quality and biological data in the section of Montgomery Creek above Clearfield Reservoir as part of the development of the Clearfield County Water Supply Plan. This study showed that for the most part, the various branches of Montgomery Creek are meeting state water quality standards in regards to pollution with the exception being the North Branch of Montgomery Creek, which is impacted by AMD. The instream habitat of Montgomery Creek above the reservoir was noted as being particularly good, while the macroinvertebrate community was noted as being low to fair due to the depressed pH.

The Susquehanna River Basin Commission (SRBC) completed an Unassessed Waters Survey for the DEP in 1998-99. The results of this survey showed that the main stem of Montgomery Creek below the Clearfield Reservoir and many of its unnamed tributaries are not meeting their designated uses for aquatic life due mainly to impairment of water quality by AMD, as the habitat assessment portion of the study indicated that suitable habitat does exist. According to the PA Code, Title 25, Chapter 93 Water Quality

Standards, Montgomery Creek from its source to the Clearfield Reservoir is classified as a high quality cold water fishery (HQ-CWF), while downstream of the reservoir, the watershed is classified as a cold water fishery (CWF).

In the past, other studies have been conducted by various agencies to assess the biological health and water quality of Montgomery Creek (Bisko 1994, Pennsylvania Fish Commission 1970). They have shown that Montgomery Creek was once able to support aquatic life, as the Fish Commission stocked it with fingerling brook trout from 1932 to 1957, when stocking ceased due to AMD impairment. At the request of the Lawrence Township Supervisors, the Fish Commission performed a study of the stream in 1970 and found that it was still too polluted by AMD to recommence a stocking program.

2.0 IDENTIFICATION OF POLLUTION SOURCES

Pollution sources in the Montgomery Creek watershed were identified during the yearlong assessment that was conducted by the project partners including the Clearfield County Conservation District (CCCD), Montgomery Run Watershed Association (MRWA), Clearfield County Senior Environment Corps (CCSEC), and Lawrence Township Board of Supervisors (Township). The information collected during this assessment, as well as, other applicable TMDL and stream data, and water quality standards will be outlined in the following paragraphs.

2.1 Total Maximum Daily Loads and Other Watershed Problems

As stated before, acid mine drainage (AMD) is the greatest source of pollution in the Montgomery Creek watershed. It is also possible that acid deposition may contribute to the high levels of acidity and depressed pH that are found in the stream, as this is the case in many neighboring watersheds including Lick Run, Trout Run, Deer Creek, and Mosquito Creek. Other pollution problems in the watershed such as excess sediment and nutrients seem to have minimal impacts to the watershed.

TMDLs for the Montgomery Creek watershed were developed as part of the *Montgomery Creek Watershed TMDL* that was prepared for the DEP in 2003. TMDL criteria for this document are provided in Section 3 of this narrative. The watershed assessment that was completed by the Project Partners divided the stream into reaches that mirrored those found in the TMDL document. All sampling data, from both the recent assessment and mining permit data, were analyzed as they relate to the appropriate TMDL segment.

The following is a description of each sampling location that was monitored during the assessment of Montgomery Creek. A map of these sampling locations can be found in Appendix A. At each location, flow values were collected and water samples were analyzed for pH, conductivity, acidity, aluminum, iron, manganese, sulfates, total dissolved solids, and total suspended solids. Discharges and most tributaries were sampled on a monthly basis while main stem locations were sampled only quarterly. For some points, denoted by an asterisk (*), the project partners relied on water chemistry data acquired from mining permits in the area. However, these reports are often lacking analysis for aluminum. The water chemistry data and loadings for each sampling location can be found in Appendix B. Water quality data found through mining permit research can be found in Appendix C.

2.1.1 Sample Locations and Descriptions

The following discharges and instream sampling points are organized according to the TMDL section in which they are located. The tributaries that flow into the main stem of Montgomery Creek below Clearfield Reservoir are all unnamed and so the samplers arbitrarily named them for ease of reference. A map can be found in Appendix A that shows the location and name of each tributary. Another map showing the TMDL sample points in relation to the assessment sample points can also be found in Appendix A.

Montgomery Creek above TMDL point MC6

No samples were taken above this point as this is the inlet for Clearfield Reservoir and the stream is not listed as impaired above this point. There are two mining impacts noted in the section above MC6, one on Tinker Run and one to the North Branch Montgomery Creek, however, they are not severe enough to degrade the stream quality above MC6.

Unnamed Tributary to Montgomery Creek above MT5

MON 30 – This is a discharge that forms an iron mat and emanates in a field below a reclaimed surface mine. It then joins with several small tributaries to form the headwaters of the unnamed tributary (Plant Trib) to Montgomery Creek. This is also known as the Charlie's Weir discharge. Average flow was 14 gpm (much higher in storm events), and the average pH was 3.5. On average, the loading values were as follows: 9 lbs/day of acid, <1 lb/day of iron and manganese, and 2 lbs/day of aluminum.

MON 31* – This is an instream sample of the unnamed tributary (Plant Trib) to Montgomery Creek that is associated with the Sky Haven Coal Company "Otto #1" surface mining operation (4574SM33, MP 3).

MON 32 – This is the upper of two discharges that begin along 104th Cavalry Road (T-507) and flow to the unnamed trib (Plant Trib) to Montgomery Creek. It was dry for half of the yearlong sampling period, so the following loading values are based off of 6 months of data. Average flow was 26 gpm, and the average pH was 3.9. On average, the loading values were as follows: 21 lbs/day of acid, <1 lb/day of iron, 1 lb/day of manganese, and 6 lbs/day of aluminum.

MON 33 – This is the lower of two discharges that begin along 104th Cavalry Road (T-507) and flow to the unnamed tributary (Plant Trib) to Montgomery Creek. It was flowing only 3 times over the course of the yearlong sample period, and the following loading values are based off of those three sampling events. Average flow was 5 gpm, and the average pH was 4.5. On average the loading values were as follows: <1 lb/day each of acid, iron, manganese, and aluminum.

Montgomery Creek between MC6 and MC5

MON 29A – This is an instream sample of an unnamed tributary to Montgomery Creek that enters the main stem just downstream and on the opposite side as the Plant Trib (TMDL point MT5). Average flow was 22 gpm, and the average pH was 4.1. On average this tributary contributes 10 lbs/day of acid, <1 lb/day of iron, 1 lb/day of manganese, and 2 lbs/day of aluminum to the main stem of Montgomery Creek.

MON 34 – This is an instream sample of the mouth of the unnamed tributary (Plant Trib) to Montgomery Creek. It corresponds to TMDL point MT5. Average flow was 488 gpm, and the average pH was 4.2. On average this tributary contributes 133 lbs/day of acid, 2 lbs/day of iron, 8 lbs/day of manganese, and 14 lbs/day of aluminum to the main stem of

Montgomery Creek. Additional data for this point was collected in association with the Sky Haven Coal Company "Otto #1" surface mining operation (4574SM33, MP 5).

MON 35 – This is an instream sampling point that was taken in the main stem of Montgomery Creek just upstream of the confluence with the Plant Trib (TMDL point MT5). This point is below the Clearfield Reservoir and above most of the mining impacts. Average flow at this site was 10,075 gpm. The stream is net acid at this point with the following loading values: 1174 lbs/day of acid, 2 lbs/day of iron, 7 lbs/day of manganese, and 13 lbs/day of aluminum. The average pH at this point was 5.3. Data was also collected for this point in association with the Sky Haven Coal Company "Otto #1" surface mining operation (4574SM33, MP 35).

Unnamed Tributary to Montgomery Creek above MT4

No sampling took place above this point. A sampling point was located at the mouth of this unnamed tributary (MON 43) and is discussed in the next paragraph.

Montgomery Creek between MC5 and MC4

MON 25 – This is an instream sample point that was taken at the mouth of a small, unnamed tributary (Camp Trib) to Montgomery Creek that enters from the left bank behind a hunting camp along 104th Cavalry Road (T-507). This tributary is net acid. Average flow is 73 gpm, and the average pH was 4.0. This tributary contributes 29 lbs/day of acidity, <1 lb/day of iron, 6 lbs/day of manganese, and 4 lbs/day of aluminum to Montgomery Creek. Additional water quality data was found in association with S.R.P. Coal Company (now Sky Haven) "McPherson" surface mining operation (17820141, MP 4).

MON 26* – This is a seep that flows to an unnamed tributary to Montgomery Creek and is associated with the S.R.P. Coal Company (Sky Haven) "McPherson" surface mining operation (17820141, MP 28).

MON 27* – This is a seep that flows to an unnamed tributary to Montgomery Creek and is associated with the S.R.P. Coal Company (Sky Haven) "McPherson" surface mining operation (17820141, MP 18A).

MON 28* – This is an instream sample located in the headwaters of the unnamed tributary to Montgomery Creek and is associated with the S.R.P. Coal Company (Sky Haven) "McPherson" surface mining operation (17820141, MP 18).

MON 39 – This is an instream sample point that was taken in the main stem of Montgomery Creek just upstream of the confluence with the unnamed tributaries Camp Trib and Killer Trib (MT3). This point corresponds to TMDL point MC4. Average stream flow at this point was 10,372 gpm. The stream is net acid at this point with the following loading values: 1502 lbs/day of acid, 12 lbs/day of iron, 71 lbs/day of manganese, and 65 lbs/day of aluminum. The average pH at this point was 4.9. Data for

this point was also collected in association with the Sky Haven Coal Company "Otto #1" surface mining operation (4574SM33, MP 7).

MON 43 – This is an instream sample point that was taken at the mouth of a small, unnamed tributary to Montgomery Creek downstream and on the same side as the Plant Trib. This point corresponds to TMDL point MT4. This tributary is net acid. Average flow is 29 gpm, and the average pH is 3.8. This tributary contributes 20 lbs/day of acidity, <1 lb/day of iron, 2 lbs/day of manganese, and 4 lbs/day of aluminum to Montgomery Creek. Data for this point was also collected as part of the Sky Haven Coal Company "Otto #1" surface mining operation (4574SM33, MP17).

Unnamed tributary to Montgomery Creek above MT3A

MON 46* – This is an instream sample of the left branch of the unnamed tributary (Killer Trib) to Montgomery Creek that is associated with the Sky Haven Coal Company "Kramer #1" surface mining operation (17713099, MP 11).

MON 47* – This is a sample of a seep to the left branch of the unnamed tributary (Killer Trib) to Montgomery Creek that is associated with the Sky Haven Coal Company "Kramer #1" surface mining operation (Permit #17713099, MP 18).

MON 53* – This is an instream sample of the right branch of the unnamed tributary (Killer Trib) of Montgomery Creek above a couple of small seeps (MON 54 & 55). This sample is associated with the Kenneth K. Rishel & Son, Inc. "Moore" surface mining operation (17030113, MP 4).

MON 54* – This is a sample of seepage from an impoundment that flows to the right branch of the unnamed tributary (Killer Trib) to Montgomery Creek and is associated with the Kenneth K. Rishel & Son, Inc. "Moore" surface mining operation (17030113, MP 8).

MON 55* – This is a sample of a seep that flows to the right branch of the unnamed tributary (Killer Trib) to Montgomery Creek and is associated with the Kenneth K. Rishel & Son, Inc. "Moore" surface mining operation (17030113, MP 9).

MON 56* – This is a sample of the right branch of the unnamed tributary (Killer Trib) to Montgomery Creek above a wetland area. It is associated with the Kenneth K. Rishel & Son, Inc "Moore" surface mining operation (17030113, MP 22).

MON 57* – This is an instream sample of the right branch of the unnamed tributary (Killer Trib) to Montgomery Creek below a wetland area. It is associated with the Kenneth K. Rishel & Son, Inc. "Moore" surface mining operation (17030113, MP 10).

MON 58* – This is a sample of a seep that flows to the right branch of the unnamed tributary (Killer Trib) to Montgomery Creek and is associated with the Kenneth K. Rishel & Son, Inc. "Moore" surface mining operation (17030113, MP 11).

MON 59* - This is a sample of a seep that flows to the right branch of the unnamed tributary (Killer Trib) to Montgomery Creek and is associated with the Kenneth K. Rishel & Son, Inc. "Moore" surface mining operation (17030113, MP 7).

Unnamed tributary to Montgomery Creek above MT3B

MON 36* – This is an instream sample of the left branch of the unnamed tributary (Killer Trib) to Montgomery Creek and is associated with the Sky Haven "Otto #1" surface mining operation (4574SM33, MP 1).

MON 37* – This is a sample of a spring that flows to the left branch of the unnamed tributary (Killer Trib) to Montgomery Creek and is associated with the Sky Haven Coal "Otto #1" surface mining operation (4574SM33, MP 2).

MON 60* – This is a sample of a seep that flows to the left branch of the unnamed tributary (Killer Trib) to Montgomery Creek and is associated with the Kenneth K. Rishel & Son, Inc. "Moore" surface mining operation (17030113, MP 19).

MON 61* – This is a sample of a seep that flows to the left branch of the unnamed tributary (Killer Trib) to Montgomery Creek and is associated with the Kenneth K. Rishel & Son, Inc. "Moore" surface mining operation (17030113, MP 20).

MON 62* – This is a sample of a seep that is affected by a spring that flows into the left branch of the unnamed tributary (Killer Trib) to Montgomery Creek. It is associated with the Kenneth K. Rishel & Son, Inc. "Moore" surface mining operation (17030113, MP 14).

MON 63* – This is a sample of a seep that flows into the left branch of the unnamed tributary (Killer Trib) to Montgomery Creek. It is associated with the Kenneth K. Rishel & Son, Inc. "Moore" surface mining operation (17030113, MP 15).

MON 64* – This is a sample of a spring that is affected by a seep and flows to the left branch of the unnamed tributary (Killer Trib) to Montgomery Creek. It is associated with the Kenneth K. Rishel & Son, Inc. "Moore" surface mining operation (17030113, MP 13).

MON 65* – This is an instream sample of the left branch of the unnamed tributary (Killer Trib) to Montgomery Creek that is associated with the Kenneth K. Rishel & Son, Inc. "Moore" surface mining operation (17030113, MP 12).

MON 66* – This is an instream sample of the left branch of the unnamed tributary (Killer Trib) to Montgomery Creek above the crossing of T-506. It is sampled in association with the Kenneth K. Rishel & Son, Inc. "Moore" surface mining operation (17030113, MP 16).

Mine Discharge 7 (D7)

MON 40 – This is a sample of the lowest in elevation of three deep mine discharges that emanate from a hillside and enter the unnamed tributary (Killer Trib) to Montgomery Creek just upstream from the confluence with Montgomery Creek on the east side of 104th Cavalry Road (T-507). It flows year round. Average flow is 196 gpm, and the average pH is 3.7. This discharge is net acid. On average, it contributes 437 lbs/day of acid, 3 lbs/day of iron, 90 lbs/day of manganese, and 61 lbs/day of aluminum to the unnamed tributary to Montgomery Creek (Killer Trib). Data was also collected for this point in association with the Sky Haven Coal "Otto #1" surface mining operation (4574SM33, MP 11).

Mine Discharge 8 (D8)

MON 41 – This is a sample of the middle of three deep mine discharges that emanate from a hillside and enter the unnamed tributary (Killer Trib) to Montgomery Creek just upstream from the mouth on the east side of 104th Cavalry Road (T-507). It flows year round. Average flow is 78 gpm, and the average pH is 3.7. This discharge is net acid. On average, it contributes 167 lbs/day of acid, <1 lb/day of iron, 35 lbs/day of manganese, and 20 lbs/day of aluminum to the unnamed tributary (Killer Trib) to Montgomery Creek. Data was also collected for this point in association with the Sky Haven Coal "Otto #1" surface mining operation (4574SM33, MP 12).

Unnamed tributary to Montgomery Creek between the confluence of MT3A & MT3B with MT3

MON 40 – See Mine Discharge 7 above

MON 41 – See Mine Discharge 8 above

MON 42 – This is a sample of the top discharge of three deep mine discharges that emanate from a hillside and enter the killer trib just upstream from the mouth on the east side of 104th Cavalry Road. This discharge is usually dry, but seems to flow very heavily during periods of heavy rain, possibly only after the mine complex fills up beyond where MON 40 and MON 41 discharge. The following loading values are based on only 4 months of data, as this is the number of times this discharge was flowing over the study period. Average flow is 380 gpm, and the average pH was 3.4. This discharge is net acid. On average, it contributes 470 lbs/day of acid, 13 lbs/day of iron, 83 lbs/day of manganese, and 58 lbs/day of aluminum. Additional data for this point was collected in association with the Sky Haven Coal "Otto #1" surface mining operation (4574SM33, MP 13).

MON 44 – This is an instream sample of the mouth of the left branch of the unnamed tributary (Killer Trib) to Montgomery Creek. This point corresponds to the TMDL point MT3B. Average flow is 121 gpm, and the average pH was 3.6. This branch of the Killer Trib is net acid. On average, it contributes 237 lbs/day of acid, 15 lbs/day of iron, 48

lbs/day of manganese, and 25 lbs/day of aluminum to the Killer Trib. Additional data for this point was collected in association with the Sky Haven Coal "Otto #1" surface mining operation (4574SM33, MP 19).

MON 45 – This is an instream sample of the mouth of the right branch of the unnamed tributary (Killer Trib) to Montgomery Creek. This point corresponds to the TMDL point MT3A. Average flow is 158 gpm, and the average pH was 3.7. This branch of the Killer Trib is net acid. On average, it contributes 122 lbs/day of acid, 16 lbs/day of iron, 27 lbs/day of manganese, and 10 lbs/day of aluminum to the Killer Trib. Additional data for this point was also collected in association of the Sky Haven Coal "Otto #1" surface mining operation (4574SM33, MP 20).

MON 48* – This is an instream sample of the unnamed tributary (Killer Trib) to Montgomery Creek above the influence of the MON 52 discharge. This monitoring point is associated with the Sky Haven Coal Company "Kramer #1" surface mining operation (17713099, MP 19).

MON 48A – This is a sample of a discharge that emanates as a seep along the left bank of the unnamed tributary (Killer Trib) to Montgomery Creek. This discharge is upstream of MON 38 (TMDL point MT3) but downstream of MON 44 and MON 45 (TMDL points MT3A and MT3B). It is also known as the "two pipe seep" because the flow was collected using two separate pipes. Average flow is 34 gpm, and the average pH was 3.3. This discharge is net acid. On average, this discharge added 61 lbs/day of acid, 2 lbs/day of iron, 13 lbs/day of manganese, and 4 lbs/day of aluminum to the unnamed tributary (Killer Trib) to Montgomery Creek.

MON 49* – According to the permit, this is a sample of the mouth of an unnamed tributary to Montgomery Creek, however, it appears more likely that it is an old deep mine discharge, rather than a tributary. It is associated with the Sky Haven Coal Company "Kramer #1" surface mining permit (17713099, MP 20). This point samples the mouth of the MON 52A discharge.

MON 50* – This is a deep mine discharge that is associated with the Sky Haven Coal Company "Kramer #1" surface mining operation (17713099, MP 22).

MON 51* – This is a seep that is associated with the Sky Haven Coal Company "Kramer #1" surface mining operation (17713099, MP 32). It coincides with MON 52B sampling point.

MON 52* – This is a seep that is associated with the Sky Haven Coal Company "Kramer #1" surface mining operation (17713099, MP 33).

MON 52A – This is a sample of a large iron laden discharge to the unnamed tributary (Killer Trib) to Montgomery Creek that enters just below TMDL points MT3A and MT3B. The discharge is formed by waters emanating from the toe of slope of a pre-Act mining operation that was later remined and reclaimed. Some of the water may also be

coming from an unmapped deep mine entry. This site is also known as the "big weir discharge" because of the large size of the flow-measuring device that is in place. Average flow was 210 gpm, and the average pH was 3.7. This discharge is net acid. On average, this discharge contributed 179 lbs/day of acid, 10 lbs/day of iron, 52 lbs/day of manganese, and 13 lbs/day of aluminum to the unnamed tributary (Killer Trib) to Montgomery Creek.

MON 52B – This is a toe of slope seep that enters the channel formed by MON 52A just before its confluence with the unnamed tributary (Killer Trib) to Montgomery Creek. Average flow was 7 gpm, and the average pH was 3.4. This discharge is net acid. On average, it contributes 8 lbs/day of acid, 1 lb/day of iron, 2 lbs/day of manganese, and <1 lbs/day of aluminum to the unnamed tributary (Killer Trib) to Montgomery Creek.

MON 67 – This is an instream sample of the unnamed tributary (Killer Trib) to Montgomery Creek below MON 44 and MON 45 (TMDL points MT3A and MT3B) but above where MON 52A and MON 52B enter. Average flow was 255 gpm, and the average pH was 3.6. At this point, the tributary is net acid. On average, the loading values were as follows: 284 lbs/day of acid, 21 lbs/day of iron, 58 lbs/day of manganese, and 28 lbs/day of aluminum. Data for this point was also collected in association with the Kenneth K. Rishel & Son, Inc. "Moore" surface mining operation (17030113, MP 5).

MON 67A - This is an instream sample of the unnamed tributary (Killer Trib) to Montgomery Creek below where MON 52A and MON 52B enters but above MON 48A. Average flow was 352 gpm, and the average pH was 3.6. The stream remains net acid at this point. On average, the loading values were as follows: 345 lbs/day of acid, 19 lbs/day of iron, 84 lbs/day of manganese, and 32 lbs/day of aluminum.

Montgomery Creek between MC4 and MC3

MON 38 – This is an intstream sample that was taken at the mouth of the unnamed tributary (Killer Trib) just upstream of the confluence with Montgomery Creek. This point corresponds to TMDL point MT3. Average flow is 803 gpm, and the average pH was 3.6. The stream is net acid at this point. The Killer Trib contributes an average of 950 lbs/day of acid, 23 lbs/day of iron, 224 lbs/day of manganese, and 93 lbs/day of aluminum to the main stem of Montgomery Creek. Additional data was collected in association with the Sky Haven Coal "Otto #1" surface mining operation (4574SM33, MP 6).

Unnamed tributary to Montgomery Creek above MT2A

No samples were taken above this point.

Unnamed tributary to Montgomery Creek between MT2A and MT2

MON 15* – This is an old surface mine discharge that flows to the unnamed tributary (Road Trib) to Montgomery Creek and is associated with the S.R.P. Coal Company (Sky Haven) "Reed #1" surface mining operation (17803108, MP 24).

MON 16* – This is a sample of the unnamed tributary (Road Trib) to Montgomery Creek described as "below mine" in the water quality data for the S.R.P. Coal Company (Sky Haven) "Reed #1" surface mining operation (17803108, MP 24B).

MON 17* – This is an instream sample of the unnamed tributary to Montgomery Creek (Road Trib) below a series of discharges (MON 14,15,16,18) and is associated with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 1).

MON 18* – This is a deep mine discharge that flows to an unnamed tributary (Road Trib) to Montgomery Creek and is associated with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 34).

MON 19* – This is an instream sample of the unnamed tributary (Road Trib) to Montgomery Creek that was taken above the MON 18 deep mine discharge and other smaller discharges on the opposite side of the stream. It is associated with the S.R.P. Coal Company (Sky Haven) "Reed #1" surface mining operation (17803108, MP 1).

MON 21* – This is an instream sample of the headwaters of the unnamed tributary (Road Trib) to Montgomery Creek and is associated with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 35).

Montgomery Creek between MC3 and MC2

MON 13* – This is an instream sample of the mouth of the unnamed tributary to Montgomery Creek known as the Road Trib and is associated with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 9).

MON 23 – This is a deep mine discharge that forms an iron mat and flows directly to Montgomery Creek, adjacent to and on the upstream side of the Road Trib (TMDL point MT2). This discharge is net acid although some alkalinity does exist. Average flow is 32 gpm, and average pH is 6.0. This discharge contributes 16 lbs/day of acid, 16 lbs/day of iron, and 2 lbs/day of manganese directly to the main stem of Montgomery Creek. Aluminum is not an issue at this discharge as levels were usually below the detection level of <0.05 mg/l. Additional water quality data was collected at this point in association with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 6).

MON 24 – This is an instream sampling point that was taken in the main stem of Montgomery Creek just upstream of the confluence with the Road Trib (TMDL point

MT2) and a known deep mine discharge (MON 23). Average flow at this site was 10,579 gpm. The stream is net acid at this point with the following loading values: 2308 lbs/day of acid, 32 lbs/day of iron, 329 lbs/day of manganese, and 181 lbs/day of aluminum. The average pH at this point was 4.5. Additional water quality data was collected at this point in association with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 7).

MON 76* – This is a seep that flows to Montgomery Creek after crossing under 104th Cavalry Road. It was sampled in association with the Shale Hill Coal Company "Montgomery" surface mining operation (17850106, MP 19).

MON 77 – This is a sample of a very small spring that flows to Montgomery Creek after crossing under 104th Cavalry Road (T-507). This spring is net alkaline and contributes a small amount of buffering capacity to Montgomery Creek. Average flow is 27 gpm, and the average pH is 6.8. This tributary contributes less than 1 lb/day of iron, manganese, and aluminum to the main stem of Montgomery Creek.

MON 77A – This is a sample of a very small spring that flows to Montgomery Creek, downstream and on the same side as MON 77. This spring is net alkaline and contributes a small amount of buffering capacity to Montgomery Creek. Average flow is only 5 gpm, and the average pH was 6.2. This tributary contributes less than one lb/day of iron, manganese, and aluminum to the main stem of Montgomery Creek.

Unnamed tributary to Montgomery Creek above MT1

MON 68 – This is an instream sample taken in the headwaters of the unnamed tributary (Last Trib) to Montgomery Creek. It is formed by a series of discharges from several areas of reclaimed mine lands that have been directed into a large pond. The outlet of the pond forms the beginning of the stream channel. Average flow was 143 gpm, and the average pH was 6.1. On average, the loading values were as follows: 19 lbs/day of acid, 2 lbs/day of iron, 7 lbs/day of manganese, and 3 lbs/day of aluminum. Data was also collected for this site in association with the Shale Hill Coal Company "Montgomery" surface mining operation (17850106, MP 6).

MON 69* – This is a sample of a spring that flows to the unnamed tributary (Last Trib) to Montgomery Creek and is associated with the Shale Hill Coal Company "Montgomery" surface mining operation (17850106, MP 7). It was not sampled individually as part of this assessment effort; however, it is part of the water that was sampled as MON 68.

MON 70* – This is a sample of a spring that flows to the unnamed tributary (Last Trib) to Montgomery Creek and is associated with the Shale Hill Coal Company "Montgomery" surface mining operation (17850106, MP 8).

MON 71 – This is a sample of a spring that emanates from an old cistern near Danvir Road and flows to the unnamed tributary (Last Trib) to Montgomery Creek. Average

flow was 50 gpm, and the average pH was 5.4. On average, the loading values were as follows: 8 lbs/day of acidity, and <1 lb/day of iron, manganese, and aluminum. Data was also collected for this point in association with the Shale Hill Coal Company "Montgomery" surface mining operation.

MON 78* – This is a discharge from a strip pit that was monitored in association with the Shale Hill Coal Company "Montgomery" surface mining operation (17850106, MP 29).

MON 81 – This is a discharge to the unnamed tributary (Last Trib) to Montgomery Creek that was sampled just off of Danver Country Lane. Average flow was 30 gpm, and the average pH was 6.9. This discharge is net alkaline. On average, the loading values were as follows: <1 lb/day of acid, iron, manganese, and aluminum.

MON 82 – This point is located in the partially impounded headwaters to an unnamed tributary to Montgomery Creek. This point is associated with the Swisher Contracting "Gill" surface mining operation (17030110, MP 9).

Montgomery Creek between MC2 and MC1

MON 1 – This is an instream sampling point that was taken near the mouth of Montgomery Creek at Hyde. This sampling point corresponds to point MC1 of the Montgomery Creek TMDL study. Average flow at this site was 11,888 gpm. At its mouth, the stream is net acid, contributing about 2205 lbs/day of acid, 49 lbs/day of iron, 356 lbs/day of manganese, and 185 lbs/day of aluminum to the West Branch Susquehanna River at its confluence. The average pH at this point was 4.9.

MON 2* – This is a seep that flows directly to Montgomery Creek and is associated with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 32).

MON 3* – This is a seep that joins with MON 2 and flows directly to Montgomery Creek. It is associated with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 33).

MON 5* – This is a small, unnamed tributary to Montgomery Creek that was sampled in association with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 15).

MON 6* – This is a small, unnamed stream to Montgomery Creek that was sampled in association with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 5).

MON 7* – This is a sample that was taken in a wetland that outlets to Montgomery Creek and is associated with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 30).

MON 8* – This is a spring that flows to Montgomery Creek and is associated with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 12).

MON 9* – This is an intermittent stream that flows to Montgomery Creek and is associated with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 14).

MON 10* – This is a spring that flows to Montgomery Creek and is associated with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 24).

MON 11* – This is a seep that flows directly to Montgomery Creek and is associated with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 36).

MON 73* – This is a sample of the left branch of the unnamed tributary (Dog Trib) to Montgomery Creek and is associated with the Shale Hill Coal Company "Montgomery" surface mining operation (17850106, MP 13).

MON 73A – This is a sample of the combined flow of the two branches of a very small unnamed tributary (Dog Trib) to Montgomery Creek. One branch is fed by surface runoff while the other is fed by a discharge from past surface mining operations (MON 73). This tributary is net acid at this point. Average flow is 40 gpm, and the average pH was 4.7. This tributary contributes 7 lbs/day of acidity and <1 lb/day each of iron, manganese, and aluminum to Montgomery Creek.

MON 73B – This is a sample of the unnamed tributary (Dog Trib) at the mouth before it enters Montgomery Creek but after it passes through a pond and receives an additional discharge. This tributary is net acid at this point. Average flow is 23 gpm, and the average pH was 4.8. At this point, right before entry to Montgomery Creek, this tributary contributes 4.8 lbs/day acidity and <1 lb/day each of iron, manganese and aluminum to the main stem.

MON 74* – This is a sample of a discharge flowing from a white PVC pipe into Montgomery Creek. It was sampled in association with the Shale Hill Coal Company "Montgomery" surface mining operation (17850106, MP 15).

MON 75 – This is a sample that was taken near the mouth of the unnamed tributary (Dog Trib) to Montgomery Creek. It comes from a pipe that crosses under the driveway to a garage and then enters directly into Montgomery Creek. The origin of the water is unknown. This discharge is net alkaline. Average flow is 20 gpm, with an average pH of 5.8. This discharge contributes 1 lb/day of acidity and <1 lb/day each of iron, manganese, and aluminum to Montgomery Creek. Data for this point was also collected in association

with the Shale Hill Coal Company "Montgomery" surface mining operation (17850106, MP 16).

MON 12 – This is an instream sampling point that was taken in the main stem of Montgomery Creek downstream of the confluence with the Road Trib (TMDL point MT2) and a known deep mine discharge (MON 23). Average flow at this site was 11,367 gpm. The stream is net acid at this point with the following loading values: 2260 lbs/day of acid, 58 lbs/day of iron, 369 lbs/day of manganese, and 195 lbs/day of aluminum. The average pH at this point in the stream was 4.7. Additional water quality data was collected at this point in association with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 8).

MON 22 – This is an instream sampling point that was taken in the main stem of Montgomery Creek just upstream of the confluence with the Last Trib. This point corresponds to point MC2 of the TMDL study. Average flow at this site was 11,051 gpm. The stream is net acid at this point with the following loading values: 2268 lbs/day of acid, 64 lbs/day of iron, 351 lbs/day of manganese, and 201 lbs/day of aluminum. The average pH at this point was 4.7. Additional water quality data was collected at this point in association with the S.R.P. Coal Company (Sky Haven) "McPherson #2" surface mining operation (17850145, MP 2).

MON 72 – This is an instream sample that was taken in the main stem of Montgomery Creek just downstream from the confluence with the unnamed tributary (Last Trib) (TMDL point MT1). Average stream flow at this point was 12,098 gpm. The stream is net acid at this point with the following loading values: 2296 lbs/day of acid, 61 lbs/day of iron, 390 lbs/day of manganese, and 202 lbs/day of aluminum. The average pH at this point was 4.7. Data was also collected for this point in association with the Shale Hill Coal Company "Montgomery" surface mining operation (17850106, MP 12).

MON 79 – This is an instream sample that was taken near the mouth of the unnamed tributary (Last Trib) to Montgomery Creek. It corresponds to the TMDL point MT1. This tributary is net alkaline. Average flow was 383 gpm, and the average pH was 6.9. On average, loading values were as follows: <1 lb/day of iron, 6 lbs/day of manganese, and 1 lb/day of aluminum. Data was also collected for this point in association with the Shale Hill Coal Company "Montgomery" surface mining operation (17850106, MP 30).

2.2 Applicable Water Quality Standards

Montgomery Creek and its tributaries below the Clearfield Reservoir are listed as having a protected use of Cold Water Fishery in Title 25, Chapter 93 of the Pennsylvania Code. The stream is included in Drainage List L for the West Branch Susquehanna River Basin. In addition to the TMDLs for iron, manganese, aluminum, and acidity that were established by the DEP for the watershed, specific and state-wide water quality criteria for the stream are provided in Title 25, Chapter 93 of the Pennsylvania Code.

Tables 3 and 4 of 25 PA Code §93.7 provide specific water quality criteria for critical uses including CWF, as Montgomery Creek is classified. Specific criteria for CWF include dissolved oxygen and temperature. Water quality criteria for CWF uses are provided in Table 2.1.

TABLE 2.1 WATER QUALITY CRITERIA FOR CWF

PARAMETER	CRITERIA
Alkalinity	Minimum 20 mg/l as $CaCO_3$ except where natural conditions are less
Dissolved Oxygen	6.0 mg/l minimum daily average for flowing waters; 5.0 mg/l minimum
Osmotic Pressure	50 milliosmoles per kilogram
Temperature	Ranges from 38 to 66 degrees, maximum, depending on the month
Total Dissolved Solids	500 mg/l monthly average value; 750 mg/l maximum
Total Residual Chlorine	0.011 mg/l for 4-day average; 0.019 mg/l for hourly average

Values have also been established for iron and pH but they duplicate the values for these parameters established by the TMDLs for the stream and were included with the TMDLs.

The TMDLs for the Montgomery Creek Watershed were developed to meet water quality endpoints or goals as provided in Table 2.2.

TABLE 2.2 WATER QUALITY ENDPOINTS FOR THE MONTGOMERY CREEK WATERSHED

PARAMETER	ENDPOINT
Aluminum, Total Recoverable	0.75
Manganese, Total Recoverable	1.00
Iron, 30-day Average Recoverable	1.50
Iron, Dissolved	0.30
pH	6.0-9.0

These endpoints were selected, as they should allow the waters to achieve their designated uses. The required reductions were designed to be protective of the water quality criterion for each specific parameter 99 percent of the time. Additional information about specific TMDL limits and reductions for points in the Montgomery Creek Watershed is provided in Section 3 of this narrative.

2.3 Prioritization of Pollution Sources

The prioritization of treatment areas was based on a variety of criteria. The criteria used were outlined by the EPA for the development and prioritization of treatment projects as received by the watershed manager of the Moshannon District Office of the PADEP. Priorities were based on loadings or significant impact in the watershed, availability of space for construction, cost feasibility, landowner permission, access, and overall impact towards reaching the outlined watershed goals. There are eleven priority areas in the watershed. Treatment at all eleven sites is recommended to restore Montgomery Creek. Most of the sites are treatable through passive treatment technology, one site due to the severity of the chemistry and the large flow is being recommended for active treatment.
Each priority area and its conceptual treatment design are presented below. All are conceptual designs and will most likely change to some extent during the design and permitting phase of each individual project as more information is gathered. Estimated costs are given for each and were calculated using AMDTreat.

Table 2.3 provides a summary of the priority areas for the restoration of the Montgomery Creek Watershed. Additional information about each of these priority areas and areas requiring additional consideration can be found in Section 4 of this narrative.

TABLE 2.3 SUMMARY OF PRIORITY TREATMENT AREAS IN THE MONTGOMERY CREEK WATERSHED

Priority	Sites	Treatment	Cost
#1	MON 52A	Vertical Flow Wetlands (VFW)	$525,000 to $625,000
#2	MON 52B	Wetland with limestone	$125,000
#3	MON 40, 41, 42	VFW, limestone cell	$625,000
#4	MON 30	Upflow pond, VFW	$275,000 to $350,000
#5	MON 34	Limestone cell: treat stream Lime sand addition	$225,000 $4,000/yr
#6	MON 68	Aeration, windmill, limestone cell	$175,000
#7	MON 23	Wetland	$125,000
#8	MON 73	Reclamation, limestone cell	$125,000
#9	MON 71	Anoxic Limestone Drain or Open Limestone Channel	$75,000
#10	MON 67	Lime Doser	$150,000 capital cost and $15,000 annual lime cost
#11	MON 48A	To be determined	---
Total Estimated Cost for Priority Treatment Areas			$2,425,000 to $2,600,000 + $19,000/yr

3.0 POLLUTANT REDUCTIONS REQUIRED TO MEET TMDLS

Total Maximum Daily Loads (TMDLs) for Montgomery Creek were included in the *Montgomery Creek Watershed TMDL* prepared for the PA DEP in 2003. This section is based on the limits established by and published in the *Montgomery Creek Watershed TMDL*.

The TMDLs for Montgomery Creek were developed for depressed pH and high levels of metals due to acid mine drainage from abandoned coal mines. The TMDL addresses pH and the three primary metals associated with AMD (iron, manganese, and aluminum). No other categories of impairment were listed for the Montgomery Creek Watershed. The required pollutant reductions specified in the TMDL and the impacts to downstream waters from the required reductions are discussed in the following paragraphs.

3.1 Required Reductions

The TMDLs for Montgomery Creek were developed for specific reaches of the stream and are provided in reference to several points in the watershed, including the following: Montgomery Creek above MC6; Unnamed Tributary to Montgomery Creek above MT5; Montgomery Creek between MC6 and MC5; Unnamed Tributary to Montgomery Creek above MT4; Montgomery Creek between MC5 and MC4; Unnamed Tributary to Montgomery Creek above MT3A; Unnamed Tributary to Montgomery Creek above MT3; Mine Discharge 7 (D7); Mine Discharge 8 (D8); Unnamed Tributary to Montgomery Creek between the Confluence of MT3A and MT3B with MT3; Montgomery Creek between MC4 and MC3; Unnamed Tributary to Montgomery Creek above MT2A; SRP2 Wasteload Allocation; Unnamed Tributary to Montgomery Creek between MT2A and MT2; Montgomery Creek between MC3 and MC2; Unnamed Tributary to Montgomery Creek above MT1; SRP1 Wasteload Allocation, and Montgomery Creek between MC2 and MC1. Figures showing the locations of each of the sample points are provided as in Appendix A.

The TMDLs were developed to meet water quality criterion values of 0.75 mg/l of total recoverable aluminum, 1.50 mg/l of 30-day average recoverable iron, 1.00 mg/l of total recoverable manganese, 0.3 mg/l of dissolved iron, and a pH between 6.0 and 9.0 The pollutant reductions needed to meet the water quality criteria are described in detail below for each stream segment. The required reductions were designed to be protective of the water quality criterion for each specific parameter 99 percent of the time.

Montgomery Creek above MC6

Point MC6 represents Montgomery Creek from the Clearfield Reservoir to the headwaters. No TMDLs have been developed for this segment because it is attaining its designated use. According to the 1996 303(d) list, two segments of the stream above this point were listed due to impairments from AMD, an unnamed tributary to North Branch Montgomery Creek and an unnamed tributary to Tinker Run. These streams have since been found to be meeting their designated uses and for that reason have been delisted.

Unnamed Tributary to Montgomery Creek above MT5

TMDLs have been developed for iron, manganese, aluminum, and acidity for this segment of an unnamed tributary to Montgomery Creek that enters Montgomery Creek just south of the Clearfield Reservoir impoundment. Sample point MT5 is located at the mouth of the unnamed tributary, which carries the flow from the MON 30 (Charlie's Weir) discharge. While the pH in this segment ranges between 3.05 to 5.55, the segment is net acidic due to mining impacts so acidity values were included in the TMDL for the segment.

TABLE 3.0 REQUIRED POLLUTANT REDUCTIONS FOR THE UNNAMED TRIBUTARY TO MONTGOMERY CREEK ABOVE SAMPLE POINT MT5

SAMPLE POINT MT5	MEASURED SAMPLE VALUES		ALLOWABLE VALUES		REDUCTION IDENTIFIED
	Conc. (mg/l)	Load (lb/day)	LTA Conc. (mg/l)	Load (lb/day)	Percent
Iron	0.36	1.9	0.28	1.4	21
Manganese	3.29	17.0	0.26	1.3	92
Aluminum	3.30	17.1	0.23	1.2	93
Acidity	37.74	195.1	0.76	3.9	98
Alkalinity	2.79	14.4			

All values shown in this table are long-term daily values.

Iron concentrations in this segment must be reduced from a long-term average daily value of 0.36 mg/l to 0.28 mg/l, while the iron loading must be reduced from 1.9 lb/day to 1.4 lb/day. Manganese concentrations must be reduced from a long-term average daily value of 3.29 mg/l to 0.26 mg/l, while the manganese loading must be reduced from 17.0 lb/day to 1.3 lb/day. Aluminum concentrations in this segment must be reduced from a long-term average daily value of 3.30 mg/l to 0.23mg/l, while aluminum loading must be reduced from 17.1 lb/day to 1.2 lb/day. Acidity must be reduced from 37.74 mg/l to 0.76 mg/l for the long-term average daily concentration. The corresponding reduction in acidity is a reduction from 195.1 lb/day of acidity to 3.9 lb/day. The reductions identified are 21% for iron, 92% for manganese, 93% for aluminum, and 98% for acidity.

Montgomery Creek between MC6 and MC5

This segment of the main stem of Montgomery Creek begins at the Clearfield Reservoir and flows southeast toward Hyde. Sample point MC5 is located just downstream of the gated area for the Clearfield Municipal Authority property and upstream of the confluence with the MT4 unnamed tributary. Montgomery Creek between MC6 and MC5 receives drainage from the MT5 unnamed tributary (Plant Trib) which conveys the MON 30 (Charlie's Weir) discharge and a series of discharges from partially reclaimed surface mine areas. It also receives flow from another unnamed tributary that enters just upstream and on the opposite bank that is of good water quality.

The load reductions for this segment consist of a reduction in acidity. While the pH in this segment ranges between 4.85 and 6.20, acidity will be addressed as part of this TMDL because the water quality is net acidic due to mining impacts in this segment. *The Montgomery Creek Watershed TMDL* developed load allocations for sample point MC5. These allocations are provided in Table 3.1.

TABLE 3.1 LOAD ALLOCATIONS FOR MONTGOMERY CREEK BETWEEN SAMPLE POINTS MC6 AND MC5

SAMPLE POINT MC5	MEASURED SAMPLE VALUES		ALLOWABLE SAMPLE VALUES	
	Conc. (mg/l)	Load (lb/day)	LTA Conc. (mg/l)	Load (lb/day)
Iron	0.30	42.0	0.30	42.0
Manganese	0.54	75.6	0.17	23.8
Aluminum	0.68	95.2	0.29	40.6
Acidity	12.97	1,815.1	1.30	181.9
Alkalinity	7.77	1,087.4		

All values shown in this table are long-term average daily values.

Based on the data included in Table 3.1, reductions in manganese from concentrations of 0.54 mg/l to 0.17 mg/l and reductions in manganese loading from 75.6 lb/day to 23.8 lb/day are required at MC5. Also required are reductions in aluminum from 0.68 mg/l to 0.29 mg/l and reductions in aluminum loading from 95.2 lb/day to 40.6 lb/day. Acidity reductions from concentrations of 12.97 mg/l to 1.30 mg/l and from acidity loading of 1,815.1 lb/day to 181.9 lb/day are required at MC5.

Sample points MC6 and MT5 are located upstream of MC5, and loading reductions for MT5 were prescribed. The TMDL plan accounted for loading reductions at point MT5. For each pollutant, the total load that was removed upstream at MT5 was subtracted from the existing load at point MC5, and the calculated value was compared to the allowable load at point MC5. Reductions at point MC5 are necessary for any pollutant parameter that exceeds the allowable load at MC5. The required reductions at point MC5 are shown in Table 3.2.

TABLE 3.2 POLLUTANT REDUCTIONS NECESSARY AT POINT MC5

	Iron (lb/day)	Manganese (lb/day)	Aluminum (lb/day)	Acidity (lb/day)
Existing Loads at MC5	42.0	75.6	95.2	1,815.1
Total Load Reduction (MT5)	0.5	15.7	15.9	191.2
Remaining Load	41.5	59.9	79.3	1,623.9
Allowable Loads at MC5	42.0	23.8	40.6	181.9
Percent Reduction	0	61	49	89
Load Reduction	0	36.1	38.7	1,442.0

Provided that the specified reductions at MT5 are met, manganese, aluminum, and acidity are the three parameters where reductions are needed at point MC5. The loading for iron will be below the allowable load at MC5. Manganese loadings at MC5 will be reduced from 75.6 lb/day to 59.9 lb/day due to upstream reductions, so reductions in loading from 59.9 lb/day to 23.8 lb/day (61%) are required in this segment. Aluminum loadings at MC5 will be reduced from 95.2 lb/day to 79.3 lb/day by upstream reductions, so reductions in loading from 79.3 lb/day to 40.6 lb/day (49%) will be required at MC5. Acidity loadings at MC5 will be reduced from 1,815.1 lb/day to 1,623.9 lb/day due to upstream reductions, so reductions in loading from 1,623.9 lb/day to 181.9 lb/day (89%) will be required at MC5.

Unnamed Tributary to Montgomery Creek above MT4

Point MT4 is located at the mouth of an unnamed tributary to Montgomery Creek that originates in an area that was previously surface mined. Pre-Act clay mines exist in this area, as well, and the tributary receives drainage from at least one deep mine (D10). Point MT4 represents all of the upstream watershed areas of the unnamed tributary to Montgomery Creek above its confluence with Montgomery Creek.

TMDLs have been developed for manganese, aluminum, and acidity for this segment of the unnamed tributary. The pH in this segment ranges between 3.14 and 4.20, and acidity values were included in the TMDL for the segment. The load allocations made at point MT4 are provided in Table 3.3.

TABLE 3.3 REQUIRED POLLUTANT REDUCTIONS FOR THE UNNAMED TRIBUTARY TO MONTGOMERY CREEK ABOVE SAMPLE POINT MT4

SAMPLE POINT MT4	MEASURED SAMPLE VALUES		ALLOWABLE VALUES		REDUCTION IDENTIFIED
	Conc. (mg/l)	Load (lb/day)	LTA Conc. (mg/l)	Load (lb/day)	Percent
Iron	0.55	0.3	0.55	0.3	0
Manganese	15.24	8.9	0.46	0.3	97
Aluminum	15.68	9.2	0.16	0.1	99
Acidity	180.30	105.3	0	0	100
Alkalinity	0	0			

All values shown in this table are long-term average daily values.

Manganese concentrations in this segment must be reduced from a long-term average daily value of 15.24 mg/l to 0.46 mg/l, while manganese loading must be reduced from 8.9 lb/day to 0.3 lb/day. Aluminum concentrations must be reduced from a 15.68 mg/l to 0.16 mg/l, while aluminum loading must be reduced from 9.2 lb/day to 0.1 lb/day. Acidity concentrations must be reduced from 180.30 mg/l to 0 mg/l, while loadings must be reduced from 105.3 lb/day to 0 lb/day. The reductions identified are 97% for manganese, 99% for aluminum, and 100% for acidity.

Montgomery Creek between MC5 and MC4

This segment of the main stem of Montgomery Creek runs parallel to 104th Cavalry Road (T-507) from just below the unnamed trib MT5 to just upstream of the unnamed trib MT3 (Killer Trib). Sample point MC4 is located in the main stem of Montgomery Creek just upstream of the confluence with the Killer Trib. This segment receives discharges from point MT4.

The load reductions for this segment consist of reductions in manganese, aluminum, and acidity. While the pH in this segment ranges from 2.69 to 6.79, acidity will be addressed as part of this TMDL because the water quality is net acidic due to mining impacts in this segment. The *Montgomery Creek Watershed TMDL* developed load allocations for sample point MC4. These allocations are provided in Table 3.4.

TABLE 3.4 LOAD ALLOCATIONS FOR MONTGOMERY CREEK BETWEEN SAMPLE POINTS MC5 AND MC4

SAMPLE POINT MC4	MEASURED SAMPLE VALUES		ALLOWABLE SAMPLE VALUES	
	Conc. (mg/l)	Load (lb/day)	LTA Conc. (mg/l)	Load (lb/day)
Iron	0.17	24.9	0.17	24.9
Manganese	1.98	289.5	0.20	29.2
Aluminum	0.98	143.3	0.18	26.3
Acidity	21.29	3,112.6	0.64	93.6
Alkalinity	3.24	473.7		

All values shown in this table are long-term average daily values.

Based on the data included in Table 3.4, reductions in manganese concentrations from 1.98 mg/l to 0.20 mg/l, and reductions in manganese loadings from 289.5 lb/day to 29.2 lb/day are required. Aluminum concentrations must be reduced from 0.98 mg/l to 0.18 mg/l, and aluminum loadings must be reduced from 143.3 lb/day to 26.3 lb/day. Acidity concentrations must be reduced from 21.29 mg/l to 0.64 mg/l, and reductions in acidity loading from 3,112.6 lb/day to 93.6 lb/day are required at MC4.

Sample points MT5, MT4, and MC5 are located upstream of MC4, and loading reductions for those upstream points were prescribed. The TMDL plan accounted for loading reductions at the three upstream sample points. For each pollutant, the total load that was removed upstream at sample points MT5, MT4, and MC5 was subtracted from the existing load at point MC4, and the calculated value was compared to the allowable load at point MC4. Reductions at point MC4 are necessary for any pollutant parameter that exceeds the allowable load at MC4. The required reductions at point MC4 are shown in Table 3.5.

TABLE 3.5 POLLUTANT REDUCTIONS NECESSARY AT POINT MC4

	Iron (lb/day)	Manganese (lb/day)	Aluminum (lb/day)	Acidity (lb/day)
Existing Loads at MC4	24.9	289.5	143.3	3,112.6
Total Load Reduction (MT4, MC5, MT5)	0.5	60.4	63.7	1,738.5
Remaining Load	24.4	229.1	79.6	1,374.1
Allowable Loads at MC4	24.9	29.2	26.3	93.6
Percent Reduction	0	88	67	94
Load Reduction	0	199.9	53.3	1,280.5

Provided that the specified reductions at MT4, MC5, and MT5 are met, manganese, aluminum, and acidity are the three parameters where reductions are needed at point MC4. The loading for iron will be below the allowable load at MC4. Manganese loadings at MC4 will be reduced from 289.5 lb/day to 229.1 lb/day due to upstream reductions, so reductions in loading from 229.1 lb/day to 29.2 lb/day (88%) must be achieved in this segment. Aluminum loadings will be reduced from 143.3 lb/day to 79.6 lb/day due to upstream reductions, so reductions in loading from 79.6 lb/day to 26.3 lb/day (67%) must be achieved in this segment. Acidity loadings will be reduced from 3,112.6 lb/day to 1,374.1 lb/day due to upstream reductions, so reductions in loading from 1,374.1 lb/day to 93.6 lb/day (94%) must be achieved at MC4.

Unnamed Tributary to Montgomery Creek above MT3A

Point MT3A is located at the mouth of the right branch of an unnamed tributary (Killer Trib) to Montgomery Creek that originates in an area that was previously surface mined by Sky Haven Coal Company (MP# 17713099) and has since been reclaimed. Point MT3A represents all of the upstream watershed areas of the right branch of the unnamed tributary to Montgomery Creek above its confluence with the main stem of the unnamed trib (Killer Trib).

TMDLs have been developed for iron, manganese, aluminum, and acidity for this segment of the unnamed tributary. The pH in this segment ranges between 2.81 and 4.70, and acidity values were included in the TMDL for the segment. The load allocations made at point MT3A are provided in Table 3.6.

TABLE 3.6 REQUIRED POLLUTANT REDUCTIONS FOR THE UNNAMED TRIBUTARY TO MONTGOMERY CREEK ABOVE SAMPLE POINT MT3A

SAMPLE POINT MT3A	MEASURED SAMPLE VALUES		ALLOWABLE VALUES		REDUCTION IDENTIFIED
	Conc. (mg/l)	Load (lb/day)	LTA Conc. (mg/l)	Load (lb/day)	Percent
Iron	25.24	46.3	0.25	0.5	99

Manganese	62.63	114.9	0.44	0.8	99.3
Aluminum	25.21	46.3	0.25	0.5	99
Acidity	368.99	677.0	0	0	100
Alkalinity	0.07	0.1			

All values shown in this table are long-term average daily values.

Iron concentrations in this segment must be reduced from the long-term daily value of 25.24 mg/l to 0.25 mg/l, while iron loadings must be reduced from 46.3 lb/day to 0.5 lb/day. Manganese concentrations in this segment must be reduced from 62.63 mg/l to 0.44 mg/l, while manganese loadings must be reduced from 114.9 lb/day to 0.8 lb/day. Aluminum concentrations must be reduced from a 25.21 mg/l to 0.25 mg/l, while aluminum loadings must be reduced from 46.3 lb/day to 0.5 lb/day. Acidity concentrations must be reduced from 368.99 mg/l to 0 mg/l, while loadings must be reduced from 677.0 lb/day to 0 lb/day. The reductions identified are 99% for iron, 99.3% for manganese, 99% for aluminum and 100% for acidity.

Unnamed Tributary to Montgomery Creek above MT3B

Point MT3B is located at the mouth of the left branch of an unnamed tributary (Killer Trib) to Montgomery Creek that originates in an area with a forested corridor surrounded by reclaimed mine lands upstream of the Otto #1 permit. Benjamin Coal Company installed a passive treatment system to treat a discharge at the head of the tributary; however, the system does not have an NPDES permit for its effluent. Point MT3B represents all of the upstream watershed areas of the left branch of the unnamed tributary to Montgomery Creek above its confluence with main stem of the unnamed trib (Killer Trib).

TMDLs have been developed for iron, manganese, aluminum, and acidity for this segment of the unnamed tributary. The pH in this segment ranges between 2.84 and 6.70, and acidity values were included in the TMDL for the segment. The load allocations made at point MT3B are provided in Table 3.7.

TABLE 3.7 REQUIRED POLLUTANT REDUCTIONS FOR THE UNNAMED TRIBUTARY TO MONTGOMERY CREEK ABOVE SAMPLE POINT MT3B

SAMPLE POINT MT3B	MEASURED SAMPLE VALUES		ALLOWABLE VALUES		REDUCTION IDENTIFIED
	Conc. (mg/l)	Load (lb/day)	LTA Conc. (mg/l)	Load (lb/day)	Percent
Iron	14.12	45.9	0.28	0.9	98
Manganese	35.31	114.8	0.28	0.9	99.2
Aluminum	9.91	32.2	0.20	0.7	98
Acidity	224.17	729.1	0	0	100
Alkalinity	0.36	1.2			

All values shown in this table are long-term average daily values.

Iron concentrations in this segment must be reduced from the long-term daily value of 14.12 mg/l to 0.28 mg/l, while iron loadings must be reduced from 45.9 lb/day to 0.9 lb/day. Manganese concentrations in this segment must be reduced from 35.31 mg/l to 0.28 mg/l, while manganese loadings must be reduced from 114.8 lb/day to 0.9 lb/day. Aluminum concentrations must be reduced from a 9.91 mg/l to 0.20 mg/l, while aluminum loadings must be reduced from 32.2 lb/day to 0.7 lb/day. Acidity concentrations must be reduced from 224.17 mg/l to 0 mg/l, while loadings must be reduced from 729.1 lb/day to 0 lb/day. The reductions identified are 98% for iron, 99.2% for manganese, 98% for aluminum, and 100% for acidity.

Mine Discharge 7 (D7)

Point D7 is the lowest of a series of three in elevation that discharges from a collapsed deep mine opening around the perimeter of the Otto #1 surface mine and flows to the unnamed tributary MT3 (Killer Trib) to Montgomery Creek. The small abandoned deep mine that this discharge drains was probably used to mine house coal or coal for other local uses. Point D7 represents the discharge at its origin.

TMDLs have been developed for iron, manganese, and acidity for this segment of the unnamed tributary. A TMDL for aluminum was not developed as part of the *Montgomery Creek Watershed TMDL* most likely because sufficient data containing aluminum concentrations was lacking. The pH in this segment ranges between 3.48 and 3.70, and acidity values were included in the TMDL for the segment. The load allocations made at point D7 are provided in Table 3.8.

TABLE 3.8 REQUIRED POLLUTANT REDUCTIONS FOR MINE DISCHARGE 7

SAMPLE POINT D7	MEASURED SAMPLE VALUES		ALLOWABLE VALUES		REDUCTION IDENTIFIED
	Conc. (mg/l)	Load (lb/day)	LTA Conc. (mg/l)	Load (lb/day)	Percent
Iron	1.54	0.3	0.63	0.1	59
Manganese	73.99	12.3	0.67	0.1	99.1
Aluminum	NA	NA	NA	NA	NA
Acidity	296.81	49.5	0	0	100
Alkalinity	0	0			

All values shown in this table are long-term average daily values.

Iron concentrations in this segment must be reduced from the long-term daily value of 1.54 mg/l to 0.63 mg/l, while iron loadings must be reduced from 0.3 lb/day to 0.1 lb/day. Manganese concentrations in this segment must be reduced from 73.99 mg/l to 0.67 mg/l, while manganese loadings must be reduced from 12.3 lb/day to 0.1lb/day. Acidity concentrations must be reduced from 296.81 mg/l to 0 mg/l, while loadings must be reduced from 49.5 lb/day to 0 lb/day. The reductions identified are 59% for iron, 99.1% for manganese, and 100% for acidity.

Mine Discharge 8 (D8)

Point D8 is the middle of a series of three in elevation that discharges from a collapsed deep mine opening around the perimeter of the Otto #1 surface mine and flows to the unnamed tributary MT3 (Killer Trib) to Montgomery Creek. The small abandoned deep mine that this discharge drains was probably used to mine house coal or coal for other local uses. Point D8 represents the discharge at its origin.

TMDLs have been developed for iron, manganese, and acidity for this segment of the unnamed tributary. A TMDL for aluminum was not developed as part of the *Montgomery Creek Watershed TMDL* mostly likely because sufficient data containing aluminum concentrations was lacking. The pH in this segment ranges between 3.60 and 4.30, and acidity values were included in the TMDL for the segment. The load allocations made at point D8 are provided in Table 3.9.

TABLE 3.9 REQUIRED POLLUTANT REDUCTIONS FOR MINE DISCHARGE 8

SAMPLE POINT D8	MEASURED SAMPLE VALUES		ALLOWABLE VALUES		REDUCTION IDENTIFIED
	Conc. (mg/l)	Load (lb/day)	LTA Conc. (mg/l)	Load (lb/day)	Percent
Iron	1.18	0.1	0.83	0.07	30
Manganese	70.13	5.8	0.70	0.06	99
Aluminum	NA	NA	NA	NA	NA
Acidity	280.54	23.4	0	0	100
Alkalinity	0	0			

All values shown in this table are long-term average daily values.

Iron concentrations in this segment must be reduced from the long-term daily value of 1.18 mg/l to 0.83 mg/l, while iron loadings must be reduced from 0.1 lb/day to 0.07 lb/day. Manganese concentrations in this segment must be reduced from 70.13 mg/l to 0.70 mg/l, while manganese loadings must be reduced from 5.8 lb/day to 0.06 lb/day. Acidity concentrations must be reduced from 280.54 mg/l to 0 mg/l, while loadings must be reduced from 23.4 lb/day to 0 lb/day. The reductions identified are 30% for iron, 99% for manganese, and 100% for acidity.

Unnamed Tributary to Montgomery Creek between the Confluence of MT3A and MT3B with MT3

This segment of the unnamed tributary to Montgomery Creek between the confluence of points MT3A and MT3B with point MT3 represents the unnamed tributary (Killer Trib) immediately upstream of its confluence with Montgomery Creek. Sample point MT3 is located in the main stem of the unnamed tributary just upstream of the confluence with Montgomery Creek. This segment receives discharges from point MT3A, MT3B, D7, and D8.

The load reductions for this segment consist of reductions in manganese, aluminum, and acidity. While the pH in this segment ranges from 2.75 to 4.78, acidity will be addressed as part of this TMDL because the water quality is net acidic due to mining impacts in this segment. The *Montgomery Creek Watershed TMDL* developed load allocations for sample point MC4. These allocations are provided in Table 3.10.

TABLE 3.10 LOAD ALLOCATIONS FOR THE UNNAMED TRIBUTARY TO MONTGOMERY CREEK BETWEEN THE CONFLUENCE OF MT3A AND MT3B WITH MT3

SAMPLE POINT MT3	MEASURED SAMPLE VALUES		ALLOWABLE SAMPLE VALUES	
	Conc. (mg/l)	Load (lb/day)	LTA Conc. (mg/l)	Load (lb/day)
Iron	7.13	48.8	0.50	3.4
Manganese	49.10	335.8	0.44	3.0
Aluminum	14.72	100.7	0.30	2.1
Acidity	259.82	1,776.9	0	0
Alkalinity	0.03	0.2		

All values shown in this table are long-term average daily values.

Based on the data included in Table 3.10, reductions in iron concentrations from 7.13 mg/l to 0.50 mg/l, and reductions in iron loadings from 48.8 lb/day to 3.4 lb/day are required. Manganese concentrations must be reduced from 49.10 mg/l to 0.44 mg/l, and reductions in manganese loadings from 335.8 lb/day to 3.0 lb/day are required. Aluminum concentrations must be reduced from 14.72 mg/l to 0.30 mg/l, and aluminum loadings must be reduced from 100.7 lb/day to 2.1 lb/day. Acidity concentrations must be reduced from 259.82 mg/l to 0 mg/l, and reductions in acidity loading from 1,776.9 lb/day to 0 lb/day are required at MT3.

Sample points MT3A, MT3B, D7, and D8 are located upstream of MT3, and loading reductions for those upstream points were prescribed. The TMDL plan accounted for loading reductions at the four upstream sample points. For each pollutant, the total load that was removed upstream at sample points MT3A, MT3B, D7 and D8 was subtracted from the existing load at point MT3, and the calculated value was compared to the allowable load at point MT3. Reductions at point MT3 are necessary for any pollutant parameter that exceeds the allowable load at MT3. The required reductions at point MT3 are shown in Table 3.11.

TABLE 3.11 POLLUTANT REDUCTIONS NECESSARY AT POINT MT3

	Iron (lb/day)	Manganese (lb/day)	Aluminum (lb/day)	Acidity (lb/day)
Existing Loads at MT3	48.8	335.8	100.7	1,776.9
Total Load Reduction (MT3A, MT3B, D7, D8)	91.03	245.94	77.3	1,479.0
Remaining Load	0	89.86	23.4	297.9
Allowable Loads at MT3	3.4	3.0	2.1	0
Percent Reduction	0	97	92	100
Load Reduction	0	86.86	21.3	297.9

Provided that the specified reductions at MT3A, MT3B, D7, and D8 are met, manganese, aluminum, and acidity are the three parameters where reductions are needed at point MT3. The loading for iron will be below the allowable load at MT3. Manganese loadings at MT3 will be reduced from 335.8 lb/day to 89.86 lb/day due to upstream reductions, so reductions in loading from 89.86 lb/day to 3.0 lb/day (97%) must be achieved in this segment. Aluminum loadings will be reduced from 100.7 lb/day to 23.4 lb/day due to upstream reductions, so reductions in loading from 23.4 lb/day to 2.1 lb/day (92%) must be achieved in this segment. Acidity loadings will be reduced from 1,776.9 lb/day to 297.9 lb/day due to upstream reductions, so reductions in loading from 297.9 lb/day to 0 lb/day (100%) must be achieved at MT3.

Montgomery Creek between MC4 and MC3

This segment of Montgomery Creek begins immediately upstream from the unnamed tributary MT3 (Killer Trib) at the previously described point, MC4, and ends immediately downstream from said tributary at point MC3. This segment receives discharges from the unnamed tributary MT3. No other tributaries or sources of pollution enter the stream between these two points.

The load reductions for this segment consist of reductions in iron, manganese, aluminum, and acidity. While the pH in this segment ranges from 3.20 to 5.05, acidity will be addressed as part of this TMDL because the water quality is net acidic due to mining impacts in this segment. The *Montgomery Creek Watershed TMDL* developed load allocations for sample point MC3. These allocations are provided in Table 3.12.

TABLE 3.12 LOAD ALLOCATIONS FOR MONTGOMERY CREEK BETWEEN MC4 AND MC3

SAMPLE POINT MC3	MEASURED SAMPLE VALUES		ALLOWABLE SAMPLE VALUES	
	Conc. (mg/l)	Load (lb/day)	LTA Conc. (mg/l)	Load (lb/day)
Iron	0.76	120.7	0.31	49.3

Manganese	5.01	796.0	0.15	23.8
Aluminum	2.02	320.9	0.14	22.2
Acidity	33.00	5,242.9	0.99	157.3
Alkalinity	4.80	762.6		

All values shown in this table are long-term average daily values.

Based on the data included in Table 3.12, reductions in iron concentrations from 0.76 mg/l to 0.31 mg/l, and reductions in iron loadings from 120.7 lb/day to 49.3 lb/day are required. Manganese concentrations must be reduced from 5.01 mg/l to 0.15 mg/l, and reductions in manganese loadings from 796.0 lb/day to 23.8 lb/day are required. Aluminum concentrations must be reduced from 2.02 mg/l to 0.14 mg/l, and aluminum loadings must be reduced from 320.9 lb/day to 22.2 lb/day. Acidity concentrations must be reduced from 33.00 mg/l to 0.99 mg/l, and reductions in acidity loading from 5,242.9 lb/day to 157.3 lb/day are required at MC3.

Sample points MT4, MT5, MC5, MT3A, MT3B, D7, D8, MC4, and MT3 are located upstream of MC3, and loading reductions for those upstream points were prescribed. The TMDL plan accounted for loading reductions at the nine upstream sample points. For each pollutant, the total load that was removed upstream at the sample points listed above was subtracted from the existing load at point MC3, and the calculated value was compared to the allowable load at point MC3. Reductions at point MC3 are necessary for any pollutant parameter that exceeds the allowable load at MC3. The required reductions at point MC3 are shown in Table 3.13.

TABLE 3.13 POLLUTANT REDUCTIONS NECESSARY AT POINT MC3

	Iron (lb/day)	Manganese (lb/day)	Aluminum (lb/day)	Acidity (lb/day)
Existing Loads at MC3	120.7	796.0	320.9	5,242.9
Total Load Reduction (MT4, MT5, MC5, MT3A, MT3B, D7, D8, MC4, MT3)	91.53	593.1	215.6	4,795.9
Remaining Load	29.25	202.9	105.3	447.0
Allowable Loads at MT3	49.3	23.8	22.2	157.3
Percent Reduction	0	89	79	65
Load Reduction	0	179.1	83.1	289.7

Provided that the specified reductions at all upstream points are met, manganese, aluminum, and acidity are the three parameters where reductions are needed at point MC3. The loading for iron will be below the allowable load at MC3. Manganese loadings at MC3 will be reduced from 796.0 lb/day to 202.9 lb/day due to upstream reductions, so reductions in loading from 202.9 lb/day to 23.8 lb/day (89%) must be achieved in this segment. Aluminum loadings will be reduced from 320.9 lb/day to 105.3 lb/day due to upstream reductions, so reductions in loading from 105.3 lb/day to 22.2 lb/day (79%) must be achieved in this segment. Acidity loadings will be reduced from

5,242.9 lb/day to 447.0 lb/day due to upstream reductions, so reductions in loading from 447.0 lb/day to 157.3 lb/day (65%) must be achieved at MC3.

Unnamed Tributary to Montgomery Creek above MT2A

Point MT2A is located in the headwaters of an unnamed tributary (Road Trib) to Montgomery Creek that originates in a mostly residential area. It flows past a reclaimed surface mine with a pre-Act discharge before reaching the SRP2 point where it receives treated drainage from the S.R.P. (Sky Haven) Reed #1 permit. Point MT2A represents the unnamed tributary upstream of point SRP2 to the headwaters.

TMDLs have been developed for iron, manganese, and aluminum for this segment of the unnamed tributary. The pH in this segment ranges between 6.10 and 7.10, and pH values were not included in the TMDL for the segment because the stream is net alkaline at this point. The load allocations made at point MT2A are provided in Table 3.14.

TABLE 3.14 REQUIRED POLLUTANT REDUCTIONS FOR THE UNNAMED TRIBUTARY TO MONTGOMERY CREEK ABOVE SAMPLE POINT MT2A

SAMPLE POINT MT2A	MEASURED SAMPLE VALUES		ALLOWABLE VALUES		REDUCTION IDENTIFIED
	Conc. (mg/l)	Load (lb/day)	LTA Conc. (mg/l)	Load (lb/day)	Percent
Iron	1.20	1.1	0.35	0.3	71
Manganese	1.82	1.7	0.28	0.3	85
Aluminum	0.72	0.7	0.22	0.2	70
Acidity	0.56	0.5	0.55	0.5	0
Alkalinity	44.04	40.4			

All values shown in this table are long-term average daily values.

Iron concentrations in this segment must be reduced from the long-term daily value of 1.20 mg/l to 0.35 mg/l, while iron loadings must be reduced from 1.1 lb/day to 0.3 lb/day. Manganese concentrations in this segment must be reduced from 1.82 mg/l to 0.28 mg/l, while manganese loadings must be reduced from 1.7 lb/day to 0.3 lb/day. Aluminum concentrations must be reduced from 0.72 mg/l to 0.22 mg/l, while aluminum loadings must be reduced from 0.7 lb/day to 0.2 lb/day. The reductions identified are 71% for iron, 85% for manganese, and 70% for aluminum.

SRP2 Wasteload Allocation

Point SRP2 is a pre-Act deep mine discharge that was affected by surface mining as part of the S.R.P. Coal Company (Sky Haven) Reed #1 permit. Because the discharge was affected by their mining operation, Sky Haven is now responsible to treat the discharge. At the time the TMDL document was developed, the discharge flowed into holding ponds where lime/limestone were added to raise the pH and precipitate the metals. Within the past year, a passive treatment system was constructed to replace the active treatment

system at this site. Flow from this discharge is intermittent with up to a year between discharge events. This discharge flows to the unnamed tributary MT2 (Road Trib) to Montgomery Creek. The allowable load for iron is 0.4 lb/day and the allowable load for manganese is 0.3 lb/day based on measured flow data and the monthly average permit limits.

Unnamed Tributary to Montgomery Creek between MT2A and MT2

This segment of the unnamed tributary (Road Trib) to Montgomery Creek receives drainage from the SRP2 Reed #1 treatment system. Sources of mine drainage enter the tributary both above and below the treatment system, degrading the stream from just below the effluent of the treatment system to the mouth (point MT2).

The load reductions for this segment consist of reductions in iron, manganese, aluminum, and acidity. While the pH in this segment ranges from 6.60 to 7.15, acidity will be addressed as part of this TMDL because the water quality is net acidic due to mining impacts in this segment. The *Montgomery Creek Watershed TMDL* developed load allocations for sample point MT2. These allocations are provided in Table 3.15.

TABLE 3.15 LOAD ALLOCATIONS FOR THE UNNAMED TRIBUTATY TO MONTGOMERY CREEK BETWEEN MT2A AND MT2

SAMPLE POINT MT2	MEASURED SAMPLE VALUES		ALLOWABLE SAMPLE VALUES	
	Conc. (mg/l)	Load (lb/day)	LTA Conc. (mg/l)	Load (lb/day)
Iron	3.44	12.6	0.45	1.3 (1.7)*
Manganese	8.33	30.6	0.25	0.6 (0.9)*
Aluminum	1.96	7.2	0.31	1.1
Acidity	23.47	86.1	3.05	11.2
Alkalinity	17.53	64.3		

All values shown in this table are long-term average daily values.
* Values in parentheses are allowable loads at MT2 before subtracting loads from the wasteload allocation for SRP2.

Based on the data included in Table 3.15, reductions in iron concentrations from 3.44 mg/l to 0.45 mg/l, and reductions in iron loadings from 12.6 lb/day to 1.3 lb/day are required. Manganese concentrations must be reduced from 8.33 mg/l to 0.25 mg/l, and reductions in manganese loadings from 30.6 lb/day to 0.6 lb/day are required. Aluminum concentrations must be reduced from 1.96 mg/l to 0.31 mg/l, and aluminum loadings must be reduced from 7.2 lb/day to 1.1 lb/day. Acidity concentrations must be reduced from 23.47 mg/l to 3.05 mg/l, and reductions in acidity loading from 86.1 lb/day to 11.2 lb/day are required at MT2.

Sample point MT2A is located upstream of MT2, and loading reductions for that upstream point were prescribed. The TMDL plan accounted for loading reductions at the upstream sample point. For each pollutant, the total load that was removed upstream at the sample point listed above was subtracted from the existing load at point MT2, and the calculated value was compared to the allowable load at point MT2. Reductions at point MT2 are necessary for any pollutant parameter that exceeds the allowable load at MT2. The required reductions at point MT2 are shown in Table 3.16.

TABLE 3.16 POLLUTANT REDUCTIONS NECESSARY AT POINT MT2

	Iron (lb/day)	Manganese (lb/day)	Aluminum (lb/day)	Acidity (lb/day)
Existing Loads at MT2	12.6	30.6	7.2	86.1
Total Load Reduction (MT2A)	0.8	1.4	0.5	0
Remaining Load	11.8	29.2	6.7	86.1
Allowable Loads at MT2	1.3	0.6	1.1	11.2
Percent Reduction	89	98	84	87
Load Reduction	10.5	28.6	5.6	74.9

Provided that the specified reductions at MT2A are met, iron, manganese, aluminum, and acidity are the parameters where reductions are needed at point MT2. Iron loadings at MT2 will be reduced from 12.6 lb/day to 11.8 lb/day due to upstream reductions, so reductions in loading from 11.8 lb/day to 1.3 lb/day (89%) must be achieved in this segment. Manganese loadings at MT2 will be reduced from 30.6 lb/day to 29.2 lb/day due to upstream reductions, so reductions in loading from 29.2 lb/day to 0.6 lb/day (98%) must be achieved in this segment. Aluminum loadings will be reduced from 7.2 lb/day to 6.7 lb/day due to upstream reductions, so reductions in loading from 6.7 lb/day to 1.1 lb/day (84%) must be achieved in this segment. Acidity loadings will not be reduced due to upstream reductions, so reductions in loading from 86.1 lb/day to 11.2 lb/day (87%) must be achieved at MT2.

Montgomery Creek between MC3 and MC2

This segment of Montgomery Creek begins immediately downtream from the unnamed tributary MT3 (Killer Trib) at the previously described point, MC3, and ends downstream from the unnamed tributary MT2 (Road Trib). This segment receives discharges from the unnamed tributary MT2 and an intermittent abandoned mine discharge, D5. The load reductions for this segment consist of reductions in iron, manganese, aluminum, and acidity. While the pH data for point MC2 was not available, acidity will be addressed as part of this TMDL because the water quality is net acidic due to mining impacts in this segment. The *Montgomery Creek Watershed TMDL* developed load allocations for sample point MC2. These allocations are provided in Table 3.17.

TABLE 3.17 LOAD ALLOCATIONS FOR MONTGOMERY CREEK BETWEEN MC3 AND MC2

SAMPLE POINT MC2	MEASURED SAMPLE VALUES		ALLOWABLE SAMPLE VALUES	
	Conc. (mg/l)	Load (lb/day)	LTA Conc. (mg/l)	Load (lb/day)
Iron	1.26	213.5	0.39	66.1
Manganese	9.47	1,604.9	0.19	32.2
Aluminum	3.68	623.6	0.18	30.5
Acidity	55.14	9,344.5	1.10	186.4
Alkalinity	5.43	920.2		

All values shown in this table are long-term average daily values.

Based on the data included in Table 3.17, reductions in iron concentrations from 1.26 mg/l to 0.39 mg/l, and reductions in iron loadings from 213.5 lb/day to 66.1 lb/day are required. Manganese concentrations must be reduced from 9.47 mg/l to 0.19 mg/l, and reductions in manganese loadings from 1,604.9 lb/day to 32.2 lb/day are required. Aluminum concentrations must be reduced from 3.68 mg/l to 0.18 mg/l, and aluminum loadings must be reduced from 623.6 lb/day to 30.5 lb/day. Acidity concentrations must be reduced from 55.14 mg/l to 1.10 mg/l, and reductions in acidity loading from 9,344.5 lb/day to 186.4 lb/day are required at MC2.

Sample points MT4, MT5, MC5, MT3A, MT3B, D7, D8, MC4, MT3, MC3, MT2A and MT2 are located upstream of MC2, and loading reductions for those upstream points were prescribed. The TMDL plan accounted for loading reductions at the twelve upstream sample points. For each pollutant, the total load that was removed upstream at the sample points listed above was subtracted from the existing load at point MC2, and the calculated value was compared to the allowable load at point MC2. Reductions at point MC2 are necessary for any pollutant parameter that exceeds the allowable load at MC2. The required reductions at point MC2 are shown in Table 3.18.

TABLE 3.18 POLLUTANT REDUCTIONS NECESSARY AT POINT MC2

	Iron (lb/day)	Manganese (lb/day)	Aluminum (lb/day)	Acidity (lb/day)
Existing Loads at MC2	213.5	1,604.9	623.6	9,344.5
Total Load Reduction (MT4, MT5, MC5, MT3A, MT3B, D7, D8, MC4, MT3, MC3, MT2A, MT2)	102.83	802.2	304.8	5,160.5
Remaining Load	110.67	802.7	318.8	4,184.0
Allowable Loads at MC2	66.1	32.2	30.5	186.4
Percent Reduction	41	96	91	96
Load Reduction	44.57	770.5	288.3	3,997.6

Provided that the specified reductions at all upstream points are met, iron, manganese, aluminum, and acidity are the parameters where reductions are needed at point MC2. Iron loadings at MC2 will be reduced from 213.5 lb/day to 110.67 lb/day due to upstream reductions, so reductions in loading from 110.67 lb/day to 66.1 lb/day (41%) must be achieved in this segment. Manganese loadings will be reduced from 1,604.9 lb/day to 802.7 lb/day due to upstream reductions, so reductions in loading from 802.7 lb/day to 32.2 lb/day (96%) must be achieved in this segment. Aluminum loadings will be reduced from 623.6 lb/day to 318.8 lb/day due to upstream reductions, so reductions in loading from 318.8 lb/day to 30.5 lb/day (91%) must be achieved in this segment. Acidity loadings will be reduced from 9,344.5 lb/day to 4,184.0 lb/day due to upstream reductions, so reductions in loading from 4,184.0 lb/day to 186.4 lb/day (96%) must be achieved at MC2.

Unnamed Tributary to Montgomery Creek above MT1

Point MT1 is located at the mouth of the unnamed tributary (Last Trib) to Montgomery Creek. It receives mine drainage from at least one abandoned mine discharge, D1. Point MT1 represents the unnamed tributary upstream of its confluence with Montgomery Creek.

TMDLs have been developed for iron, manganese, aluminum, and acidity for this segment of the unnamed tributary. The pH in this segment ranges between 6.60 and 6.85, and acidity values were addressed in the TMDL for the segment because of mining impacts to the stream. The load allocations made at point MT1 are provided in Table 3.19.

TABLE 3.19 REQUIRED POLLUTANT REDUCTIONS FOR THE UNNAMED TRIBUTARY TO MONTGOMERY CREEK ABOVE SAMPLE POINT MT1

SAMPLE POINT MT1	MEASURED SAMPLE VALUES		ALLOWABLE VALUES		REDUCTION IDENTIFIED
	Conc. (mg/l)	Load (lb/day)	LTA Conc. (mg/l)	Load (lb/day)	Percent
Iron	2.39	9.2	0.31	1.2	87
Manganese	4.90	18.8	0.25	1.0	95
Aluminum	2.00	7.7	0.16	0.6	92
Acidity	12.89	49.5	3.73	14.3	71
Alkalinity	27.90	107.0			

All values shown in this table are long-term average daily values.

Iron concentrations in this segment must be reduced from the long-term daily value of 2.39 mg/l to 0.31 mg/l, while iron loadings must be reduced from 9.2 lb/day to 1.2 lb/day. Manganese concentrations in this segment must be reduced from 4.90 mg/l to 0.25 mg/l, while manganese loadings must be reduced from 18.8 lb/day to 1.0 lb/day. Aluminum concentrations must be reduced from a 2.00 mg/l to 0.16 mg/l, while aluminum loadings must be reduced from 7.7 lb/day to 0.6 lb/day. Acidity concentrations must be reduced

from 12.89 mg/l to 3.73 mg/l, while acidity loadings must be reduced from 49.5 lb/day to 14.3 lb/day. The reductions identified are 87% for iron, 95% for manganese, 92% for aluminum, and 71% for acidity.

SRP1 Wasteload Allocation

Point SRP1 is a pre-Act deep mine discharge that was affected by surface mining as part of the S.R.P. Coal Company (Sky Haven) McPherson #2 permit. Because the discharge was affected by their mining operation, Sky Haven is now responsible to treat the discharge. The discharge flows from the deep mine through a passive limestone channel. Flow from this discharge is fairly constant. This discharge flows to the unnamed tributary MT1 (Last Trib) to Montgomery Creek. The allowable load for iron is 0.8 lb/day, the allowable load for manganese is 0.5 lb/day, and the allowable load for aluminum is 0.5 lb/day based on measured flow data and the monthly average permit limits.

Montgomery Creek between MC2 and MC1

This segment of Montgomery Creek begins at the previously described point, MC2, and ends downstream at point MC1 near the post office in Hyde. This segment receives discharges from the unnamed tributary MT1, the McPherson #2 passive treatment system (SRP1), and three abandoned mine discharges (D2, D3, and D4). The load reductions for this segment consist of reductions in iron, manganese, aluminum, and acidity. While the pH at point MC1 ranged from 3.90 to 4.70, acidity will be addressed as part of this TMDL because the water quality is net acidic due to mining impacts in this segment. The *Montgomery Creek Watershed TMDL* developed load allocations for sample point MC1. These allocations are provided in Table 3.20.

TABLE 3.20 LOAD ALLOCATIONS FOR MONTGOMERY CREEK BETWEEN MC2 AND MC1

SAMPLE POINT MC1	MEASURED SAMPLE VALUES		ALLOWABLE SAMPLE VALUES	
	Conc. (mg/l)	Load (lb/day)	LTA Conc. (mg/l)	Load (lb/day)
Iron	0.30	55.5	0.30	54.7 (55.5)*
Manganese	5.44	1,007.2	0.22	40.2 (40.7)*
Aluminum	2.23	412.9	0.18	32.8 (33.3)*
Acidity	41.33	7,652.2	0.41	75.9
Alkalinity	6.07	1,123.8		

All values shown in this table are long-term average daily values.
*Values in parentheses are allowable loads at MC1 before subtracting the wasteload allocation for SRP1.

Based on the data included in Table 3.20, iron concentrations of 0.30 mg/l are allowable at point MC1, and reductions in iron loadings from 55.5 lb/day to 54.7 lb/day are

required. Manganese concentrations must be reduced from 5.44 mg/l to 0.22 mg/l, and reductions in manganese loadings from 1,007.2 lb/day to 40.2 lb/day are required. Aluminum concentrations must be reduced from 2.23 mg/l to 0.18 mg/l, and aluminum loadings must be reduced from 412.9 lb/day to 32.8 lb/day. Acidity concentrations must be reduced from 41.33 mg/l to 0.41 mg/l, and reductions in acidity loading from 7,652.2 lb/day to 75.9 lb/day are required at MC1.

Sample points MT4, MT5, MC5, MT3A, MT3B, D7, D8, MC4, MT3, MC3, MT2A, MT2, MC2, and MT1 are located upstream of MC1, and loading reductions for those upstream points were prescribed. The TMDL plan accounted for loading reductions at the fourteen upstream sample points. For each pollutant, the total load that was removed upstream at the sample points listed above was subtracted from the existing load at point MC1, and the calculated value was compared to the allowable load at point MC1. Reductions at point MC1 are necessary for any pollutant parameter that exceeds the allowable load at MC1. The required reductions at point MC1 are shown in Table 3.21.

TABLE 3.21 POLLUTANT REDUCTIONS NECESSARY AT POINT MC1

	Iron (lb/day)	Manganese (lb/day)	Aluminum (lb/day)	Acidity (lb/day)
Existing Loads at MC1	55.5	1,007.2	412.9	7,652.2
Total Load Reduction (MT4, MT5, MC5, MT3A, MT3B, D7, D8, MC4, MT3, MC3, MT2A, MT2, MC2, MT1)	155.4	1,590.5	600.2	9,193.3
Remaining Load	0	0	0	0
Allowable Loads at MC1	54.7	40.2	32.8	75.9
Percent Reduction	0	0	0	0
Load Reduction	0	0	0	0

Provided that the specified reductions at all upstream points are met, reductions are not needed at point MC1. Iron loadings at MC1 will be reduced from 55.5 lb/day to 0 lb/day due to upstream reductions. The allowable iron load is 54.7 lb/day, so no further reductions must be achieved in this segment. Manganese loadings at MC1 will be reduced from 1,007.2 lb/day to 0 lb/day due to upstream reductions. The allowable manganese load is 40.2 lb/day, so no further reductions must be achieved in this segment. aluminum loadings at MC1 will be reduced from 412.9 lb/day to 0 lb/day due to upstream reductions. The allowable aluminum load is 32.8 lb/day, so no further reductions must be achieved in this segment. Acidity loadings at MC1 will be reduced from 7,652.2 lb/day to 0 lb/day due to upstream reductions. The allowable iron load is 75.9 lb/day, so no further reductions must be achieved at MC1.

3.2 Impacts to Downstream Waters

Montgomery Creek discharges to the West Branch Susquehanna River near the town of Hyde. The West Branch Susquehanna River at Hyde is somewhat impacted by AMD.

The restoration activities in the Montgomery Creek watershed will help to reduce the metal and acid loadings and increase the buffering capacity of the West Branch Susquehanna River, further enhancing the already recovering fishery that exists there. The Old Town Sportsmen's Association is currently working with Trout Unlimited to perform a benthic survey of the main stem of the West Branch that will become a valuable tool in determining the effects that restoration of Montgomery Creek will have on the river.

The restoration of Montgomery Creek through the implementation of restoration projects in the priority areas will result in a reduction in pollutant loadings in the West Branch Susquehanna River. However, the reduction in loadings from Montgomery Creek to the West Branch alone will not be sufficient to completely restore the West Branch below its confluence with Montgomery Creek. It will, however, have a positive impact to the aquatic community in the river until influences from other AMD-impacted streams, such as Clearfield Creek, Deer Creek and Moshannon Creek, enter downstream. Restoration of Montgomery Creek should also allow for fish and other aquatic life to move from the river upstream into Montgomery Creek into areas of suitable habitat that are currently inaccessible to them due to poor water quality.

4.0 MANAGEMENT MEASURES REQUIRED TO ACHIEVE PRESCRIBED LOAD REDUCTIONS

Water quality and flow data were studied during the assessment of Montgomery Creek in preparation for development of this implementation plan. Based on the data collected during the assessment, eleven priority areas for restoration were identified to aid in meeting the prescribed TMDLs for the different segments of Montgomery Creek. Existing best management practices (BMPs), areas designated for additional pollution controls, and appropriate best management practices and their anticipated performance are described in the following paragraphs.

4.1 Existing Best Management Practices

Existing BMPs relating to impairments from AMD in the Montgomery Creek Watershed include both active and passive treatment systems, remining and reclamation activities, and other BMPs. As announced for the 2007 grant round, a Section 319 grant for the design and permitting of a passive treatment system on the MON 52A discharge has been awarded to the Lawrence Township Board of Supervisors and Montgomery Run Watershed Association. Passive treatment systems in the form of limestone channels and settling ponds (SRP1 and SRP2) have been constructed as part of the S.R.P. Coal Company (Sky Haven) Reed #1 permit and McPherson #2 permit as described in Section 3 of this report. Reclamation has occurred in various areas throughout the watershed, while remining and eventual reclamation is currently occurring in the headwaters of the unnamed tributary (Killer Trib) as part of the Kenneth K. Rishel & Son "Moore" surface mining permit. Within the past year, a passive treatment system including a vertical flow wetland went online and flows to the unnamed tributary (Road Trib) to Montgomery Creek. It treats water that is discharging from the Reed #1 permit area (SRP2) and was formerly being treated using lime addition and settling basins. A picture of this new treatment system can be found in Appendix E.

4.2 Areas Designated for Additional Controls

The available water quality data from both the assessment and historic mining permits were used to identify areas where additional controls are needed. Eleven priority areas within the watershed have been designated as having a need for BMPs to control pollutants resulting from AMD. The proposed controls are located at eleven remaining large AMD sources. Approximately three miles of the main stream and an additional three miles of tributaries could benefit from this work. The areas where controls are proposed include the following:

- MON 52A, Big Weir discharge
- MON 52B, iron bog discharge
- MON 40, 41 & 42, Mt. Everest discharges
- MON 30, Charlie's Weir discharge
- MON 34, Plant Trib
- MON 68, Big Pond

- MON 23, Coutriaux's deep mine discharge
- MON 73, Dog Trib discharge
- MON 71, Danvir's Cistern
- MON 67, Killer Trib
- MON 48A, Two Pipe Seep

The location of each of these areas is provided on the figure labeled "Overview of Proposed Treatment Systems" in Appendix A. Each area is described in detail in the following paragraphs along with the cost estimate for each treatment option and the predicted effect on the receiving stream. Conceptual designs for each BMP are located in Appendix D and a photograph of each priority area as it currently exists can be found in Appendix E.

Priority #1: MON 52A, Big Weir discharge

Site Description:

This monitoring point appears to be emanating from an abandoned deep mine. It flows into an impoundment that appears to have been built during previous surface mining activities. From there, it seeps under the breast of the impoundment and flows in a channel through a small open meadow and then into a wooded area where it is joined by additional seeps from an adjacent hillside that has been previously surface mined. Within this channel, iron precipitate has built up over a long period of time resulting in a terraced effect.

Summary of Chemistry for MON 52A

	Flow (gpm)	pH Lab (SU)	Cond (Umhos)	Acidity (mg/l)	Acid Load (lbs/day)	Iron (mg/l)	Iron Load (lbs/day)	Mn (mg/l)	Al (mg/l)	Sulfate (mg/l)
Average	210.03	3.67	2219.17	80.58	179.25	5.27	10.05	22.33	4.97	1342.92
Min	20.40	3.20	2020.00	49.00	27.15	2.30	1.96	17.90	3.27	1180.00
Max	458.00	3.90	2470.00	120.00	354.32	11.60	13.90	27.80	7.18	1492.00
75% CI	254.50	3.74	2265.60	87.40	208.54	6.18	11.08	23.49	5.36	1380.17
90% CI	273.62	3.77	2285.56	90.32	221.13	6.57	11.53	23.99	5.53	1396.19

Recommendations:

A grant was submitted for the design and permitting phase for MON 52A in the 2007 Growing Greener Grant and it was recently learned that it has been funded. This discharge was designated as the number one treatment priority as the restoration plan was being completed. The design flow is 275 gpm, Fe is 10 mg/L, Al is 6 mg/L, and Mn is 25 mg/L. The discharge will be treated in the valley and will gather the lower seeps in a treatment cell or bypass the system in a lined diversion or by-pass ditch. Due to the high flow that travels through the valley at times, in part due to run-off, a large amount of limestone is needed. The proposed system will be a vertical flow wetland (VFW) due to moderate levels of both iron and aluminum. Automatic flushers will be incorporated because of the moderate aluminum levels and the high flow rates, but valves will also be part of the design to allow for manual flushing.

Two options will be considered at this site. The first will be to treat the 90% CI of 275 gpm. This flow will need 5200 tons of limestone to produce a net alkalinity of 95 mg/L. The treatment train will involve leaving the original pond at the top of the valley as an equalization basin followed by a VFW with 2000 tons of limestone followed by a settling basin. Another VFW with 1700 tons of limestone will follow with another settling basin. A final VFW with 1500 tons of limestone and a final settling basin will complete the train. The system will also contain a bypass channel to handle large storm events.

An alternative is to consider treating 200 gpm due to the placement of the weir and the great possibility that the extra flow in the spring was due to runoff in the valley. Treating only 200 gpm would reduce the limestone volume to 4000 tons. The treatment train would again consist of leaving the existing pond in place and having 2 VFW, each with 2000 tons of limestone and each being followed by a settling basin. This would greatly reduce the cost of the construction of the system in both excavation and material costs.

The estimated cost of constructing the treatment train of option #1 is $675,000 and constructing the treatment train of option #2 is $525,000.

Predicted Effect of System on Receiving Stream:

The water discharging from the polishing wetland should be alkaline in nature with minimal iron and aluminum concentrations. The treatment will remove 180 lbs/day of acidity, 10 lbs/day of iron, and 5 lbs/day of aluminum. The metals will be retained in the series of settling ponds. The treated water will be able to support an aquatic community and will begin the neutralization of Montgomery Creek.

Other:

The moderate aluminum concentrations at this site will minimize the need for flushing. An automatic flushing system, however, will be installed on the VFWs. A final O&M plan will be developed with the construction phase of the project once final design specifications are complete. Additional maintenance will include the removal of precipitated metals from the settling ponds. The ponds will be designed for a 10-year lifespan. Visual checks of the system will be made monthly to insure that wildlife is not affecting the integrity of the system. A monitoring plan will be established to determine the overall effects of the treatment system on water quality. The Montgomery Run Watershed Association has agreed to assume the long term O&M of the treatment system. They will be conducting the monthly checks and reporting to the consultant if any corrections need to be made.

Priority #2: MON 52B, iron bog discharge

Site Description:

This monitoring point is a small wetland, iron bog area, located along the stream bank of an unnamed tributary (Killer Trib) of Montgomery Creek. This discharge is located just

above where the MON 52A discharge enters the unnamed tributary. Water from this iron seep seems to be coming from the same source as the other seeps that enter MON 52A.

Summary of Chemistry for MON 52B

	Flow (gpm)	pH Lab (SU)	Cond (Umhos)	Acidity (mg/l)	Acid Load (lbs/day)	Iron (mg/l)	Iron Load (lbs/day)	Mn (mg/l)	Al (mg/l)	Sulfate (mg/l)
Average	13.59	3.43	2059.17	104.67		16.57		27.88	1.97	1156.33
Min	0.69	3.10	1420.00	53.00		7.57		17.30	0.78	720.00
Max	20.72	3.90	2780.00	169.00		28.80		36.50	4.61	1621.00
75% CI	21.03	3.51	2195.24	116.47		18.72		29.97	2.34	1256.30
90% CI	24.22	3.54	2253.74	121.55		19.64		30.87	2.51	1299.27

Recommendations:

This discharge was designated as the second priority for treatment due to its proximity to MON 52A. A grant will be submitted to the PA Growing Greener Program in the 2008 grant round for the design/permitting phase of the project. The design flow is 25 gpm, Fe is 20 mg/L, Al is 2.5 mg/L, and Mn is 30 mg/L. This site is extremely difficult to treat due to its proximity to the stream channel. The recommendation for treatment is to build a wetland for settling with 400 tons of limestone mixed with organic matter to allow the iron to settle and to increase the pH. The iron level is fairly high, so it would be advantageous to allow for settling in a constructed wetland instead of in the stream channel. A major issue will be permitting at this site as wetland impacts will be unavoidable although the wetland is sustained by the AMD and is highly degraded in nature.

The estimated cost of constructing the wetland is $125,000.

Predicted Effect of System on Receiving Stream:

The water discharging from the constructed wetland may still be acidic in nature due to precipitation of iron hydroxide, but the goal of the wetland is to precipitate the iron as much as possible and keep it out of the stream channel. Flows were very difficult to obtain at this site due to the diffuse nature of the discharge so further study may be needed during the design phase to gather more flow data and ensure a proper design flow.

Other:

A final O&M plan will be developed with the construction phase of the project once final design specifications are complete. Visual checks of the system will be made monthly to insure that wildlife is not affecting the integrity of the system. A monitoring plan will be established to determine the overall effects of the treatment system on water quality. The Montgomery Run Watershed Association has agreed to assume the long term O&M of the treatment system. They will be conducting the monthly checks and reporting to the project consultant if any corrections need to be made.

Priority #3: MON 40, 41 & 42, Mt. Everest discharges

Site Description:

These monitoring points are comprised of three discharges that are connected to deep mines. MON 40 & 41 have similar chemistry and come from the same seam, and MON 42 has a differing chemistry and must come from a different seam. The main channel is comprised of the high flow MON 40, which appears to be a drift mine. It combines with flow from MON 41, which also appears to emanate from a drift mine. MON 42 is connected to both a deep mine and surface flow and typically dries up during low flow conditions. These three discharges will be combined and treated in a single treatment system.

Summary of Chemistry on MON 40, 41, 42

MON 40

	Flow (gpm)	pH Lab (SU)	Cond (Umhos)	Acidity (mg/l)	Acid Load (lbs/day)	Iron (mg/l)	Iron Load (lbs/day)	Mn (mg/l)	Al (mg/l)	Sulfate (mg/l)
Average	77.36	3.69	2883.33	213.67	172.94	1.45	1.79	42.43	26.12	1882.50
Min	29.00	3.50	2610.00	176.00	0.00	0.48	0.00	36.20	20.20	1657.00
Max	260.87	3.80	3280.00	257.00	550.54	4.50	14.08	48.00	30.70	2377.00
75% CI	99.79	3.72	2960.54	223.06	218.08	1.92	3.08	43.64	27.12	1954.35
90% CI	109.44	3.73	2993.74	227.10	237.49	2.12	3.63	44.16	27.55	1985.23

MON 41

	Flow (gpm)	pH Lab (SU)	Cond (Umhos)	Acidity (mg/l)	Acid Load (lbs/day)	Iron (mg/l)	Total Fe	Mn (mg/l)	Al (mg/l)	Sulfate (mg/l)
Average	20.61	3.69	2850.83	199.33	44.44	1.18	0.29	42.63	25.61	1847.00
Min	4.21	3.40	2610.00	172.00	0.00	0.58	0.00	33.40	19.80	1625.00
Max	34.29	3.80	3240.00	231.00	78.12	2.64	1.09	52.60	32.20	2120.00
75% CI	24.28	3.73	2918.79	205.90	53.15	1.39	0.38	44.54	26.75	1899.47
90% CI	25.85	3.75	2948.01	208.73	56.89	1.48	0.42	45.36	27.25	1922.03

MON 42

	Flow (gpm)	pH Lab (SU)	Cond (Umhos)	Acidity (mg/l)	Acid Load (lbs/day)	Iron (mg/l)	Total Fe	Mn (mg/l)	Al (mg/l)	Sulfate (mg/l)
Average	13.07	3.42	2224.00	142.60	42.09	2.59	0.73	23.46	16.88	1299.80
Min	0.00	3.20	2070.00	126.00	0.00	1.38	0.00	21.70	15.10	1204.00
Max	65.94	3.50	2470.00	155.00	121.77	4.16	2.21	26.40	19.30	1530.00
75% CI	23.11	3.49	2302.16	148.99	72.34	3.21	1.26	24.52	17.81	1368.22
90% CI	27.43	3.52	2335.75	151.74	85.35	3.48	1.49	24.97	18.22	1397.63

Recommendations:

A grant will be submitted for the design and permitting phase for MON 40, 41 and 42 in the 2008 Growing Greener Grant Round. These discharges were designated as the third priority for treatment during the assessment because of the severity of their chemistry and their location in the watershed. The discharges will be combined and treated together, so the combined design chemistry using mass balance is flow at 175 gpm, 3 mg/L of Fe, 25 mg/L of Al, and 36 mg/L of Mn. The main issue at this site is wetland impacts. The system will have to be built to fit the space, while minimizing wetland impacts. It will most likely be "serpentine" in shape as it meanders back and forth on both sides of the

existing access road to minimize the impact to the existing wetlands. The wetlands have formed due to the mine discharges, but it may be possible that mitigation will be needed. The treatment train will consist of a sacrificial cell of 800 tons of limestone due to the high aluminum levels. This cell will allow for aluminum to precipitate while protecting the integrity of the remaining components. A VFW with 1700 tons of limestone and a settling basin will follow it. An additional limestone cell with 2000 tons of limestone will follow and a final settling basin. The iron levels are relatively low at this site, so the first VFW will remove the iron and will not be necessary as the second major component. This will save money in organic matter cost. Automatic flushers will be incorporated because of the moderate aluminum levels and the high flow rates, but valves will also be part of the design to allow for manual flushing.

The estimated cost of constructing the treatment train is $625,000.

Predicted Effect of System on Receiving Stream:

The water discharging from the polishing wetland should be alkaline in nature with minimal iron and aluminum concentrations. The treatment will remove 80 lbs/day of acidity, 1 lb/day of iron, and 10 lbs/day of aluminum. The metals will be retained in the series of settling ponds. The treated water will be able to support an aquatic community and will continue the neutralization of Montgomery Creek.

Other:

The high aluminum concentrations at this site have made it necessary to include a sacrificial cell into the treatment train to protect the integrity of the remaining components. We have also included automatic flushing systems and manual valves to allow for flushing when deemed necessary. A final O&M plan will be developed with the construction phase of the project once final design specifications are complete. Additional maintenance will include the removal of precipitated metals from the settling ponds. The ponds will be designed for a 10-year lifespan. Visual checks of the system will be made monthly to insure that wildlife is not affecting the integrity of the system. A monitoring plan will be established to determine the overall effects of the treatment system on water quality. The Montgomery Run Watershed Association has agreed to assume the long term O&M of the treatment system. They will be conducting the monthly checks and reporting to the project consultant if any corrections need to be made.

Priority #4: MON 30, Charlie's Weir discharge

Site Description:

This monitoring point is a small tributary that emerges from a reclaimed surface mine site with numerous AMD seeps. A biologically dead area where seeps emerge can be seen in the large reclaimed field. The tributary also is connected with degraded runoff from the reclaimed surface mine site and can see high flow fluctuation rates. All flow from the

reclaimed surface mine site collects into a discrete channel and flows through a previously mined but now wooded area before discharging into Montgomery Creek. The source of pollution from the reclaimed surface mine is the only discrete source that degrades the unnamed tributary although runoff and base flow to the stream are likely also degraded due to past mining practices.

Summary of Chemistry on MON 30

	Flow (gpm)	pH Lab (SU)	Cond (Umhos)	Acidity (mg/l)	Acid Load (lbs/day)	Iron (mg/l)	Iron Load (lbs/day)	Mn (mg/l)	Al (mg/l)	Sulfate (mg/l)
Average	14.30	3.45	630.18	94.18	8.61	5.62	0.33	8.24	9.47	252.45
Min	0.07	2.80	323.00	41.00	0.10	1.41	0.01	3.25	4.88	115.00
Max	108.00	3.90	917.00	130.00	53.10	9.56	1.83	10.50	11.70	318.00
75% CI	26.41	3.57	694.08	103.22	14.49	6.59	0.53	9.04	10.31	274.07
90% CI	31.62	3.62	721.54	107.11	17.02	7.01	0.61	9.38	10.67	283.36

Recommendations:

MON 30 has two recommendations to treat the discharge. One is to treat in the existing channel that is created by the discharge and the second is to try to capture the discharge where it emanates in the farm field. Both options need 1200 tons of limestone to treat the discharge based on the chemistry of a flow of 30 gpm, acidity of 110 mg/L, Fe concentration of 7 mg/L and Al concentration of 12 mg/L. It is also recommended to try to vegetate the grassy reclaimed strip-mined area to decrease infiltration and runoff to the channel area.

The treatment train for option #1 would entail constructing an upflow pond at the beginning of the seep in the field followed by a settling basin. A VFW would then be constructed followed by an additional settling basin. Option #2 would be to construct an equalization basin in the channel followed by a VFW with 1200 tons of limestone followed by a settling basin. A flushing component would be a part of both options due to the moderate levels of aluminum. A concern with option #1 is that it is unknown what excavation at the source of the discharge may uncover. Without further investigation into the deep mine history of the area, option #2 is probably the safest option.

The estimated cost of constructing the treatment train for option #1 is $350,000, and the estimated cost for option #2 is $275,000.

Predicted Effect of System on Receiving Stream:

The water discharging from the final settling basin should be alkaline in nature with minimal iron and aluminum concentrations. The treatment will remove 10 lbs/day of acidity, 1 lb/day of iron, and 1 lb/day of aluminum. The metals will be retained in the series of settling ponds. The treated water will be able to support an aquatic community and will continue the neutralization of Montgomery Creek.

Other:

The moderate aluminum concentrations at this site will minimize the need for flushing. Therefore, an automatic flushing system will be installed on the VFWs. A final O&M plan will be developed with the construction phase of the project once final design specifications are complete. Additional maintenance will include the removal of precipitated metals from the settling ponds. The ponds will be designed for a 10-year lifespan. Visual checks of the system will be made monthly to insure that wildlife is not affecting the integrity of the system. A monitoring plan will be established to determine the overall effects of the treatment system on water quality. The Montgomery Run Watershed Association has agreed to assume the long term O&M of the treatment system. They will be conducting the monthly checks and reporting to the project consultant if any corrections need to be made.

Priority #5: MON 34, Plant Trib

Site Description:

This monitoring point is the mouth of the small tributary (Plant Trib) that begins unimpaired and is joined by MON 30 (Charlie's Trib) before flowing through some previously mined but now forested land and into Montgomery Creek. Although the previously mined land is now forested, it still consists of large spoil areas that were planted with pine trees. Two to three small seeps enter downstream of the spoil piles, but do not significantly change the quality of the tributary.

Summary of Chemistry on MON 34

	Flow (gpm)	pH Lab (SU)	Cond (Umhos)	Acidity (mg/l)	Acid Load (lbs/day)	Iron (mg/l)	Iron Load (lbs/day)	Mn (mg/l)	Al (mg/l)	Sulfate (mg/l)
Average	488.26	4.16	209.58	25.58	132.50	0.33	1.91	2.05	2.39	68.67
Min	23.25	3.80	127.00	13.00	10.32	0.14	0.08	0.93	1.00	35.00
Max	1055.35	5.00	343.00	37.00	299.56	0.58	5.19	4.66	3.78	129.00
75% CI	624.40	4.26	226.57	27.98	166.53	0.36	2.46	2.39	2.62	76.38
90% CI	682.92	4.31	233.87	29.02	181.15	0.38	2.70	2.54	2.71	79.69

Recommendations:

MON 34 is slightly different than the other sites. The recommendation here is to actually treat the tributary instead of treating a discrete discharge. Two options are recommended for this tributary. The first is to pull off 150 gpm near the headwaters of the tributary and run through a limestone cell to increase the pH and allow aluminum to precipitate. The second option is to place 200 tons per year of limestone sand along the stream bank and allow it to wash into the stream. A concern with this would be the aluminum precipitating in the stream and the length of stream necessary for mixing to occur. The design chemistry at the weir was a flow rate of 680 gpm, acidity of 30 mg/L, Fe less than 1 mg/L and Al of 3 mg/L. The chemistry is not that severe, but severe enough to not allow fish to survive. By treating through either lime sand addition or by treating 120 gpm of stream water running through two limestone cells of 1200 tons each with a settling basin in

between, the pH would increase and the aluminum levels would decrease to sufficient values able to support a fish community.

The estimated cost of constructing the treatment train for option #1 is $225,000, and the estimated cost for option #2 is $4,000/year. The cost for option one is more expensive up front, but it would be designed to function for 25 years with limited maintenance compared to option #2 which would have yearly costs associated with it, along with stream impacts.

Predicted Effect of System on Receiving Stream:

The water discharging from the final settling basin in option #1 should be alkaline in nature with minimal iron and aluminum concentrations. The treatment will remove 10 lbs/day of acidity, 1 lb/day of iron, and 1 lb/day of aluminum. The metals will be retained in the series of settling ponds. The treated water will be able to support an aquatic community and will continue the neutralization of Montgomery Creek.

Other:

The low aluminum concentrations at this site will minimize the need for flushing with option #1. A final O&M plan will be developed with the construction phase of the project once final design specifications are complete. Additional maintenance will include the removal of precipitated metals from the settling ponds. The ponds will be designed for a 10-year lifespan. Visual checks of the system will be made monthly to insure that wildlife is not affecting the integrity of the system. A monitoring plan will be established to determine the overall effects of the treatment system on water quality. The Montgomery Run Watershed Association has agreed to assume the long term O&M of the treatment system. They will be conducting the monthly checks and reporting to the project consultant if any corrections need to be made.

Priority #6: MON 68, Big Pond

Site Description:

This monitoring point is below a large pond that is formed by numerous seeps emanating from a large reclaimed surface mine which feeds the headwaters of the unnamed tributary (Last Trib) to Montgomery Creek. The seeps form from toe-of-spoil seepage that enters all along the pond. The pond also has an intermittent channel that enters. The channel is formed from toe of spoil seepage entering along the edge of the reclaimed surface mine. An additional source of hydrology enters from above the reclaimed strip mine. The weir catches all sources of hydrology mentioned.

Summary of Chemistry on MON 68

	Flow (gpm)	pH Lab (SU)	Cond (Umhos)	Acidity (mg/l)	Acid Load (lbs/day)	Iron (mg/l)	Iron Load (lbs/day)	Mn (mg/l)	Al (mg/l)	Sulfate (mg/l)
Average	142.89	6.11	808.25	8.25	18.80	1.33	1.65	4.85	1.78	386.75
Min	23.40	5.50	623.00	-1.00	-1.18	0.51	0.37	2.70	0.33	292.00
Max	370.00	6.70	980.00	18.00	79.86	2.70	3.19	6.49	7.91	482.00
75% CI	184.75	6.23	844.20	10.18	26.89	1.58	1.99	5.25	2.45	404.36
90% CI	202.75	6.28	859.65	11.01	30.37	1.68	2.14	5.42	2.74	411.94

Recommendations:

MON 68 is a large existing pond with many seeps emanating into it. The recommended system would leave the pond in place and add baffles and aeration through a windmill to allow the metals to precipitate before entering the treatment train. The design chemistry has the flow rate at 100 gpm (flow is much higher in the spring, and a by-pass channel will be included), acidity is 12 mg/L, Fe is 2 mg/L, Al is 3 mg/L and Mn is 6 mg/L. The treatment system will be built in the existing valley. After discharging from the existing pond, a limestone cell with 800 tons of limestone will be built followed by an additional settling basin in the valley. The pH at this site ranges from 5.5 to 6.7, so it is felt that settling volume and aeration is the biggest obstacle at this site. Innovative techniques of aeration using a windmill and "bubbles" under the surface of the water will be used. A similar system is being designed in the Morgan Run watershed on a site with much higher levels of iron.

The estimated cost of constructing the treatment train is $175,000.

Predicted Effect of System on Receiving Stream:

The water discharging from the final settling basin should be alkaline in nature with minimal iron and aluminum concentrations. The treatment will remove 20 lbs/day of acidity, 2 lb/day of iron, and 2 lbs/day of aluminum. The metals will be retained in the series of settling ponds. The treated water will be able to support an aquatic community and will continue the neutralization of Montgomery Creek.

Other:

The low aluminum concentrations at this site will minimize the need for flushing. A final O&M plan will be developed with the construction phase of the project once final design specifications are complete. Additional maintenance will include the removal of precipitated metals from the settling ponds. The ponds will be designed for a 10-year lifespan. Visual checks of the system and windmill will be made monthly or bi-weekly to insure that wildlife or people are not affecting the integrity of the system. A monitoring plan will be established to determine the overall effects of the treatment system on water quality. The Montgomery Run Watershed Association has agreed to assume the long term O&M of the treatment system. They will be conducting the monthly checks and reporting to project consultant if any corrections need to be made.

Priority #7: MON 23, Coutriaux's deep mine

Site Description:

This monitoring point is a conveyed deep mine discharge. The discharge emerges from a drainpipe and forms an iron mat just upstream of the unnamed tributary (Road Trib) to Montgomery Creek. The iron mat borders both the unnamed tributary and Montgomery Creek for approximately 30 feet or more.

Summary of Chemistry on MON 23

	Flow (gpm)	pH Lab (SU)	Cond (Umhos)	Acidity (mg/l)	Acid Load (lbs/day)	Iron (mg/l)	Iron Load (lbs/day)	Mn (mg/l)	Al (mg/l)	Sulfate (mg/l)
Average	32.19	6.05	986.83	41.83	16.18	41.98	16.23	5.80	0.32	357.00
Min	23.10	5.00	924.00	37.00	11.63	36.80	11.38	5.25	0.32	325.00
Max	40.10	6.40	1060.00	49.00	23.02	49.90	23.93	6.39	0.32	376.00
75 % CI	33.85	6.18	999.61	43.20	17.26	43.23	17.28	5.94		362.08
90% CI	34.57	6.24	1005.11	43.79	17.72	43.77	17.73	6.00		364.26

Recommendations:

MON 23 is difficult to treat due to space issues. One option may be to try to pipe the discharge to another location to treat, but watching elevation changes would be important. A final decision would be based on surveying of the area. The major concern of the discharge is the iron concentration of 44 mg/L. The design chemistry is a flow of 40 gpm, pH of 6.2, alkalinity of 37 mg/L, acidity of 45 mg/L and Al less than 1 mg/L. Basically, this type of discharge needs aeration and settling volume, which unfortunately is not available at this site. Also, approximately 500 tons of limestone is needed to neutralize the acidity from the precipitating iron. Further investigation needs to occur as to where the settling basin or constructed wetland with the necessary limestone could be located. Due to the proximity to the stream and a residence, no "good" recommendation is available at this time. Further investigation at this site is needed to develop the proper treatment option. A similar system is being designed in the Morgan Run watershed on a site with much higher levels of iron.

The estimated cost of constructing the necessary wetland with 500 tons of limestone would be approximately $125,000.

Predicted Effect of System on Receiving Stream:

The water discharging from the wetland should be alkaline in nature with minimal iron and aluminum concentrations. The treatment will remove 16 lbs/day of acidity, 16 lb/day of iron, and less than 1 lb/day of aluminum. The iron will be retained in the wetland. The treated water will be able to support an aquatic community and will continue the neutralization of Montgomery Creek.

Other:

A final O&M plan will be developed with the construction phase of the project once final design specifications are complete. Maintenance will include the removal of precipitated metals from the settling ponds and/or wetland. Visual checks of the system will be made monthly to insure that wildlife is not affecting the integrity of the system. A monitoring plan will be established to determine the overall effects of the treatment system on water quality. The Montgomery Run Watershed Association has agreed to assume the long term O&M of the treatment system. They will be conducting the monthly checks and reporting to the project consultant if any corrections need to be made.

Priority #8: MON 73, Dog Trib

Site Description:

MON 73 emanates from an abandoned highwall area (exploratory cut) where a small impoundment has formed. It flows out of the "cut" joining an unnamed tributary (Dog Trib) to Montgomery Creek. Iron is precipitating at the top of the channel, creating a small iron mat. The weir was positioned to collect water below the confluence of the discharge and the unnamed tributary as the tributary flows down from a previously mined area.

Summary of Chemistry on MON 73

	Flow (gpm)	pH Lab (SU)	Cond (Umhos)	Acidity (mg/l)	Acid Load (lbs/day)	Iron (mg/l)	Iron Load (lbs/day)	Mn (mg/l)	Al (mg/l)	Sulfate (mg/l)
Average	36.26	4.66	511.33	15.56	6.95	0.64	0.21	0.49	0.76	223.78
Min	0.00	4.10	355.00	8.00	0.50	0.05	0.02	0.16	0.28	148.00
Max	120.00	5.40	627.00	25.00	17.99	1.79	1.04	0.91	1.28	286.00
75% CI	49.67	4.81	546.21	17.36	9.17	0.90	0.34	0.59	0.90	239.72
90% CI	55.43	4.87	561.20	18.13	10.12	1.02	0.39	0.63	0.95	246.57

Recommendations:

MON 73 ranks as #8 on the priority list due to the chemistry and because of the potential remining in the area. This site would benefit most from reclamation of the abandoned highwall and as the permitting process occurs with the remining activities, GFCC will be recommended if at all possible to reclaim the highwall area which is producing the discharge. If this is not possible, when remining activities are complete, this discharge will be revisited to determine if the chemistry is the same. If so, the design chemistry of 60 gpm, pH 4.8, acidity 20 mg/L, Fe, Al, and Mn all less than 1 mg/L will be used. The recommendation for this site would be to "pack the pit" with a limestone cell with approximately 1000 tons of limestone to neutralize the acidity before it flows and forms a channel down to the tributary to Montgomery Creek. Any metals would be allowed to precipitate in the existing channel.

The estimated cost of constructing the limestone cell would be $125,000.

Predicted Effect of System on Receiving Stream:

The water entering the tributary should be alkaline in nature with minimal iron and aluminum concentrations. The treatment will remove 7 lbs/day of acidity and less than 1 lb/day of iron and aluminum. The metals will be retained in the existing channel. The treated water will be able to support an aquatic community and will continue the neutralization of Montgomery Creek.

Other:

A final O&M plan will be developed with the construction phase of the project once final design specifications are complete. Visual checks of the system will be made monthly to insure that wildlife is not affecting the integrity of the system. A monitoring plan will be established to determine the overall effects of the treatment system on water quality. The Montgomery Run Watershed Association has agreed to assume the long term O&M of the treatment system. They will be conducting the monthly checks and reporting to the project consultant if any corrections need to be made.

Priority #9: MON 71, Danvir's Cistern

Site Description:

This discharge forms from what is either a piped spring or a possible borehole from a deep mine. The discharge exits a pipe cast in concrete. The discharge flows near houses before it enters into an unnamed tributary (Last Trib) to Montgomery Creek.

Summary of Chemistry on MON 71

	Flow (gpm)	pH Lab (SU)	Cond (Umhos)	Acidity (mg/l)	Acid Load (lbs/day)	Iron (mg/l)	Iron Load (lbs/day)	Mn (mg/l)	Al (mg/l)	Sulfate (mg/l)
Average	43.10	5.38	899.58	10.00	6.00	0.13		1.23	0.78	437.33
Min	9.48	4.60	798.00	3.00	0.00	0.05		0.91	0.47	354.00
Max	109.00	5.90	998.00	23.00	30.06	0.37		1.83	1.62	527.00
75% CI	53.58	5.49	921.66	11.92	8.75	0.20		1.33	0.88	456.46
90% CI	58.09	5.54	931.15	12.74	9.93	0.23		1.37	0.92	464.68

Recommendations:

MON 71 ranks as #9 on the priority list due to the chemistry and because of the space availability for treatment. There is also a concern of safety due to the proximity of the potential treatment systems to houses and children. Fencing would definitely need to be a component of these treatment systems. If ultimately it is deemed necessary to treat this discharge, the design chemistry would be 40 gpm, pH of 5.5, acidity of 15 mg/L, alkalinity of 10 mg/L, and Fe, Al, and Mn all less than 1 mg/L. The recommendation at this site would be to dig into the borehole/spring and put in an ALD for safety or just line the existing channel with limestone. It would not be recommended that any ponds or standing water be located so close to houses. An open limestone channel would work well here due to the "drop", but survey and elevations would be necessary before a final decision could be reached. Another concern of digging into the "borehole" would be what

you might find or the quantity of water you may encounter. The safe bet would be to pack the channel with limestone or to determine if it is even necessary to treat the discharge due to the borderline chemistry.

The estimated cost of constructing the limestone cell would be $75,000.

Predicted Effect of System on Receiving Stream:

The water entering the tributary should be alkaline in nature with minimal iron and aluminum concentrations. The treatment will remove 6 lbs/day of acidity and less than 1 lb/day of iron and aluminum. The metals will be retained in the limestone channel. The treated water will be able to support an aquatic community and will continue the neutralization of Montgomery Creek.

Other:

A final O&M plan will be developed with the construction phase of the project once final design specifications are complete. Visual checks of the system will be made monthly to insure that wildlife is not affecting the integrity of the system. A monitoring plan will be established to determine the overall effects of the treatment system on water quality. The Montgomery Run Watershed Association has agreed to assume the long term O&M of the treatment system. They will be conducting the monthly checks and reporting to the project consultant if any corrections need to be made.

Priority #10: MON 67, Killer Trib

A schematic of this treatment system is not included because it is an active treatment system, however the existing site conditions and placement of the treatment system can be found in Appendix D.

Site Description:

MON 67 is a stream sample that was taken below the confluence of two branches, MON 44 and MON 45, of the unnamed tributary (Killer Trib) to Montgomery Creek. Both branches are impacted from reclaimed surface mine sites. Remining is taking place on the MON 44 tributary and improvements are being seen in the quality and it is believed that improvements will continue. Both branches of the Killer Trib have numerous small, diffuse seeps entering them that make it hard to treat the stream. It is believed that some of the water chemistry is due to polluted base flow to the stream in addition to the seeps. The MON 67 sample was collected below the confluence with the intention that active treatment would most likely be recommended due to the severity of the chemistry and the fact that there is no discrete discharges to focus treatment on. MON 67 is just below the headwaters of the Killer Trib but above the MON 52A and 52B discharges. By using a lime doser and building settling basins off stream to protect the integrity of the stream channel itself, it is felt that a surge of alkalinity can be sent down the tributary and boost quality throughout the watershed.

Summary of Chemistry on MON 67

	Flow (gpm)	pH Lab (SU)	Cond (Umhos)	Acidity (mg/l)	Acid Load (lbs/day)	Iron (mg/l)	Iron Load (lbs/day)	Mn (mg/l)	Al (mg/l)	Sulfate (mg/l)
Average	255.27	3.57	1737.50	117.75	283.58	9.49	21.18	24.45	9.21	959.75
Min	71.63	3.30	1060.00	61.00	0	4.50	0	13.10	4.83	514.00
Max	651.88	3.90	2440.00	174.00	656.60	16.00	35.17	35.00	13.10	1429.00
75% CI	316.02	3.73	1869.49	128.72	339.78	10.67	24.55	26.69	10.06	1051.34
90% CI	342.14	3.75	1926.44	133.43	363.94	11.18	26.00	27.66	10.42	1090.72

Recommendations:

MON 67 is the most severe sampling location in the watershed. Passive treatment is not really an option at this site as over 10,000 tons of limestone would be needed due to the high flow rate and severity of the chemistry. The use of a lime doser is being recommended at the site. It would not only treat the high flow rate from the tributaries, but would also add alkalinity to the entire length of the Killer Trib and boost the quality throughout the watershed in combination with efforts downstream at sites MON 52A & 52B, and MON 40, 41, & 42.

The design chemistry for the doser would be a flow rate of 350 gpm with an acidity concentration of 150 mg/L, iron concentration of 15 mg/L, aluminum concentration of 15 mg/L, and manganese concentration of 30 mg/L.

The lime doser would use approximately 125 tons per year of lime with a cost of $15,000 per year with an initial capital cost of $150,000.

Predicted Effect of System on Receiving Stream:

The treatment options will remove 285 lbs/day of acidity, 22 lbs per day of iron and 28 lbs/day of aluminum. Excess alkalinity would be produced and would continue the neutralization of Montgomery Creek.

Priority #11: MON 48A, Two Pipe Seep

A schematic of this treatment system is not included because it has not been determined what type of treatment will be used to treat this discharge.

Site Description:

MON 48A is a discharge that was sampled below the confluence of two branches, MON 44 and MON 45, of the unnamed tributary (Killer Trib) to Montgomery Creek. Both branches are impacted from reclaimed surface mine sites. Remining is taking place on the MON 44 tributary and improvements are being seen in the quality and it is believed that improvements will continue; however, this discharge will need to be addressed in order to meet the TMDL. Due to the high loadings of acidity and dissolved metals, as well as, the close proximity of this discharge to the stream (<5 feet), designing a system to treat this discharge will be challenging.

Summary of Chemistry on MON 48A

	Flow (gpm)	pH Lab (SU)	Cond (Umhos)	Acidity (mg/l)	Acid Load (lbs/day)	Iron (mg/l)	Iron Load (lbs/day)	Mn (mg/l)	Al (mg/l)	Sulfate (mg/l)
Average	33.53	3.27	2353	158.67	61.22	4.42	1.69	34.45	11.04	1374.42
Min	14.20	3.00	2130	126.00	35.22	1.24	0.33	28.20	8.27	1214.00
Max	61.60	3.60	2640	207.00	102.16	8.27	2.72	41.80	16.10	1538.00
75% CI	39.52	3.33	2399	165.62	70.43	5.10	1.93	35.85	11.81	1416.03
90% CI	42.09	3.36	2418	168.60	74.39	5.40	2.03	36.45	12.14	1433.93

Recommendations:

MON 48A is one of the most difficult discharges to treat in the watershed from an engineering standpoint. This discharge emerges as a seep less than 20 feet from the right bank of the "Killer Trib" and is sandwiched between that tributary and a very steep hillside. Passive treatment is not really an option at this site as there is not enough room to build a passive system big enough to handle the severe chemistry of this discharge. Several options are being explored to capture and reroute this discharge so that it can be treated in conjunction with other discharges in the area. One possibility would be to pipe the discharge downstream to be treated with Priority #3: MON 40, 41 & 42. The other option would be to capture the water and direct it to active treatment along with the other water at Priority #10: MON 67, which is just upstream from this site.

The design chemistry for the system would be a flow rate of 50 gpm with an acidity concentration of 170 mg/L, iron concentration of 10 mg/L, aluminum concentration of 15 mg/L, and manganese concentration of 40 mg/L.

Cost for treatment will depend on what type of treatment is deemed most appropriate for this discharge once further engineering studies are completed.

Predicted Effect of System on Receiving Stream:

Without knowing the exact method of treatment for this discharge, it can only be said that whatever option is chosen will be designed to remove the acid and metal loads from the stream and produce excess alkalinity that would continue the neutralization of Montgomery Creek.

4.3 Summary Treatment Areas

Table 2.3 in Section 2 of this narrative summarizes the treatment necessary for the restoration of Montgomery Creek. Eleven priority treatment areas as described above are needed. The table lists the type of treatment to be used and the cost associated with each area. The best available technology at the time will be used and treatment designs may be changed upon further site investigation. These are conceptual designs only.

Considerations will be taken into all final designs. Flushing systems will be a priority and concern, especially at all sites with high aluminum levels. Systems with the highest

aluminum levels are being designed with sacrificial limestone cells at the beginning of the treatment to protect the main treatment cell from plugging. The vertical flow systems may incorporate the two-tiered approach to flushing to insure the top 6" of limestone does not become plugged with aluminum. By-pass systems will be used in all treatment areas to allow excess flow to by-pass the system, instead of short circuiting or decreasing the longevity of the system. The by-pass system will consist of limestone channels to provide some treatment to the excess flow. The VFW will incorporate at least 24 inches of organic matter to insure the long-term viability of a bacterial community, which should act to reduce iron and add alkalinity to the system. The piping system will be designed in a grid like pattern to insure flow throughout the system and decrease the chance of preferential flow. In-flow will be distributed through a perforated pipe on the horizontal surface of the VFW to insure flow throughout the system. The aerobic wetlands will be constructed with a combination of organic material and limestone to increase alkalinity production and longevity of the compost layer. This will ensure the bacterial community is able to thrive and act as sulfate reducers through the lifetime of the system.

4.4 Additional Areas of Interest

Due to constraints of both time and money, certain areas of the watershed were not studied in as great of detail during the assessment of Montgomery Creek as others. Some data was collected for these areas from historic mining permits and all were sampled at the mouth on a monthly or quarterly basis, but due to low volume and/or marginal impairment, these areas were determined to have minimal impact to the overall health of the watershed. The following are tributaries/areas that show water quality impairment but were determined through the assessment to be of little significance to the overall water quality of the main stem of Montgomery Creek.

- MON 29, Unnamed tributary to Montgomery Creek
- MON 43, Unnamed tributary to Montgomery Creek (MT4)
- MON 25, Unnamed tributary to Montgomery Creek (Camp Trib)
- Unnamed tributary to Montgomery Creek (Road Trib, MT2)

Once the top eleven priorities in the watershed have been addressed, it is expected that the TMDL for Montgomery Creek should be met. If this is not the case, perhaps these tributaries should be taken into further consideration at that time.

In addition, due to the fact that Clearfield Reservoir is a water supply reservoir for Clearfield and the surrounding areas, it is recommended that a Source Water Protection Plan be developed for the area of the watershed above the reservoir impoundment. Clearfield County Conservation District will work with the watershed group to help develop that plan.

Note: A description of each of these areas can be found in Section 2 of this report, while a photograph of each can be found in Appendix E.

5.0 TECHNICAL AND FINANCIAL ASSISTANCE NEEDED TO IMPLEMENT BMPS

Several organizations are working to restore the Montgomery Creek Watershed. These include the Lawrence Township Board of Supervisors (Township), the Montgomery Run Watershed Association (MRWA), Clearfield County Conservation District (CCCD), the Clearfield County Senior Environment Corps (CCSEC), and the Clearfield High School Watershed Club (Watershed Club), collectively known as the "Project Partners." The roles and efforts of these organizations are discussed later in this narrative. These organizations, particularly the MRWA, SEC, and Watershed Club are comprised of volunteers and have limited technical and financial resources. Lawrence Township has been assisting the MRWA with project administration and oversight for restoration projects in the Montgomery Creek Watershed, but the Township is also financially strapped and is unable to provide significant amounts of funding for the restoration of Montgomery Creek. Therefore, technical and financial assistance will be needed to implement the BMPs required to restore the Montgomery Creek Watershed. The technical and financial assistance needed for design, installation, and maintenance and potential funding sources and shortfalls are described in the following paragraphs.

5.1 Design, Installation, and Maintenance Costs

This implementation plan has identified ten areas where BMPs are currently being installed or will need to be installed to remediate the water quality problems in the Montgomery Creek Watershed in order for the TMDLs for the stream to be met. A listing of the ten priority areas, as well as, the areas in need of further study and the activities for which future funding will be required is provided in the following table.

TABLE 5.1 PROJECTS AND PROJECT TASKS REQUIRING FUTURE FUNDING

PROJECT	DESIGN AND PERMITTING FUNDS NEEDED	CONSTRUCTION FUNDS NEEDED	OPERATION AND MAINTENANCE FUNDS NEEDED	ESTIMATED COSTS
MON 52A Passive Treatment System	NO 319 Program funded 2007	YES	YES	$525,000 to $625,000

MON 52B Passive Treatment System	YES Applied for 2008	YES	YES	$125,000
MON 40, 41 & 42 Passive Treatment System	YES Applied for 2008	YES	YES	$625,000
MON 30 Passive Treatment System	YES	YES	YES	$275,000 to $350,000
MON 34 Passive Treatment System	YES	YES	YES	$225,000 + $4,000/yr
MON 68 Passive Treatment System	YES	YES	YES	$175,000
MON 23 Passive Treatment System	YES	YES	YES	$125,000
MON 73 Reclamation and Passive Treatment System	YES	YES	YES	$125,000

MON 71 Passive Treatment System	YES	YES	NO Minimal maintenance	$75,000
MON 67 Active Treatment System	YES	YES	YES	$150,000 + $15,000/yr
MON 48A Additional Studies & Treatment System	YES	YES	YES	$45,000 for additional studies & design and permitting
MON 29* Additional Studies	YES	NO	NA	$3,550
MON 43* Additional Studies	YES	NO	NA	$3,550
MON 25* Additional Studies	YES	NO	NA	$3,550
Road Trib* Additional Studies	YES	NO	NA	$3,550
TOTAL ESTIMATED COST FOR ABOVE RESTORATION PROJECTS				$2,484,200 – 2,659,200 + $19,000/yr

* Will require funding for further investigation, water sampling, etc.

5.1.1 Overall Watershed Restoration Costs

Construction costs for the future treatment and reclamation sites in the Montgomery Creek Watershed are also addressed in Section 4 of this report as part of the description of each priority area. A summary of the priority projects along with the associated construction costs can also be found in Table 2.3 in Section 2.

5.2 Sources of Funding for Plan Implementation

Several potential sources of funding have been identified for the remaining restoration efforts in the Montgomery Creek Watershed. These funding sources include Pennsylvania's Growing Greener Program (both the Growing Greener I and II Programs) and the Federal Section 319 Program. The Township and CCCD have both been successful in obtaining Section 319 and Growing Greener funding for projects in the area in the past. Other potential sources of funding include Federal Funding available through the Office of Surface Mining and/or assistance from the DEP BAMR. Several areas in the watershed may have bond money available to assist in the restoration of those areas. This will need to be explored through talks with the DEP Moshannon District Mining Office.

Other smaller potential sources of funding in the form of matching funds and volunteer funds have also been identified. These include funding provided by project consultants, who typically provide some services at no charge as a form of matching funds, volunteer labor for the collection of water samples, and matching funds provided by the Township and/or CCCD for project oversight and management. Potential other sources include volunteer labor for planting and other small projects.

Operation and maintenance costs will require long-term and ongoing funding. The Project Partners will explore all avenues for long-term operation and maintenance, including the potential for re-use or sale of precipitates, such as iron and aluminum, recovered from their treatment facilities. If current research into the recovery and reuse of metals precipitates from treatment systems results in a market for these materials, these precipitates will be sold, donated to research, etc. in a manner which either generates funds that could be used for operation and maintenance costs or that minimizes the costs of disposal of materials for the Project Partners.

5.3 Funding Shortfalls

At the present time, it is believed that the current funding sources are sufficient to provide for the design and construction of reclamation/remediation projects for the restoration of most of the priorities in the watershed. However, funding for the more costly projects, especially those requiring active treatment methods, may be more difficult to obtain due to limited funding sources and competition for funding among projects. Currently, the Growing Greener and 319 programs will pay for construction of active treatment systems, but only if the applicant has demonstrated the ability to pay for the operation and maintenance for those systems for a period of at least 20 years.

A known funding shortfall for treatment system operation, maintenance, and replacement currently exists for all projects to be implemented. Prior to the 2006 Growing Greener

Grant Application Round, funding was not available for the operation and ongoing maintenance of treatment systems. Although some grant funding is now available for operation and maintenance, these funds are limited. While the Project Partners can provide varying amounts of volunteer labor for operation and maintenance activities, both groups will be in need of funds for future maintenance activities, such as replacement of limestone in passive treatment systems.

There is some talk that these funds may become available through the recent reauthorization of the federal Abandoned Mine Land Fund, where up to thirty percent of Pennsylvania's annual allocation could be set aside for watershed restoration projects.

5.4 Technical Assistance Required

The MRWA, Watershed Club, and CCSEC are organizations comprised of volunteers, and all have limited technical and financial resources. These organizations will be in need of technical assistance for these projects to be implemented in the Montgomery Creek Watershed. The needed technical assistance will include, but will not be limited to, engineering and design services such as site design, development of erosion and sediment control plans, and development of operation and maintenance plans, and permitting assistance such as obtaining stream encroachment permits. These organizations have established consultants who have been assisting them with watershed restoration activities for a number of years.

6.0 PUBLIC INFORMATION AND PARTICIPATION

As part of the watershed assessment, the stakeholders for restoration of the Montgomery Creek Watershed were identified. This section provides more detailed information specific to the Montgomery Creek watershed regarding stakeholders, sources of information and influence in the watershed, a watershed advisory group, and information strategy.

6.1 Stakeholder Identification

The following stakeholders have been identified for restoration activities in the watershed: MRWA; PA DEP; Lawrence Township Board of Supervisors; Clearfield Borough; Clearfield County Conservation District (CCCD); Clearfield High School Watershed Club; Susquehanna River Basin Commission; the Pennsylvania State University DuBois Campus; Old Town Sportsman's Association; Clearfield County Recreation and Tourism Authority; Clearfield County Planning Commission; West Branch Susquehanna Restoration Coalition; Upper West Branch Regional Greenways Committee; Trout Unlimited; Clearfield Municipal Authority; the Pennsylvania Department of Conservation and Natural Resources - Bureau of Forestry (Moshannon State Forest); the Mid-Atlantic Highlands Action Program; U.S. Office of Surface Mining; U.S. Army Corps of Engineers; U.S. Environmental Protection Agency; private consultants; residents and landowners along Montgomery Creek; other government interests; and local development interests. Strong, sustainable partnerships between local stakeholders and other entities is crucial in the restoration of the Montgomery Creek Watershed.

Lawrence Township has provided ongoing support for the MRWA's restoration activities in the Montgomery Creek Watershed. The Township provides fiscal administration for the MRWA's grants, as the MRWA does not have 501(c)(3) status, and also provides matching funds in the form of project administration costs.

The CCCD has provided ongoing support to the restoration of Montgomery Creek by providing technical guidance through all phases of the assessment project, as well as, the preparation of this implementation plan. The Watershed Specialist at the District has provided the volunteers with training on water sampling, equipment use, and AMD treatment technologies. She has also helped the group to collect monthly and quarterly stream samples, performed macroinvertebrate sampling, compiled and interpreted the water quality data, and worked with a consultant to develop the conceptual treatment system designs. She has and will continue to assist the volunteers with grant writing and other technical assistance as restoration of the watershed progresses.

The Clearfield High School Watershed Club was re-organized using a grant provided by the Mid-Atlantic Highlands Action Program. The aim of the watershed club is to give students hands-on learning opportunities as they relate to new standards in science and environmental education curriculums. The students have spent a great deal of time along Montgomery Creek gathering water samples, performing streamside tests of water

chemistry, and collecting macroinvertebrates for study. The students have agreed to continue these activities, as well as, collect quarterly samples at the mouth of Montgomery Creek for analysis by a DEP-certified laboratory. In this way, the students will keep record of the improvements in water quality that are noted in Montgomery Creek as implementation of restoration activities progresses. The students are also planning stream clean-ups and other projects to benefit the watershed. They have built and maintain a kiosk located near the Hyde Post Office at the mouth of Montgomery Creek to keep local citizens informed of the work being done on the stream. Many students use this work to complete their senior projects and it is hoped that the watershed club can serve as a pilot project that can be implemented in other local schools with nearby streams.

A large portion of the Montgomery Creek Watershed is located within the boundaries of the Moshannon State Forest. Because the stream is located within State Forest Lands, opportunities for public access and recreation are abundant. Water quality improvements in the lower reaches of the stream will complement the already abundant aquatic life, wildlife, and wetland and riparian habitats on the State Forest Lands, and will also improve recreational opportunities. Because this watershed serves as the public water supply for Hyde, Clearfield Borough, and the surrounding community, it is important that the MRWA work with DCNR – Bureau of Forestry and the Clearfield Municipal Authority to assure that a source water protection plan is in place for this area of the watershed.

The list of stakeholders includes Lawrence Township, the Borough of Clearfield, the town of Hyde, and residents and property owners along Montgomery Creek and nearby communities. Montgomery Creek flows through the town of Hyde and into the West Branch just upstream of Clearfield Borough. Improved water quality in the stream would result in improved quality of living in these areas, increased property values, and increased recreational opportunities.

6.2 Sources of Information and Influence in the Watershed

Sources of information and influence in the watershed include newspapers, websites, radio stations, and local gathering places. The Clearfield Progress and the DuBois Courier Express/Tri-County Sunday are the local newspapers and the primary sources of printed information in the watershed. The Progress is available online at www.theprogressnews.com, and the Courier Express/Tri-County Sunday is available online at www.thecourierexpress.com. These papers include community and outdoor features in addition to regular news that would be appropriate for publication of watershed-related activities. Another local, online news source is Gant Daily, which can be found online at www.gantdaily.com.

A website is available for Clearfield County, which could also potentially serve to publicize information relating to watershed issues. This website can be located at http://www.clearfieldco.org/. Additional information pertaining to watershed activities could potentially be posted on the Clearfield County Recreation & Tourism Authority's

website at www.visitclearfieldcounty.org or the Clearfield County Conservation District's website at www.clfdccd.com.

The local radio station out of Clearfield is WOKW 102.9 FM. This station regularly runs public notices and information pieces on local happenings. They have a regular public affairs program on Sunday called "A Closer Look," where they discuss issues that are important to the local community. The Conservation District has used this format to get the word out about watershed-related activities in the past, so this would likely be a great way to inform the public about the efforts to restore Montgomery Creek.

The town of Hyde is a very small community with limited public and commercial locations. Events and news relating to Montgomery Creek could be posted in the Hyde Post Office and the Hyde Fire Hall building in Hyde. Additional public places for the distribution of information in Clearfield include the Clearfield Post Office and numerous outdoor related businesses, such as, Jim's Sports Center and Bob's Army and Navy Store. The kiosk at the Hyde Post Office that is maintained by the Clearfield High School Watershed Club would also be a great place to post watershed-related information, as is already being done.

On a related note, the Conservation District is currently involved in a Social Marketing study through EPA Region 3 to determine the marketability of Montgomery Creek, and two adjacent watersheds, Hartshorn Run and Anderson Creek. Through this study, the Conservation District hopes to learn the best ways to inform the public of watershed activities in those watersheds, raise awareness of AMD issues, and attract new volunteers to help in restoration activities. This project should be complete in 2008.

6.3 Information Strategy

Local citizens will be informed about current watershed issues in the Montgomery Creek Watershed, and their involvement will be solicited during implementation of restoration projects in the watershed. Two primary mechanisms will be utilized to disseminate information: public presentations to be held during meetings of the MRWA and press releases to the local media identified previously in this narrative.

The MRWA meets on an as-needed basis, however, as restoration activities in the watershed increase, it is recommended that they begin to meet on a more regular basis, preferably monthly or bi-monthly. Using the information gleaned from the Social Marketing project, the MRWA can, hopefully, attract some additional members and these meetings will become an excellent setting for distribution of watershed information. The meetings will allow for dialog with local citizens and provide an opportunity for citizens to provide input on the project and restoration plan. The local newspapers and websites will also provide a means of distributing information to the general public.

Public distribution of planning and project information shall occur at three key points for the remaining projects in the watershed: 1) Prior to the application for funding for design and for construction; 2) Prior to commencement of construction; and 3) Following completion of construction. A project status report will be provided at an MRWA

meeting for each of the three key points. A press release will also be distributed to the newspapers and websites listed previously, prior to the commencement of construction activities.

7.0 IMPLEMENTATION SCHEDULE AND EVALUATION

This implementation plan has identified ten priority areas where BMPs will need to be installed and several other areas that need further evaluation to remediate the water quality problems in the Montgomery Creek Watershed in order for the TMDLs for the stream to be met. In three of the areas, efforts to obtain funding for reclamation and remediation, design and permitting activities, or construction activities are underway. Efforts have yet to begin in the other areas pending completion of this implementation plan. An implementation schedule, including implementation milestones, funding, construction, and maintenance activities, responsible parties, local considerations, and progress monitoring and reporting is detailed in the following paragraphs. Because the watershed is fairly small in size, the watershed was not divided into subwatersheds.

7.1 Implementation Milestones

The implementation milestones for the restoration of Montgomery Creek include funding, construction, and maintenance activities, as shown in Section 7.4 of this narrative. The milestones provide specific target dates to obtain funding, construct or implement projects, to maintain projects, and to monitor and report on the progress of projects.

The Montgomery Creek Watershed Association will begin meeting on a more regular basis, at least once per quarter, preferably monthly or bimonthly. The meetings will allow for coordination of project funding applications, and will provide an opportunity for the responsible parties to address the planning of future projects, to review and report on the progress of ongoing and completed projects, and to address any difficulties in achieving the project implementation milestones. If milestones are not achieved due to a lack of funding, weather, or any other unforeseen factors that may prevent construction of all of the scheduled projects in any given year, the project implementation milestones and schedule will be adjusted accordingly, and uncompleted projects will be rescheduled for the following year.

7.2 Funding, Construction, and Maintenance Activities

Funding for restoration activities in the Montgomery Creek Watershed has historically been obtained from grant sources, with small amounts of matching funds provided from contractors, watershed organizations, and consultants. A schedule for applying for funding for remaining projects in the watershed is included in Section 7.4. This schedule is subject to change based on availability and award of funding.

The status of construction of existing projects has been included in Section 7.4, and estimated construction dates have been included for anticipated future projects. Construction is dependent on project funding, and the construction schedule may need to be revised in the future. As construction of each project is completed, the evaluation process will begin and the implementation schedule for future projects will be reviewed to determine if changes should be made prior to construction to incorporate

considerations such as improvements in BMP technology, successes or failures of BMPs in the watershed, and maintenance concerns specific to the watershed.

Maintenance activities have also been included in the implementation schedule. Maintenance activities have been estimated for those treatment systems or BMPs not yet designed. The actual performance of various BMPs may vary in following implementation, and the operation and maintenance schedule will be revised accordingly in the future.

7.3 Parties Responsible for Implementation Milestones

Three parties are or will be responsible for the funding, implementation, construction, operation and maintenance, and progress monitoring and reporting for the restoration projects in this watershed. These parties include the Lawrence Township Board of Supervisors, MRWA, and the Clearfield County Conservation District. The MRWA is and will be responsible for the reclamation activities and treatment systems that it installs. Similarly, Lawrence Township and the Conservation District will be responsible for assisting the MRWA with future applications for funding of those reclamation activities and BMPs. These groups, as well as, others identified in Section 6 of this narrative, will assume operation and maintenance responsibility for all the projects that they have implemented. The exact responsible parties will be laid out in the Operation & Maintenance plan that will accompany the complete design package for each construction project. Specific project responsibilities are summarized in Section 7.4.

7.4 Schedule

The proposed schedule for completion of ongoing remediation activities and for future reclamation or remediation efforts is provided in Table 7.1. Milestones and parties responsible for the activities listed on the schedule are also shown.

TABLE 7.1 PROJECT IMPLEMENTATION SCHEDULE

IMPLEMENTATION ACTIVITY OR MILESTONE	SCHEDULE	RESPONSIBLE PARTY
Construction of Passive Treatment System for the MON 52A discharge	Design & permitting funds obtained Spring 2007 Apply for construction funds - Spring 2009 Commence construction activities - Fall 2009/Spring 2010	MRWA & Lawrence Township

IMPLEMENTATION ACTIVITY OR MILESTONE	SCHEDULE	RESPONSIBLE PARTY
Construction of Passive Treatment System for the MON 52B discharge	Apply for design & permitting– Spring 2008 Apply for construction funds – Spring 2009 Commence construction activities to be completed along with MON 52A	MRWA & Lawrence Township
Construction of Passive Treatment System for the MON 40, 41 & 42 discharges	Apply for design & permitting– Spring 2008 Apply for construction funds – Spring 2009 Commence construction activities – Fall 2009/Spring 2010	MRWA & Lawrence Township
Construction of Passive Treatment System for the MON 30 (Charlie's Weir) discharge	Apply for design & permitting– Spring 2009 Apply for construction funds – Spring 2011 Commence construction activities – Fall 2011/Spring 2012	MRWA & Lawrence Township
Construction of Passive Treatment System for MON 34 (Plant Trib)	Apply for design & permitting– Spring 2009 Apply for construction funds – Spring 2011 Commence construction activities – Fall 2011/Spring 2012	MRWA & Lawrence Township

IMPLEMENTATION ACTIVITY OR MILESTONE	SCHEDULE	RESPONSIBLE PARTY
Construction of Passive Treatment for the MON 68 (Big Pond) discharges	Apply for design & permitting – Spring 2010 Apply for construction funds – Spring 2012 Commence construction activities– Fall 2012/Spring 2013	MRWA & Lawrence Township
Construction of Passive Treatment for the MON 23 (Coutriaux's Deep Mine) discharge	Apply for design & permitting – Spring 2010 Apply for construction funds – Spring 2012 Commence construction activities – Fall 2012/Spring 2013	MRWA & Lawrence Township
Reclamation & Construction of Passive Treatment for the MON 73 (Dog Trib) discharge	Apply for design & permitting – Spring 2011 Apply for construction funds – Spring 2013 Commence construction activities – Fall 2013/Spring 2014	MRWA & Lawrence Township
Construction of Passive Treatment for the MON 71 (Danvir's Cistern) discharge	Apply for design & permitting – Spring 2011 Apply for construction funds – Spring 2013 Commence construction activities – Fall 2013/Spring 2014	MRWA & Lawrence Township

IMPLEMENTATION ACTIVITY OR MILESTONE	SCHEDULE	RESPONSIBLE PARTY
Construction of Active Treatment on MON 67 (Killer Trib)	Apply for design & permitting – as soon as remining is complete & water quality has been reevaluated Apply for construction funds – as soon as long term O&M money can be found	MRWA & Lawrence Township
Further investigation into treatment options for MON 48A Source Water Protection Plan development for area above Clearfield Reservoir	Apply for funds – as soon as possible Initiate plan development – as soon as possible	Clearfield County Conservation District
Implementation Monitoring— All Projects	Monthly monitoring for the first year following construction; Quarterly monitoring for years 2 and 3 following construction; Semi-annual monitoring thereafter	MRWA & Lawrence Township
Implementation Progress Reporting — All Projects	At Watershed Group Meetings	MRWA, Lawrence Township & Project Consultant

8.0 WATER QUALITY MONITORING AND EVALUATION

The goal of this implementation plan is the restoration of water quality in Montgomery Creek to a quality sufficient to achieve the designated use of the stream as a Cold Water Fishery (CWF) and to allow for the stream to be removed from Pennsylvania's 303(d) List /2006 Integrated List of All Waters. The stream below Clearfield Reservoir is presently listed as impaired for pH and metals due to non-point source pollution from AMD and other factors.

In order to determine if the watershed restoration goal for Montgomery Creek is met, a water quality evaluation and monitoring plan has been developed. The plan, as discussed in the following sections of this narrative, includes loading and water quality milestones and local considerations, and schedules and identifies responsible parties.

8.1 Loading and Water Quality Milestones

Loading and water quality milestones are presented in Section 8.4 of this narrative. These milestones were developed to fit within the framework provided by the sampling points used in the assessment of Montgomery Creek and the framework of the TMDL developed for the watershed.

The water quality milestones were developed for reductions in pollutant load and improvements in water quality that will lead to the achievement of the DEP's standards for water quality and recommended use. The milestones were tailored to the specific impairments in the Montgomery Creek Watershed, specifically AMD. The parameters for sampling were based on impairment by AMD, and the resultant parameters of interest--acidity, alkalinity, and metals. Sampling locations and sample collection frequency have been provided.

8.2 Local Considerations

As stated previously, the Montgomery Creek Watershed benefits from having multiple conservation-minded organizations, working to improve the watershed. All parties involved will need to be in agreement for these goals to be realized.

Other unique local considerations include winter weather. The winter weather in this watershed can be more severe than many other areas of Pennsylvania, and as a result, collection of water samples during the winter months is often not practical or possible. The presence of ice precludes access to collect samples, and thick snow may prevent the sample collector from reaching the sample site. The schedule provided in Section 8.4 allows for potential weather concerns by allowing some flexibility in the sample collection schedule.

A final consideration for water quality monitoring and evaluation, while not specific to the local area, is the availability of funding for water quality monitoring activities. The MRWA relies heavily on volunteer labor and sources of grant funding to achieve project goals. Typically, manpower to collect a small number of water samples on a quarterly to

yearly frequency does not pose any difficulties to volunteer organizations such as these groups. However, the cost for ongoing monitoring does present an issue for ongoing water quality monitoring. As mentioned earlier, the organizations involved are dependent on grant funding for projects, and many of the grant programs do not provide funding for the laboratory analysis of water samples. Long-term monitoring will require the ongoing laboratory analysis of water samples, resulting in significant costs for the responsible parties. The project partners must seek a funding source to meet the costs of laboratory analysis for ongoing monitoring.

8.3 Responsible Parties

The MRWA will meet at least once per quarter, with at least one meeting in January of each year. The meetings will provide an opportunity for the responsible parties to review the water quality monitoring to determine if pollutant loading and water quality milestones are being achieved.

The parties who are or will be responsible for the funding, implementation, construction, operation and maintenance, and progress monitoring and reporting for the restoration projects in this watershed will also be responsible for water quality monitoring and evaluation. These parties are the MRWA, Lawrence Township, CCCD, CCSEC, and Clearfield High School Watershed Club. The specific water quality monitoring duties will vary by project but will be laid out in the Operation & Maintenance plan that is developed for each construction project. Specific project responsibilities are summarized in the schedule in Section 8.4 of this narrative.

8.4 Schedule

The proposed schedule for water quality monitoring activities and the achievement of water quality milestones is provided in the following table. The parties responsible for the activities listed on the schedule are also shown. Maps showing the locations of water sampling points are provided in Appendix A.

The Water Quality Monitoring Schedule and Milestones utilizes the term “restoration” of stream reaches with respect to water quality milestones. This term should be defined as restoration of water quality sufficient to achieve the designated use of Montgomery Creek as a CWF, including all applicable water quality criteria as described in 25 PA Code §93 for the designated use as well as sufficient water quality to allow for the stream to be removed from Pennsylvania’s 303d List/2006 Integrated List of All Waters. In addition, the specific pollutant limits established by the TMDL for the stream should be met. By doing so, the sport fishery of the stream will be restored.

The schedule also utilizes the phrase “improvement in water quality” with respect to several of the priority treatment areas. Since the restoration of the watershed is not progressing in an upstream-to-downstream direction, improvements in water quality may be made before the segment of stream can be considered restored.

TABLE 8.1 WATER QUALITY MONITORING SCHEDULE AND MILESTONES

MONITORING ACTIVITY OR MILESTONE	SCHEDULE	SAMPLING LOCATION(S)	SAMPLE PARAMETERS	RESPONSIBLE PARTY
ACTIVITY 1 Monitoring of effluent of Passive Treatment System for MON 52A & MON 52B plus UNT (Killer Trib) below effluent of the two systems plus mouth of Montgomery Creek	Estimated construction completion by end of 2010. Monitoring commences immediately following construction completion. Monthly monitoring January 2011-December 2011. Quarterly monitoring January 2012-December 2013. Semi-annual monitoring January 2014 and beyond.	Treatment system outfall at final settling basin UNT (Killer Trib) to Montgomery Creek below outfall of treatment systems (MON 67A) Mouth of Montgomery Creek (MC1, MON 1) -Quarterly	pH, acidity, alkalinity, iron, aluminum, and manganese	MRWA & Clearfield HS Watershed Club
MILESTONE *Improvement of UNT MT3 (Killer Trib) from confluence of MON 52A/B discharges down to confluence with Montgomery Creek (MON 38, MT3)(See note 3)*	*To be achieved by March 2011*	*Same as Activity 1*	*Same as Activity 1*	*Same as Activity 1*

MONITORING ACTIVITY OR MILESTONE	SCHEDULE	SAMPLING LOCATION(S)	SAMPLE PARAMETERS	RESPONSIBLE PARTY
ACTIVITY 2 Monitoring of effluent from MON 40, 41 & 42 Passive Treatment System plus UNT MT3 (Killer Trib) below effluent of system plus mouth of Montgomery Creek	Estimated construction completion by end of 2011. Monitoring commences immediately following construction completion. Monthly monitoring January 2011-December 2011. Quarterly monitoring January 2012-December 2013. Semi-annual monitoring January 2014 and beyond.	Treatment system outfall at final settling basin Mouth of UNT (Killer Trib) (MT3, MON38) Mouth of Montgomery Creek (MC1, MON1) - Quarterly	pH, acidity, alkalinity, iron, aluminum, and manganese	MRWA & Clearfield HS Watershed Club
MILESTONE *Improvement in water quality in UNT MT3 (Killer Trib). Reduction in pollutant loadings to Montgomery Creek*	*To be achieved by March 2011*	*Same as Activity 2*	*Same as Activity 2*	*Same as Activity 2*
ACTIVITY 3 Monitoring of effluent from MON 30 & MON 34 Passive Treatment Systems	Estimated construction completion by end of 2012. Monitoring commences immediately following construction completion. Monthly monitoring January	Treatment system outfall at final settling basin (MON 30) and effluent of diversion well (MON 34). New monitoring point between MON 30 &	pH, acidity, alkalinity, iron, aluminum, and manganese	MRWA & Clearfield HS Watershed Club

MONITORING ACTIVITY OR MILESTONE	SCHEDULE	SAMPLING LOCATION(S)	SAMPLE PARAMETERS	RESPONSIBLE PARTY
	2013-December 2013. Quarterly monitoring January 2014-December 2015. Semi-annual monitoring January 2016 and beyond.	MON 34 systems in mainstem of Plant Trib Mouth of UNT (Plant Trib) (MT5, MON 34) Mainstem of Montgomery Creek at MON 35 & MON 39		
MILESTONE *Restoration of UNT MT5 (Plant Trib). Reduction in pollutant loadings in Montgomery Creek between MC6 & MC5*	*To be achieved by March 2013*	*Same as Activity 3*	*Same as Activity 3*	*Same as Activity 3*

MONITORING ACTIVITY OR MILESTONE	SCHEDULE	SAMPLING LOCATION(S)	SAMPLE PARAMETERS	RESPONSIBLE PARTY
ACTIVITY 4 Monitoring of effluent from MON 68 (Big Pond) discharges plus mouth of UNT MT1 (Last Trib) plus mouth of Montgomery Creek	Estimated construction completion by end of 2013. Monitoring commences immediately following construction completion. Monthly monitoring January 2014-December 2014. Quarterly monitoring January 2015-December 2016. Semi-annual monitoring January 2017 and beyond.	Treatment system outfall at final settling basin Mouth of UNT (Last Trib) MT1 (MON 79) Mouth of Montgomery Creek (MC1, MON 1) - Quarterly	pH, acidity, alkalinity, iron, aluminum, and manganese	MRWA & Clearfield HS Watershed Club
MILESTONE *Improvement in water quality in UNT MT1 (Last Trib) Reduction in pollutant loadings in Montgomery Creek below UNT MT1*	*To be achieved by March 2014*	*Same as Activity 4*	*Same as Activity 4*	*Same as Activity 4*

MONITORING ACTIVITY OR MILESTONE	SCHEDULE	SAMPLING LOCATION(S)	SAMPLE PARAMETERS	RESPONSIBLE PARTY
ACTIVITY 5 Monitoring of effluent from MON 23 (Coutriaux's Deep Mine) Passive Treatment System plus Montgomery Creek	Estimated construction completion by end of 2013. Monitoring commences immediately following construction completion. Monthly monitoring January 2014-December 2014. Quarterly monitoring January 2015-December 2016. Semi-annual monitoring January 2017 and beyond.	Treatment system outfall Montgomery Creek below MON 23 outfall (MC2, MON 12) Mouth of Montgomery Creek (MC1, MON 1) - Quarterly	pH, acidity, alkalinity, iron, aluminum, and manganese	MRWA & Clearfield HS Watershed Club
MILESTONE *Improvement in water quality and reduction of pollutant loadings in main stem of Montgomery Creek downstream of MON 23 discharge*	*To be achieved by March 2014*	*Same as Activity 5*	*Same as Activity 5*	*Same as Activity 5*

MONITORING ACTIVITY OR MILESTONE	SCHEDULE	SAMPLING LOCATION(S)	SAMPLE PARAMETERS	RESPONSIBLE PARTY
ACTIVITY 6 Monitoring of effluent from MON 73 (Dog Trib) Passive Treatment System effluent plus Dog Trib plus Montgomery Creek	Estimated construction completion by end of 2014. Monitoring commences immediately following construction completion. Monthly monitoring January 2015-December 2015. Quarterly monitoring January 2016-December 2017. Semi-annual monitoring January 2018 and beyond.	Treatment system outfall Dog Trib below outfall (MON 73) Montgomery Creek below Dog Trib (MON 22) Mouth of Montgomery Creek (MC1, MON 1) - Quarterly	pH, acidity, alkalinity, iron, aluminum, and manganese	MRWA & Clearfield HS Watershed Club
MILESTONE *Improvement in water quality of Dog Trib* *Reduction of pollutant loadings in main stem of Montgomery Creek downstream of Dog Trib*	*To be achieved by March 2015*	*Same as Activity 6*	*Same as Activity 6*	*Same as Activity 6*

MONITORING ACTIVITY OR MILESTONE	SCHEDULE	SAMPLING LOCATION(S)	SAMPLE PARAMETERS	RESPONSIBLE PARTY
ACTIVITY 7 Monitoring of effluent from MON 71 (Danvir's Cistern) Passive Treatment System plus UNT MT1 (Last Trib) plus Montgomery Creek	Estimated construction completion by end of 2014. Monitoring commences immediately following construction completion. Monthly monitoring January 2015-December 2015. Quarterly monitoring January 2016-December 2017. Semi-annual monitoring January 2018 and beyond.	Treatment system outfall Last Trib below outfall (New monitoring point) Mouth of Last Trib (MT1, MON 79) Mouth of Montgomery Creek (MC1, MON 1) - Quarterly	pH, acidity, alkalinity, iron, aluminum, and manganese	MRWA & Clearfield HS Watershed Club
MILESTONE *Improvement in water quality of Last Trib* *Reduction of pollutant loadings in main stem of Montgomery Creek downstream of Last Trib*	*To be achieved by March 2015*	*Same as Activity 7*	*Same as Activity 7*	*Same as Activity 7*

MONITORING ACTIVITY OR MILESTONE	SCHEDULE	SAMPLING LOCATION(S)	SAMPLE PARAMETERS	RESPONSIBLE PARTY
ACTIVITY 8 Monitoring of UNT MT3 (Killer Trib) downstream from lime doser plus Montgomery Creek	Schedule contingent upon ability of the MRWA to find long-term funding of O&M for active treatment system	Killer Trib below active treatment (new monitoring point) Mouth of Killer Trib (MT3, MON 38) Montgomery Creek below MT3 Killer Trib (MC3) Mouth of Montgomery Creek (MC1, MON 1) - Quarterly	pH, acidity, alkalinity, iron, aluminum, and manganese	MRWA & Clearfield HS Watershed Club
MILESTONE *Restoration of Killer Trib* *Reduction of pollutant loadings in main stem of Montgomery Creek downstream of Killer Trib* *Restored fishery in Montgomery Creek from Clearfield Reservoir to mouth*	*To hopefully be achieved by 2020*	*Same as Activity 8*	*Same as Activity 8*	*Same as Activity 8*

MONITORING ACTIVITY OR MILESTONE	SCHEDULE	SAMPLING LOCATION(S)	SAMPLE PARAMETERS	RESPONSIBLE PARTY
Water Quality Progress Reporting—All Projects	At regular MRWA meetings Special meeting to be called if problems or declines in water quality are noted	All points listed above	All points listed above	MRWA & Clearfield HS Watershed Club

Notes:

1. All samples to be analyzed for the parameters of acidity, alkalinity, iron, aluminum, and manganese.

2. If projects are completed sooner than anticipated, monitoring shall begin immediately following completion of construction.

3. A time of 6 months following completion of construction of passive treatment systems or other BMPs has been allowed before a water quality milestone was considered to be achieved. This 6-month time period was allowed to account for variability in treatment system efficiency during startup and any necessary adjustments to treatment systems due to unforeseen conditions.

4. The sampling timeframe has been left fairly flexible to allow for adjustments for winter weather conditions, flooding conditions, etc. However, the sample should be collected during high flow winter conditions, when treatment efficiency is likely to decline, and during low flow summer conditions, when discharges may be less diluted and other environmental factors such as temperature and oxygen levels are likely to have negative impacts to aquatic life.

5. See also Sample Location Map provided in Appendix A. Sample location points reference the same sample point designations as the Montgomery Creek assessment that was completed to develop this implementation plan and the *Montgomery Creek TMDL* to the fullest extent possible. Several new sample points may be necessary in order to fully measure the effects of each treatment system on its receiving waters. These were noted above in the "Sampling Locations" column.

6. Manganese, and aluminum to be measured as total recoverable quantity. Iron to be measured as total recoverable, dissolved, as per PA Code, Title 25, Chapter 93.

9.0 REMEDIAL ACTIONS

The need for remedial or corrective actions for BMPs and restoration activities will be based on achieving certain criteria that were established for the purpose of evaluating the results of restoration projects in the Montgomery Creek watershed. The criteria for evaluating results and re-evaluation procedures are discussed in the following paragraphs.

9.1 Criteria for Evaluating Results

The results of project implementation and water quality monitoring will be judged against prescribed milestones for water quality improvement. Water quality milestones were addressed in Section 8.4 of this narrative.

The water quality criteria to be met include the following criteria established by the TMDLs for Montgomery Creek as discussed in Section 3 of this narrative.

Title 25, §93.7 of the Pennsylvania Code provides water quality criteria for designated uses such as CWF. The criteria listed above for the TMDL should be used for iron, manganese, aluminum, and acidity. Alkalinity must be 20 mg/l minimum as per §93.7.

It should be noted that in some cases the TMDLs for Montgomery Creek involve relatively small reductions in pollutant concentrations. Some initial metals concentrations are well below the level of 1 mg/l. Reductions in metals concentrations below 1 mg/l are difficult to predict and achieve using today's current passive treatment technologies, and special care must be exercised to provide appropriate treatment methods to achieve the necessary reductions in pollutant concentration.

9.2 Re-evaluation Procedures

The goal of this implementation plan is the restoration of water quality in Montgomery Creek to a quality sufficient to achieve the designated use of the stream as a Cold Water Fishery (CWF) to allow for the stream to be removed from Pennsylvania's 303(d) List /2006 Integrated List of All Waters and to meet the TMDLs that were established for the stream. Post-construction water quality monitoring will be used to indicate if the implemented projects are meeting the water quality criteria established for the restoration of Montgomery Creek.

In the event that the water quality data collected during the post-construction sampling indicate that project implementation has not produced the desired improvements in water quality, if the water quality criteria are not being met, or if progress is less than expected, the implementation process must be re-evaluated. Implementation efforts, project milestones, the selected restoration measures, and the TMDLs for the stream may be re-evaluated, either collectively or on an individual basis.

The MRWA and CCCD will be responsible for the re-evaluation process. As indicated on the Water Quality Monitoring Schedule, the MRWA will meet on a regular basis, but a special meeting will be called if water quality results indicate that the water quality

criteria are not being met and a problem is occurring. The group will discuss the nature and severity of the situation and develop a plan and schedule for correction of the situation. As needed, additional special meetings will be called until the situation is addressed. On an as-needed basis, the group may take actions such as re-scheduling proposed activities and shifting priorities to the necessary corrective action to ensure that remediation of the watershed is proceeding in an effective and technically appropriate fashion based on current watershed conditions.

10.0 REFERENCES

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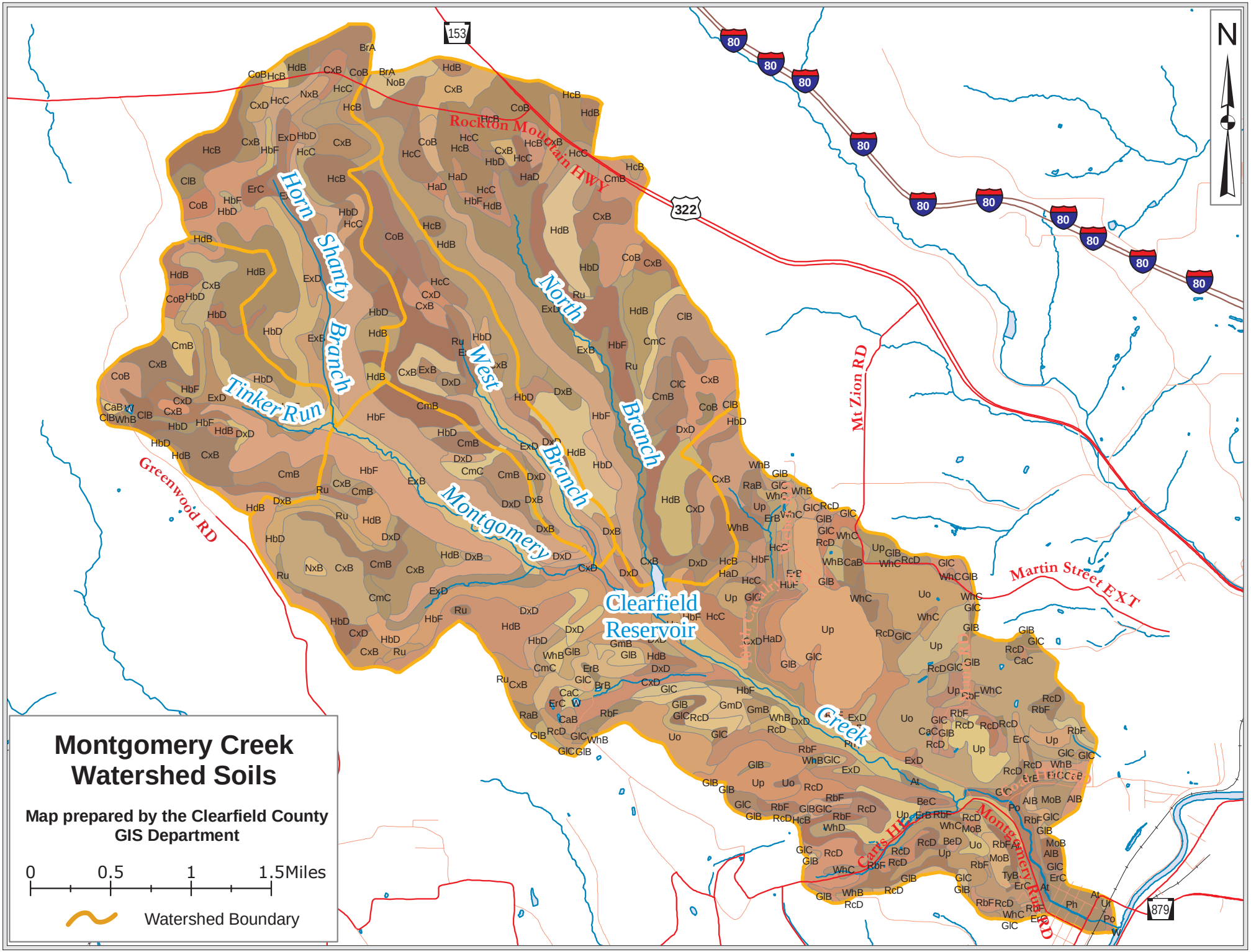
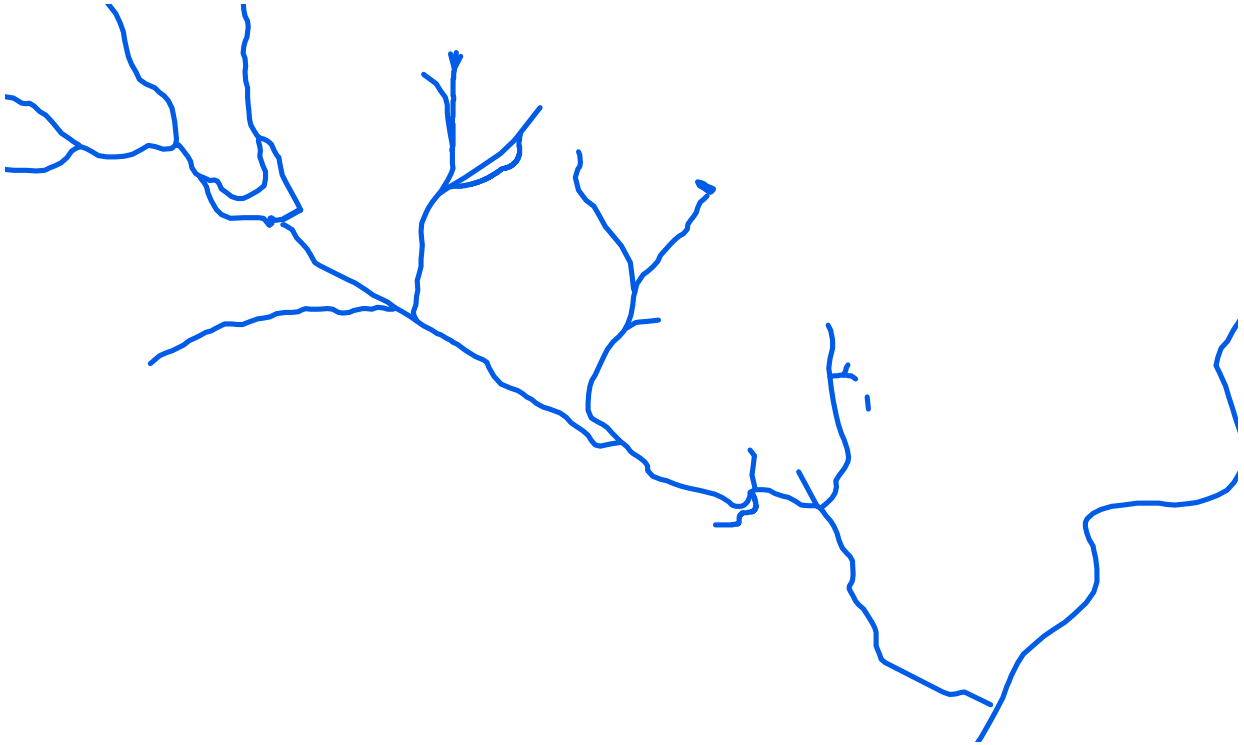

Montgomery Creek Watershed Soils
Map prepared by the Clearfield County GIS Department
0 0.5 1 1.5Miles
Watershed Boundary
N
Horn Branch
Shanty Run
Tinker Run
West Branch
North Branch
Montgomery Creek
Clearfield Reservoir
Rockton Mountain HWY
Mt Zion RD
Greenwood RD
Martin Street EXT
Cans Hollow Rd
Montgomery Run RD
153
322
80
879



Prepared by:
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1602 Orebed Rd
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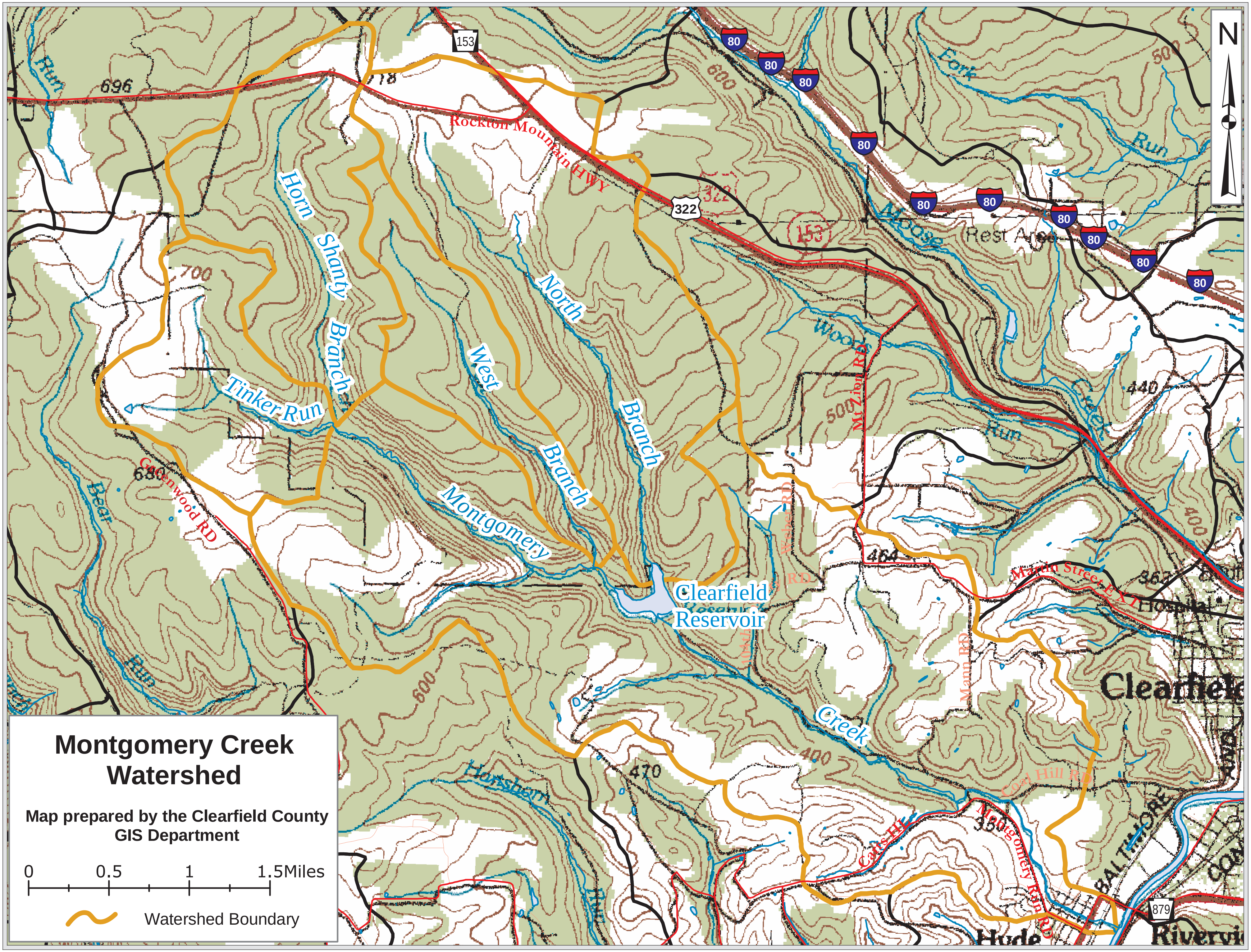
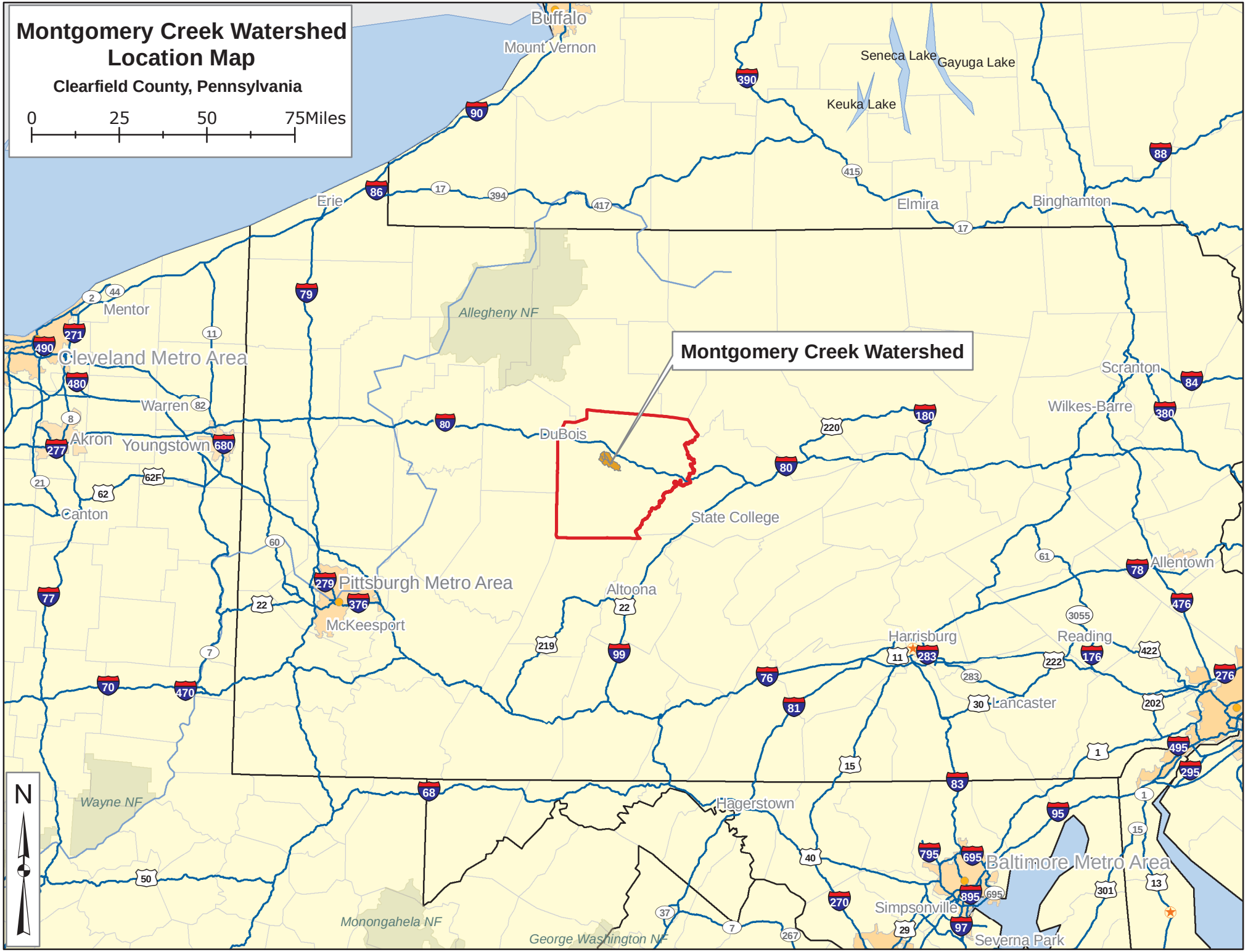
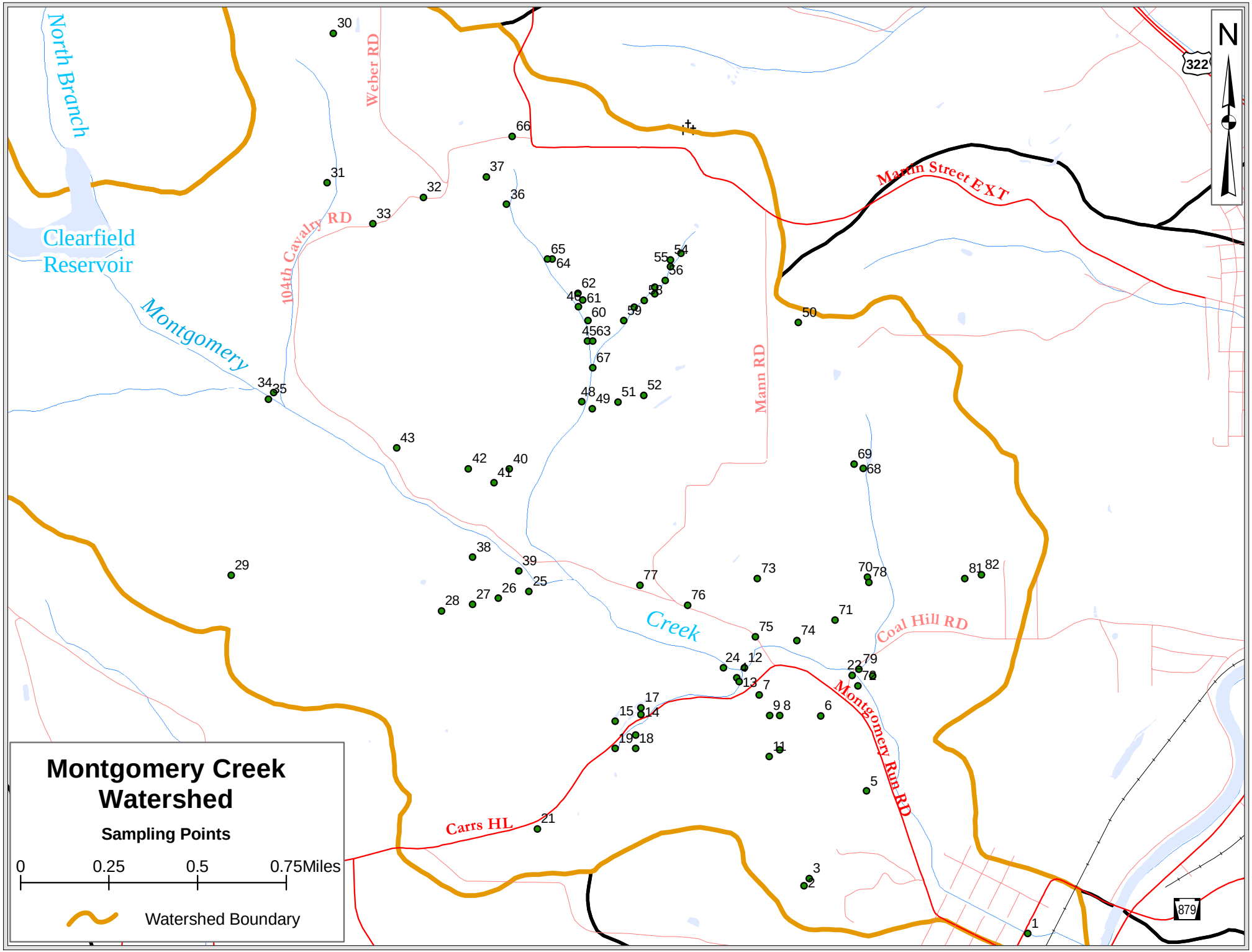
Sampling Points
Montgomery Creek Watershed

NMBS
NEW MILES OF BLUE STREAM


Montgomery Creek Watershed
Map prepared by the Clearfield County GIS Department
0 0.5 1 1.5Miles
Watershed Boundary
N
Horn Shanty Branch
Tinker Run
West Branch
North Branch
Montgomery Creek
Clearfield Reservoir
Rockton Mountain HWY
Greenwood RD
Mt Zion RD
Martin Street EXT
Coal Hill RD
Montgomery Run RD
Moose Run
Woods Run
Bear Run
Fork Run
Rest Area
Hospital
Clearfield
Hyde
Baltimore
80
322
153
879
696
700
680
600
500
470
464
440
400
362
350


Montgomery Creek Watershed Location Map
Clearfield County, Pennsylvania
0 25 50 75Miles
Montgomery Creek Watershed
N
Buffalo
Mount Vernon
Seneca Lake
Gayuga Lake
Keuka Lake
Erie
Elmira
Binghamton
Mentor
Cleveland Metro Area
Allegheny NF
Warren
Akron
Youngstown
DuBois
Scranton
Wilkes-Barre
Canton
State College
Pittsburgh Metro Area
McKeesport
Altoona
Allentown
Harrisburg
Reading
Lancaster
Wayne NF
Hagerstown
Baltimore Metro Area
Simpsonville
Severna Park
Monongahela NF
George Washington NF


North Branch
Clearfield Reservoir
Montgomery
Creek
Weber RD
104th Cavalry RD
Martin Street EXT
Mann RD
Coal Hill RD
Montgomery Run RD
Carrs HL
322
879
N
Montgomery Creek Watershed
Sampling Points
0 0.25 0.5 0.75Miles
Watershed Boundary

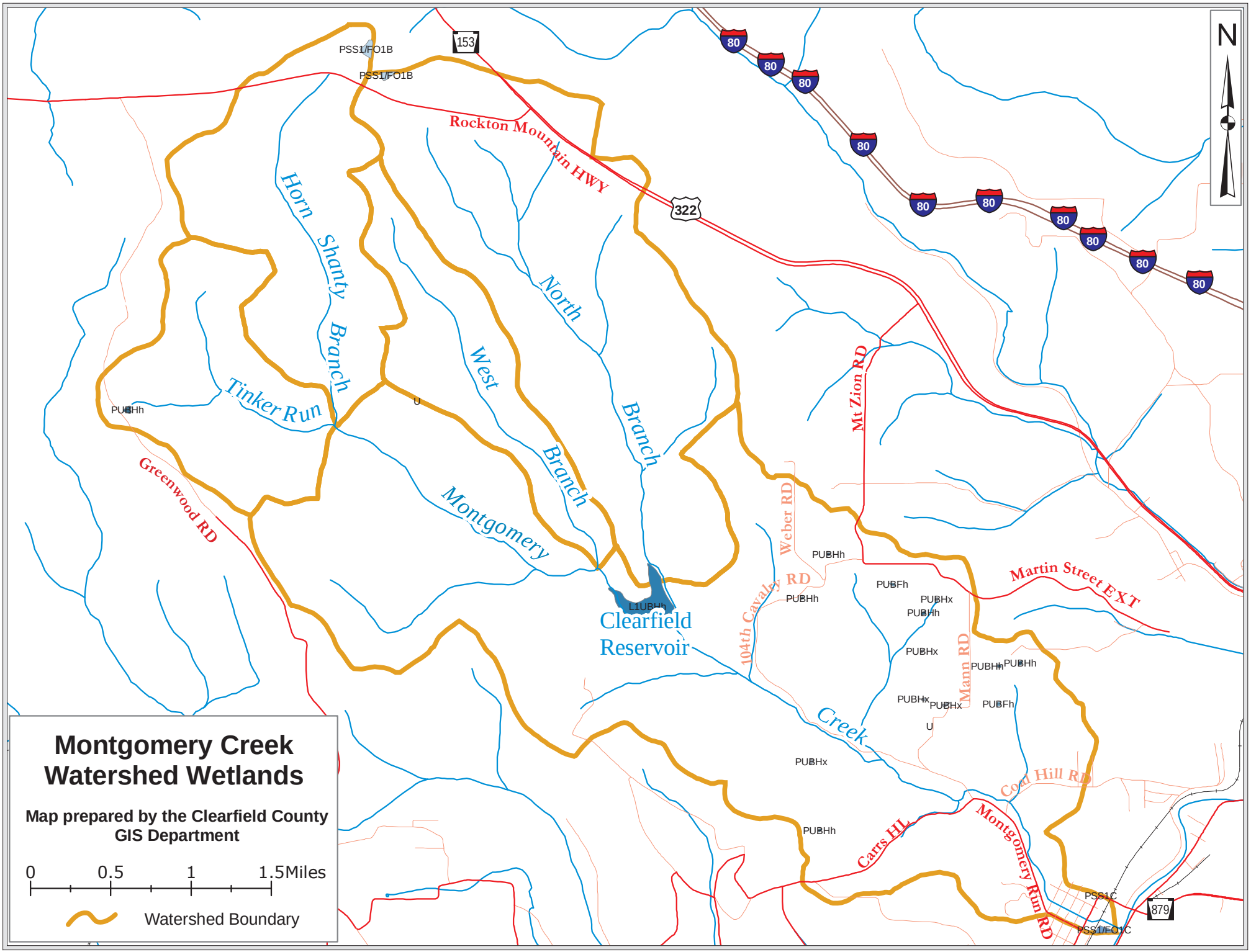

Montgomery Creek Watershed Wetlands
Map prepared by the Clearfield County GIS Department
0 0.5 1 1.5Miles
Watershed Boundary
N
Rockton Mountain HWY
Horn Shanty Branch
Tinker Run
West Branch
North Branch
Montgomery Creek
Greenwood RD
Clearfield Reservoir
Weber RD
104th Cavalry RD
Mt Zion RD
Martin Street EXT
Mann RD
Coal Hill RD
Carrs HL
Montgomery Run RD
153
322
80
879
PSS1/FO1B
PSS1/FO1C
PUBHh
PUBHx
PUBFh
L1UBHh
U

Table 1: Water Chemistry of Mon 23

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/17/2006	40.1	6.1	924	42	20.19524	35	37.3	17.9353	<0.05	#VALUE!	5.41	2.60134	349	14.3	677
8/21/2006	30	6	967	39	14.02947	36	43	15.46839	<0.05	#VALUE!	5.77	2.075642	357	8.6	651
9/18/2006	36	5.6	928	38	16.40369	19	40.5	17.48288	<0.05	#VALUE!	5.25	2.266299	360	7.1	653
10/15/2006	29.56	6.2	999	37	13.1148	36	36.8	13.04391	<0.05	#VALUE!	5.27	1.867972	361	10	671
11/20/2006	40	6.3	995	48	23.02272	41	49.9	23.93404	0.32	0.153485	6.39	3.0649	376	21.4	677
12/18/2006	27.27	6.3	1000	49	16.02273	34	43.7	14.28966	<0.05	#VALUE!	6.07	1.984857	373	7.1	670
1/19/2007	33.33	6.2	950	38	15.18708	35	45.2	18.06463	<0.05	#VALUE!	6.31	2.521855	351	6	639
2/20/2007	31.58	6.4	1010	41	15.52571	45	45.1	17.07828	<0.05	#VALUE!	6.2	2.34779	371	11	693
3/21/2007	30	6.3	999	38	13.66974	35	42.9	15.43242	<0.05	#VALUE!	6.05	2.176367	371	8	670
4/7/2007	23.1	6.1	1060	42	11.63367	31	41.1	11.38438	<0.05	#VALUE!	5.9	1.634253	353	9	
5/14/2007	30	5	1010	44	15.82812	32	39.8	14.31725	<0.05	#VALUE!	5.66	2.036072	337	9	671
6/18/2007	35.3	6.1	1000	46	19.47099	34	38.5	16.29637	<0.05	#VALUE!	5.3	2.243396	325	9	681
Average	**32.18667**	**6.05**	**986.8333**	**41.83333**	**16.17533**	**34.41667**	**41.98333**	**16.22729**	**0.32**	0.123504	**5.798333**	**2.235062**	**357**	**10.04167**	**668.4545**
Min	**23.1**	**5**	**924**	**37**	**11.63367**	**19**	**36.8**	**11.38438**	**0.32**	**#VALUE!**	**5.25**	**1.634253**	**325**	**6**	**639**
Max	**40.1**	**6.4**	**1060**	**49**	**23.02272**	**45**	**49.9**	**23.93404**	**0.32**	**#VALUE!**	**6.39**	**3.0649**	**376**	**21.4**	**693**
75 % CI	**33.85477**	**6.17939**	**999.6147**	**43.20496**	**17.25547**	**36.46107**	**43.23484**	**17.27832**	**#DIV/0!**	**#VALUE!**	**5.937055**	**2.359539**	**362.0798**	**11.42618**	**673.7542**
90% CI	**34.57185**	**6.235011**	**1005.109**	**43.79459**	**17.71979**	**37.33991**	**43.77283**	**17.73013**	**#DIV/0!**	**#VALUE!**	**5.996688**	**2.413048**	**364.2635**	**12.02135**	**676.0324**

Table 2: Water Chemistry of Mon 43

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/17/2006	3.43	3.7	822	73	3.002426	0	0.59	0.024266	8.9	0.366049	9.37	0.38538	385	11.4	667
8/22/2006					0			0		0		0			
9/17/2006	40	3.7	770	60	28.7784	0	0.52	0.249413	6.49	3.112864	6.17	2.959379	295	<6.2	444
9/28/2006	25				0			0		0		0			
10/15/2006	7	3.8	997	86	7.218582	0	0.48	0.04029	11.3	0.948488	10.9	0.914913	451	<6.2	719
12/19/2006	16	3.9	802	70	13.42992	0	0.33	0.063312	9.93	1.90513	8.39	1.609672	384	<6.2	566
12/6/2006	26	3.9	784	71	22.13539	0	0.27	0.084177	9.42	2.936836	7.24	2.257186	429	<6.2	583
1/28/2007	36.4	3.9	870	78	34.04485	0	0.36	0.15713	14.7	6.416144	9.74	4.251241	381	<5	630
3/2/2007		3.9	461	37	0	0	0.6	0	4.43	0	3.9	0	187	14	
3/29/2007	112	3.9	817	75	100.7244	0	0.27	0.362608	10.4	13.96712	7.17	9.629253	381	<5	557
5/24/2007	11	3.8	1010	91	12.00299	0	0.6	0.079141	14.6	1.925755	10.8	1.424531	483	<5	722
6/22/2007	14	3.7	967	99	16.61953	0	0.62	0.104082	14	2.350236	11.7	1.964126	463	<5	826
Average	**29.083**	**3.82**	**830**	**74**	**19.82971**	**0**	**0.464**	**0.097035**	**10.417**	3.632765	**8.538**	**2.116307**	**383.9**	**12.7**	**634.8889**
Min	**3.43**	**3.7**	**461**	**37**	**0**	**0**	**0.27**	**0**	**4.43**	**0**	**3.9**	**0**	**187**	**11.4**	**444**
Max	**112**	**3.9**	**1010**	**99**	**100.7244**	**0**	**0.62**	**0.362608**	**14.7**	**13.96712**	**11.7**	**9.629253**	**483**	**14**	**826**
75 % CI	**40.55162**	**3.853428**	**887.3321**	**80.26093**	**29.09643**	**#NUM!**	**0.516104**	**0.133931**	**11.65512**	**4.947907**	**9.42515**	**3.013904**	**415.822**	**14.19545**	**678.2257**
90% CI	**45.48167**	**3.867798**	**911.9776**	**82.95233**	**33.07995**	**#NUM!**	**0.538502**	**0.149792**	**12.18735**	**5.513252**	**9.806512**	**3.399758**	**429.5444**	**14.83831**	**696.855**

Table 3: Water Chemistry of Mon 77

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/19/2006	1.6	6.2	1470	5	0.095928	10	0.26	0.004988	0.36	0.006907	0.06	0.001151	906	<6.2	371
8/22/2007															
9/18/2006	39	6.8	326	-14	-6.54709	26	0.23	0.107559	0.74	0.34606	0.25	0.116912	92	52.9	174
10/15/2006	7.7	7.2	504	-20	-1.84661	34	0.06	0.00554	0.08	0.007386	0.11	0.010156	192	<6.2	319
12/6/2006	15	6.8	273	-3	-0.5396	16	0.17	0.030577	0.44	0.079141	0.26	0.046765	100	<6.2	164
12/19/2006	11.36	7.4	376	-5	-0.68109	20	0.25	0.034054	0.42	0.057211	0.25	0.034054	129	10	231
1/28/2007	32.9	6.8	228	2	0.789008	10	4.09	1.613521	8.38	3.305943	0.63	0.248537	77	17	145
3/2/2007	54	6.2	663	-12	-7.77017	24	0.2	0.129503	0.3	0.194254	0.2	0.129503	93	12	
3/29/2007	82.8	6.3	225	3	2.978564	8	0.55	0.54607	1.18	1.171569	0.32	0.317714	65	23	138
5/24/2007	12	7.1	309	-12	-1.7267	24	0.21	0.030217	0.3	0.043168	0.1	0.014389	89	<5	169
6/22/2007	13	6.8	294	-12	-1.8706	29	0.33	0.051441	0.33	0.051441	0.09	0.014029	94	<5	200
Average	**26.936**	**6.76**	**466.8**	**-6.8**	**-1.71184**	**20.1**	**0.635**	**0.255347**	**1.253**	**0.404706**	**0.227**	**0.093321**	**183.7**	**22.98**	**212.3333**
Min	**1.6**	**6.2**	**225**	**-20**	**-7.77017**	**8**	**0.06**	**0.004988**	**0.08**	**0.006907**	**0.06**	**0.001151**	**65**	**10**	**138**
Max	**82.8**	**7.4**	**1470**	**5**	**2.978564**	**34**	**4.09**	**1.613521**	**8.38**	**3.305943**	**0.63**	**0.317714**	**906**	**52.9**	**371**
75 % CI	**36.20936**	**6.911645**	**604.1034**	**-3.73816**	**-0.53567**	**23.31938**	**1.078989**	**0.438589**	**2.170553**	**0.782428**	**0.287678**	**0.133523**	**276.9113**	**31.96455**	**243.4838**
90% CI	**40.19572**	**6.976832**	**663.1264**	**-2.42196**	**-0.03006**	**24.70331**	**1.269847**	**0.51736**	**2.564984**	**0.9448**	**0.313762**	**0.150805**	**316.9803**	**35.82676**	**256.8745**

Table 4: Water Chemistry of Mon 77A

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/19/2006	1.67	7.5	483	-35	-0.70087	53	0.18	0.003604	0.09	0.001802	4.97	0.099524	166	<6.2	1359
8/22/2006	1.12	5.8	1650	5		10	1.75		0.46		6.24		1047	<6.2	1614
9/17/2006	3.5	6.3	1650	0	0	20	10	0.419685	3.67	0.154024	6.2	0.260205	743	64.3	1097
10/15/2006	3.3	6.4	1590	7	0.276992	12	0.31	0.012267	0.11	0.004353	7.85	0.310627	884	<6.2	1314
12/19/2006	4.4	6.1	1340	10	0.527604	9	0.43	0.022687	0.28	0.014773	5.27	0.278047	743	<6.2	1039
12/6/2006	4	6.2	1220	10	0.47964	9	0.17	0.008154	0.13	0.006235	4.97	0.238381	645	<6.2	1007
1/28/2007															
3/2/2007		5.9	863	8	0	9	0.14	0	0.17	0	4.96	0	411	8	ND
3/29/2007	17.7	5.8	831	7	1.485685	9	0.09	0.019102	0.1	0.021224	1.94	0.411747	396	<5	608
5/24/2007	3	6.3	1220	4	0.143892	11	0.2	0.007195	0.12	0.004317	1.5	0.05396	621	<5	942
6/22/2007	3.2	6.1	1250	7	0.268598	11	0.35	0.01343	1.19	0.045662	2.24	0.085951	650	<5	1083
Average	**4.654444**	**6.24**	**1209.7**	**2.3**	**0.275726**	**15.3**	**1.362**	**0.056236**	**0.632**	**0.035273**	**4.614**	**0.19316**	**630.6**	**36.15**	**1118.111**
Min	**1.12**	**5.8**	**483**	**-35**	**-0.70087**	**9**	**0.09**	**0**	**0.09**	**0**	**1.5**	**0**	**166**	**8**	**608**
Max	**17.7**	**7.5**	**1650**	**10**	**1.485685**	**53**	**10**	**0.419685**	**3.67**	**0.154024**	**7.85**	**0.411747**	**1047**	**64.3**	**1614**
75 % CI	**6.572166**	**6.418376**	**1350.216**	**7.186691**	**0.498171**	**20.26727**	**2.480232**	**0.108569**	**1.039092**	**0.054194**	**5.370453**	**0.246063**	**723.1583**	**68.53234**	**1227.732**
90% CI	**7.396543**	**6.495055**	**1410.621**	**9.287348**	**0.593794**	**22.40256**	**2.960929**	**0.131066**	**1.21409**	**0.062328**	**5.695631**	**0.268804**	**762.9467**	**82.45263**	**1274.854**

Table 1: Water Chemistry of Mon 25

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/17/2006	21.8	3.7	1400	65	16.99125	0	1.45	0.379036	5.55	1.45079109	15.8	4.13018	715	10	1186
8/21/2006	4.39	3.5	1750	94	4.948206	0	2.13	0.112124	7.06	0.371641859	21.7	1.142299	1007	<6.2	1477
9/23/2006	48	3.9	851	31	17.84261	0	0.5	0.287784	2.95	1.6979256	7.26	4.178624	418	<6.2	653
10/15/2006	34.88	3.9	1430	60	25.09476	0	1.25	0.522808	6.76	2.827343501	17.2	7.193833	753	<6.2	1141
11/24/2006	150	4.2	724	34	61.1541	2	0.38	0.683487	2.36	4.244814	5.03	9.04721	332	<6.2	470
12/17/2006	49.18	4	1150	63	37.15219	0	0.66	0.389213	4.73	2.789363207	11.5	6.78175	604	<6.2	910
1/20/2007	315	4.2	588	24	90.65196	2	0.24	0.90652	2.11	7.96981815	4.23	15.97741	273	<5	340
2/24/2007	31.58	4	1280	55	20.82717	1	2.67	1.011064	7.63	2.889296201	17.1	6.475356	691	27	995
3/22/2007		4.2	506	19	0	3	0.26	0	1.42	0	2.88	0	220	<5	315
4/28/2007	67.42	4.1	623	28	22.63613	2	0.53	0.42847	2.22	1.794721748	4.6	3.718793	268	6	391
5/14/2007	54.55	4.1	948	43	28.12669	2	0.3	0.196233	3.69	2.413662395	8.47	5.540304	404	<5	700
6/23/2007	31.1	3.8	1300	65	24.23981	0	1.04	0.387837	5.39	2.010039339	14	5.220881	642	<5	1030
Average	**73.44545**	**3.966667**	**1045.833**	**48.41667**	**29.13874**	**1**	**0.950833**	**0.442048**	**4.3225**	3.806758515	**10.81417**	**5.783886**	**527.25**	**14.33333**	**800.6667**
Min	**4.39**	**3.5**	**506**	**19**	**0**	**0**	**0.24**	**0**	**1.42**	**0**	**2.88**	**0**	**220**	**6**	**315**
Max	**315**	**4.2**	**1750**	**94**	**90.65196**	**3**	**2.67**	**1.011064**	**7.63**	**7.96981815**	**21.7**	**15.97741**	**1007**	**27**	**1477**
75 % CI	**104.1382**	**4.039329**	**1177.53**	**55.79943**	**37.35585**	**1.374634**	**1.21364**	**0.542308**	**5.037975**	**4.489939762**	**12.89227**	**7.138239**	**608.2059**	**21.73898**	**926.5713**
90% CI	**117.3322**	**4.070565**	**1234.143**	**58.97309**	**40.88816**	**1.535679**	**1.326614**	**0.585407**	**5.345538**	**4.783620997**	**13.78559**	**7.720439**	**643.0067**	**24.92247**	**980.6943**

Table 1: Water Chemistry of Mon 73A

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/17/2006	13.33	4.2	613	15	2.3976	2	0.14	0.022378	0.95	0.151848	0.84	0.134266	255	7.1	411
8/22/2006	9.23	4.1	627	17	1.881508	1	1.41	0.156054	1.28	0.141666	0.91	0.100716	286	<6.2	430
9/27/2006	3	4.4	557	14	0.503622	6	1.79	0.064392	1.17	0.042088	0.69	0.024821	249	11.4	387
10/27/2006	60	4.7	462	17	12.23082	4	0.09	0.064751	0.54	0.388508	0.38	0.273395	202	7.1	319
11/30/2006	60	4.6	492	25	17.9865	4	1.44	1.036022	0.55	0.395703	0.31	0.223033	216	<6.2	313
12/28/2006	48	4.9	407	11	6.331248	5	0.05	0.028778	0.46	0.264761	0.29	0.166915	183	<6.2	276
2/21/2007	25	4.7	549	16	4.7964	5	0.32	0.095928	1	0.299775	0.47	0.140894	241	6	380
3/26/2007	120	5.4	355	8	11.51136	6	0.25	0.35973	0.28	0.402898	0.16	0.230227	148	<5	228
5/16/2007	24	4.9	540	17	4.892328	5	0.24	0.069068	0.65	0.18706	0.36	0.103602	234	<5	341
Average	**40.28444**	**4.655556**	**511.3333**	**15.55556**	**6.947932**	**4.222222**	**0.636667**	**0.210789**	**0.764444**	**0.252701**	**0.49**	**0.155319**	**223.7778**	**7.9**	**342.7778**
Min	**3**	**4.1**	**355**	**8**	**0.503622**	**1**	**0.05**	**0.022378**	**0.28**	**0.042088**	**0.16**	**0.024821**	**148**	**6**	**228**
Max	**120**	**5.4**	**627**	**25**	**17.9865**	**6**	**1.79**	**1.036022**	**1.28**	**0.402898**	**0.91**	**0.273395**	**286**	**11.4**	**430**
75% CI	**54.35459**	**4.807867**	**546.2078**	**17.35523**	**9.166156**	**4.880198**	**0.903378**	**0.335841**	**0.897069**	**0.302509**	**0.590505**	**0.1849**	**239.7172**	**9.274816**	**368.0286**
90% CI	**60.40297**	**4.873341**	**561.1994**	**18.12886**	**10.11971**	**5.163045**	**1.01803**	**0.389598**	**0.954081**	**0.32392**	**0.633709**	**0.197616**	**246.5692**	**9.865812**	**378.8832**

Table 2: Water Chemistry of Mon 73B

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/17/2006	12.63	4.5	551	14	2.120249	4	0.36	0.054521	1.06	0.160533	1	0.151446	245	8.6	401
8/22/2006	3.21	4.5	585	13	0.500384	4	10.2	0.392609	3.76	0.144727	1.34	0.051578	279	10	429
9/27/2006	9.23	4.5	535	14	1.549477	6	0.54	0.059766	0.98	0.108463	0.78	0.086328	245	<6.2	374
10/27/2006	24	5	497	14	4.028976	5	1.93	0.555423	1.07	0.307929	0.65	0.18706	222	7.1	330
11/30/2006	30	4.9	481	21	7.55433	5	3.96	1.424531	1.24	0.446065	0.39	0.140295	212	<6.2	309
12/28/2006	36	4.8	408	16	6.906816	4	0.06	0.025901	0.48	0.207204	0.38	0.164037	184	<6.2	280
2/21/2007		4.8	532	15	0	5	0.12	0	0.85	0	0.55	0	230	6	370
3/26/2007	60	5.1	378	10	7.1946	5	1.08	0.777017	0.61	0.438871	0.31	0.223033	158	8	237
5/16/2007	12	5	522	16	2.302272	6	0.16	0.023023	0.47	0.067629	0.4	0.057557	227	<5	334
Average	**23.38375**	**4.788889**	**498.7778**	**14.77778**	**3.573012**	**4.888889**	**2.045556**	**0.368088**	**1.168889**	**0.209047**	**0.644444**	**0.117926**	**222.4444**	**7.94**	**340.4444**
Min	**3.21**	**4.5**	**378**	**10**	**0**	**4**	**0.06**	**0**	**0.47**	**0**	**0.31**	**0**	**158**	**6**	**237**
Max	**60**	**5.1**	**585**	**21**	**7.55433**	**6**	**10.2**	**1.424531**	**3.76**	**0.446065**	**1.34**	**0.223033**	**279**	**10**	**429**
75% CI	**30.90924**	**4.87972**	**524.5944**	**15.90843**	**4.709832**	**5.188645**	**3.31311**	**0.554171**	**1.555995**	**0.269537**	**0.776151**	**0.145884**	**236.0246**	**8.718167**	**363.5321**
90% CI	**34.14425**	**4.918765**	**535.6922**	**16.39447**	**5.19852**	**5.317503**	**3.857997**	**0.634163**	**1.722401**	**0.29554**	**0.832769**	**0.157902**	**241.8624**	**9.05268**	**373.4568**

Table 3: Water Chemistry of Mon 75

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/17/2006	1	6.6	527	-30	-0.35973	45	0.92	0.011032	0.05	0.0006	2.38	0.028539	202	15.7	377
8/22/2006	1	6.7	563	-28	-0.33575	41	6.18	0.074104	0.53	0.006355	1.66	0.019905	232	21.4	393
9/27/2007					0			0		0		0			
10/27/2006	24	4.9	455	14	4.028976	5	0.11	0.031656	0.58	0.166915	0.52	0.149648	198	<6.2	293
11/30/2006	12	5	481	20	2.87784	5	0.09	0.01295	0.38	0.054679	0.32	0.046045	211	<6.2	314
12/28/2006	24	4.9	403	10	2.87784	5	1.6	0.460454	1.15	0.330952	0.51	0.14677	179	8.6	281
2/21/2007		6.5	682	0	0	14	4.99	0	3.67	0	0.79	0	178	24	418
3/26/2007	60				0			0		0		0			
5/16/2007					0			0		0		0			
Average	**20.33333**	**5.766667**	**518.5**	**-2.33333**	**1.009909**	**19.16667**	**2.315**	**0.065577**	**1.06**	**0.062167**	**1.03**	**0.043434**	**200**	**17.425**	**346**
Min	**1**	**4.9**	**403**	**-30**	**-0.35973**	**5**	**0.09**	**0**	**0.05**	**0**	**0.32**	**0**	**178**	**8.6**	**281**
Max	**60**	**6.7**	**682**	**20**	**4.028976**	**45**	**6.18**	**0.460454**	**3.67**	**0.330952**	**2.38**	**0.149648**	**232**	**24**	**418**
75% CI	**30.65946**	**6.196746**	**564.3043**	**7.842184**	**1.672116**	**28.00974**	**3.546174**	**0.123111**	**1.683528**	**0.10623**	**1.412198**	**0.067028**	**209.574**	**21.35261**	**372.906**
90% CI	**35.09838**	**6.381626**	**583.9943**	**12.21637**	**1.956781**	**31.81114**	**4.075422**	**0.147842**	**1.951565**	**0.125171**	**1.576494**	**0.07717**	**213.6896**	**23.04099**	**384.4722**

Table 1: Water Chemistry of Mon 38

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/24/2006	322.01	3.3	1990	133	513.5425	0	2.99	11.54505	8.61	33.24512	28	108.1142	1264	<6.2	2109
8/21/2006	482.24	3.3	2370	144	832.6857	0	4	23.13016	9.07	52.44764	32.6	188.5108	1358	<6.2	2029
9/27/2006	535.19	3.5	2080	132	847.1052	0	2.75	17.64802	10.3	66.09987	28.2	180.9725	1258	<6.2	1854
10/23/2006	815.02	3.7	1440	71	693.8762	0	3.14	30.68692	5.9	57.66014	14.9	145.6163	723	<6.2	1067
11/22/2006	1414.84	3.8	1760	98	1662.604	0	2.13	36.13619	9.8	166.2604	21.5	364.7549	998	<6.2	1410
12/19/2006	475.73	3.7	2000	107	610.3792	0	3.09	17.62684	10.7	61.03792	27.8	158.5845	1203	<6.2	1726
1/23/2007	1274.59	3.8	1800	97	1482.51	0	2.37	36.22215	11.1	169.6481	24.7	377.5051	1014	5	1471
2/21/2007		3.7	1990	108		0	2.57		10.9		26		1132	<5.0	1688
3/30/2007	1368.84	3.8	1650	86	1411.583	0	1.91	31.35028	10.4	170.7031	21.6	354.5372	1013	<5.0	1510
4/24/2007	1238.69	3.8	1770	79	1173.397	0	1.67	24.80473	8.61	127.8855	21	311.9158	938	<5.0	1438
5/22/2007	323.14	3.6	2120	117	453.3483	0	2.36	9.144461	10.9	42.23501	24.7	95.70686	1261	<5.0	1847
6/20/2007	585.24	3.5	1930	109	764.9198	0	1.9	13.33346	9.13	64.07081	24.8	174.0368	1075	6	1693
Average	**803.23**	**3.625**	**1908.333**	**106.75**	**949.632**	**0**	**2.573333**	**22.8753**	**9.618333**	**92.63927**	**24.65**	**223.6595**	**1103.083**	**5.5**	**1653.5**
Min	**322.01**	**3.3**	**1440**	**71**	**453.3483**	**0**	**1.67**	**9.144461**	**5.9**	**33.24512**	**14.9**	**95.70686**	**723**	**5**	**1067**
Max	**1414.84**	**3.8**	**2370**	**144**	**1662.604**	**0**	**4**	**36.22215**	**11.1**	**170.7031**	**32.6**	**377.5051**	**1358**	**6**	**2109**
75% CI	**954.3216**	**3.686924**	**1988.968**	**114.1594**	**1093.939**	**0**	**2.793177**	**26.26205**	**10.11046**	**111.6707**	**26.15657**	**260.7025**	**1162.338**	**6.075175**	**1750.458**
90% CI	**1019.272**	**3.713543**	**2023.63**	**117.3445**	**1155.972**	**0**	**2.887682**	**27.71792**	**10.32201**	**119.8518**	**26.80421**	**276.6262**	**1187.809**	**6.322427**	**1792.138**

Table 2: Water Chemistry of Mon 40

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/19/2006	29.85	3.6	2890	248	88.76697	0	4.34	1.553422	28	10.02208	42.2	15.1047	2230	<6.2	2390
8/21/2006	29	3.5	3240	257	89.36892	0	1.27	0.441629	27.4	9.528049	42.3	14.70936	2377	<6.2	3286
9/23/2006	87	3.6	2670	191	199.2544	0	1	1.043217	25.1	26.18475	37.9	39.53792	1820	<6.2	2630
10/15/2006	40	3.7	3280	244	117.0322	0	0.96	0.460454	30.7	14.72495	48	23.02272	1856	<6.2	3022
11/24/2006	75	3.7	2780	204	183.4623	0	0.53	0.476642	24.8	22.30326	43.5	39.12064	1807	<6.2	2501
12/17/2006	88.24	3.7	3060	242	256.0568	0	0.9	0.952277	28.7	30.36706	46.7	49.41261	1923	<6.2	2823
1/20/2007	260.87	3.7	2640	176	550.5442	0	4.5	14.07641	21.6	67.56679	37.8	118.2419	1669	<5.0	2448
2/24/2007	40	3.7	3080	217	104.0819	0	0.88	0.422083	27.4	13.14214	44.1	21.15212	1907	<5.0	2930
3/22/2007	1500	3.8	2610	176	3165.624	0	0.48	8.63352	20.2	363.3273	36.2	651.1113	1727	<5.0	2288
4/28/2007	75	3.8	2670	192	172.6704	0	0.98	0.881339	28.4	25.54083	45.4	40.82936	1657	<5.0	2506
5/14/2007	71.43	3.8	2820	204	174.7295	0	0.6	0.51391	24.5	20.98467	41.3	35.37416	1756	<5.0	2692
6/23/2007	54.55	3.7	2860	213	139.3252	0	0.94	0.614863	26.6	17.3993	43.8	28.64998	1861	<5.0	2815
Average	**195.9117**	**3.691667**	**2883.333**	**213.6667**	**436.7431**	**0**	**1.448333**	**2.505814**	**26.11667**	**61.35267**	**42.43333**	**89.6889**	**1882.5**	**#DIV/0!**	**2694.25**
Min	**29**	**3.5**	**2610**	**176**	**88.76697**	**0**	**0.48**	**0.422083**	**20.2**	**9.528049**	**36.2**	**14.70936**	**1657**	**0**	**2288**
Max	**1500**	**3.8**	**3280**	**257**	**3165.624**	**0**	**4.5**	**14.07641**	**30.7**	**363.3273**	**48**	**651.1113**	**2377**	**0**	**3286**
75% CI	**333.8189**	**3.721565**	**2960.544**	**223.0585**	**725.1036**	**0**	**1.915262**	**3.935793**	**27.1217**	**94.3343**	**43.64318**	**149.1006**	**1954.347**	**#DIV/0!**	**2791.298**
90% CI	**393.1015**	**3.734417**	**2993.735**	**227.0958**	**849.062**	**0**	**2.115981**	**4.550502**	**27.55373**	**108.5122**	**44.16326**	**174.6402**	**1985.232**	**#DIV/0!**	**2833.017**

Table 3: Water Chemistry on Mon 41

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/19/2006	6.42	3.6	2860	221	17.01307	0	1	0.076982	24.5	1.886064	38.3	2.948419	2120	<6.2	320
8/21/2006	4.21	3.4	3110	219	11.05558	0	1.39	0.07017	26.9	1.357969	42.2	2.130345	2056	<6.2	3031
9/23/2006	24	3.6	2610	188	54.10339	0	1.09	0.313685	22.1	6.360026	33.4	9.611986	1801	<6.2	2549
10/15/2006	13.64	3.7	3240	220	35.98259	0	2.19	0.35819	32.2	5.266543	52.6	8.603111	1872	<6.2	3020
11/24/2006	34.29	3.8	2740	190	78.12256	0	2.64	1.085492	25.3	10.40264	46.2	18.99612	1799	<6.2	2523
12/17/2006	26.1	3.7	3000	231	72.29494	0	0.89	0.278539	28.8	9.013395	47.7	14.92844	1856	<6.2	2837
1/20/2007	31.58	3.7	2610	172	65.13223	0	0.68	0.2575	21.7	8.217264	38.4	14.54115	1644	<5.0	2421
2/24/2007	13.16	3.7	3000	193	30.4557	0	0.94	0.148333	28.1	4.434224	46.3	7.306212	2049	<5.0	1583
3/22/2007	706	3.8	2610	173	1464.557	0	0.58	4.910075	19.8	167.6198	35.2	297.9907	1727	<5.0	2349
4/28/2007	33.3	3.8	2750	186	74.26986	0	1.17	0.467181	25.4	10.14223	40.8	16.29145	1625	<5.0	2467
5/14/2007	24	3.8	2820	191	54.96674	0	0.69	0.198571	24.5	7.050708	42.1	12.11571	1772	<5.0	2682
6/23/2007	16	3.7	2860	208	39.90605	0	0.89	0.170752	28	5.371968	48.3	9.266645	1843	<5.0	2769
Average	**77.725**	**3.691667**	**2850.833**	**199.3333**	**166.4883**	**0**	**1.179167**	**0.694623**	**25.60833**	**19.76023**	**42.625**	**34.56086**	**1847**	**#DIV/0!**	**2379.25**
Min	**4.21**	**3.4**	**2610**	**172**	**11.05558**	**0**	**0.58**	**0.07017**	**19.8**	**1.357969**	**33.4**	**2.130345**	**1625**	**0**	**320**
Max	**706**	**3.8**	**3240**	**231**	**1464.557**	**0**	**2.64**	**4.910075**	**32.2**	**167.6198**	**52.6**	**297.9907**	**2120**	**0**	**3031**
75% CI	**143.5134**	**3.730337**	**2918.792**	**205.9025**	**302.4362**	**0**	**1.387087**	**1.144488**	**26.75497**	**35.25294**	**44.53611**	**62.16185**	**1899.475**	**#DIV/0!**	**2629.017**
90% CI	**171.7941**	**3.74696**	**2948.006**	**208.7265**	**360.8765**	**0**	**1.476466**	**1.337874**	**27.24788**	**41.91283**	**45.35765**	**74.02678**	**1922.032**	**#DIV/0!**	**2736.386**

Table 4: Water Chemistry on Mon 42

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/19/2006															
8/21/2006															
9/23/2006		3.2	2180	155		0	2.03		19.3		21.7		1296	<6.2	1916
10/15/2006					0			0		0		0			
11/24/2006	65.94	3.5	2470	154	121.7657	0	1.8	1.423236	15.7	12.41378	26.4	20.87412	1530	<6.2	2126
12/17/2006															
1/20/2007	200	3.4	2150	135	323.757	0	1.38	3.309516	15.1	36.21282	21.9	52.52058	1239	<5.0	1796
2/24/2007															
3/22/2007	1200	3.5	2070	126	1813.039	0	4.16	59.85907	16	230.2272	22.5	323.757	1204	<5.0	1656
4/28/2007	51.72	3.5	2250	143	88.68496	0	3.57	2.214023	18.3	11.34919	24.8	15.38033	1230	<5.0	1858
5/14/2007															
6/23/2007															
Average	**379.415**	**3.42**	**2224**	**142.6**	**469.4494**	**0**	**2.588**	**13.36117**	**16.88**	**58.0406**	**23.46**	**82.50641**	**1299.8**	**#DIV/0!**	**1870.4**
Min	**51.72**	**3.2**	**2070**	**126**	**0**	**0**	**1.38**	**0**	**15.1**	**0**	**21.7**	**0**	**1204**	**0**	**1656**
Max	**1200**	**3.5**	**2470**	**155**	**1813.039**	**0**	**4.16**	**59.85907**	**19.3**	**230.2272**	**26.4**	**323.757**	**1530**	**0**	**2126**
75% CI	**696.4053**	**3.487076**	**2302.156**	**148.9904**	**860.6281**	**0**	**3.208927**	**26.74776**	**17.81483**	**108.0214**	**24.5172**	**152.5799**	**1368.221**	**#DIV/0!**	**1959.159**
90% CI	**832.6709**	**3.515911**	**2335.753**	**151.7375**	**1028.785**	**0**	**3.475846**	**32.50229**	**18.21669**	**129.5069**	**24.97166**	**182.7027**	**1397.633**	**#DIV/0!**	**1997.314**

Table 5: Water Chemistry on Mon 44

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/24/2006	50.27	3.4	2420	196	118.1464	0	13.38188	36.6	13.7	8.25819	22.06203	13.7	1649	<6.2	1453
8/21/2006		3.2	2800	231		0		41.9	14.7			14.7	1798	<6.2	2660
9/28/2006	75.00	3.5	2650	240	215.838	0	15.73819	51.7	24.7	22.21333	46.4951	24.7	1741	<6.2	2585
10/23/2006	53.18	3.6	2140	180	114.7826	0	7.715945	37.5	18.7	11.92464	23.91305	18.7	1356	<6.2	1927
11/22/2006	179.74	3.5	2150	186	400.8788	0	22.41473	37.4	19.6	42.24314	80.60681	19.6	1189	10	1827
12/19/2006	60.00	3.6	2430	184	132.3806	0	11.7272	37.7	18	12.95028	27.12364	18	1564	<6.2	2143
1/23/2007	160.22	4.1	997	61	117.1931	2	17.75187	12.7	4.37	8.395635	24.39921	4.37	465	5	753
2/21/2007		3.7	2420	194		0		39.2	20.3			20.3	1468	<5.0	2227
3/28/2007	306.30	3.6	2080	153	561.945	0	21.15558	30.4	17	62.43834	111.6544	17	1252	<5.0	1709
4/24/2007	159.55	3.6	2170	160	306.1062	0	14.96094	33.5	15.5	29.65404	64.091	15.5	1241	<5.0	1908
5/22/2007	47.12	3.6	2680	215	121.4784	0	9.209759	46	23.3	13.16487	25.99073	23.3	1680	7	2433
6/20/2007	121.18	3.4	2460	192	278.9893	0	16.41968	38.8	16	23.24911	56.37909	16	1430	<5.0	2193
Average	**121.256**	**3.566667**	**2283.083**	**182.6667**	**236.7739**	**0.166667**	**15.04758**	**36.95**	**17.15583**	**24.94425**	**48.27151**	**17.15583**	**1402.75**	**7.333333**	**1984.833**
Min	**47.12**	**3.2**	**997**	**61**	**114.7826**	**0**	**7.715945**	**12.7**	**4.37**	**8.25819**	**22.06203**	**4.37**	**465**	**5**	**753**
Max	**306.3**	**4.1**	**2800**	**240**	**561.945**	**2**	**22.41473**	**51.7**	**24.7**	**62.43834**	**111.6544**	**24.7**	**1798**	**10**	**2660**
75% CI	**151.3776**	**3.637936**	**2438.066**	**197.9431**	**291.9612**	**0.358392**	**16.77479**	**40.07882**	**18.88767**	**31.26782**	**59.23572**	**18.88767**	**1521.864**	**9.004752**	**2159.82**
90% CI	**164.3261**	**3.668573**	**2504.689**	**204.51**	**315.6848**	**0.440809**	**17.51727**	**41.42382**	**19.63213**	**33.98616**	**63.94894**	**19.63213**	**1573.068**	**9.72325**	**2235.043**

Table 6: Water Chemistry on Mon 45

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/24/2006	65.52	3.4	1570	100	78.56503	0	14.3	11.2348	3.82	3.001184	22.6	17.7557	893	<6.2	1333
8/21/2006	196.01	3.2	2130	136	319.6484	0	21.4	50.29762	4.61	10.83514	29.4	69.10046	1206	8.6	1803
9/28/2006	90.21	3.5	1420	88	95.19031	0	13.5	14.60306	2.98	3.22349	19.6	21.20148	751	7.1	1143
10/23/2006	330.54	4.2	629	30	118.9052	2	5.79	22.94869	1.36	5.390367	6.8	26.95183	290	7.1	430
11/22/2006	196.58	4	1000	64	150.8602	0	7.3	17.20749	5.08	11.97453	12.8	30.17204	482	<6.2	720
12/19/2006	115.03	3.7	1270	62	85.51813	0	12.7	17.51742	3.59	4.951776	16.3	22.48299	650	<6.2	959
1/23/2007	120.28	3.7	2150	177	255.2831	0	7.74	11.16323	21.5	31.00897	36.6	52.78736	1299	6	1912
2/21/2007		3.9	1350	65	0	0	9.81	0	3.82	0	14.7	0	566	<5.0	946
3/28/2007	345.58	4	855	42	174.0417	0	5.73	23.74426	4.33	17.94287	9.37	38.82787	392	<5.0	593
4/24/2007	201.29	4.1	900	42	101.3741	1	5.5	13.27518	2.9	6.999638	9.14	22.06093	381	<5.0	630
5/22/2007	58.8	3.7	1690	95	66.98173	0	14.8	10.43505	5.59	3.941346	21.5	15.15902	896	14	1342
6/20/2007	17.95	3.4	1400	79	17.00384	0	9.87	2.124404	3.77	0.811449	16.9	3.63753	659	5	1071
Average	**157.9809**	**3.733333**	**1363.667**	**81.66667**	**121.9476**	**0.25**	**10.70333**	**16.2126**	**5.279167**	**10.00058**	**17.97583**	**26.6781**	**705.4167**	**7.966667**	**1073.5**
Min	**17.95**	**3.2**	**629**	**30**	**0**	**0**	**5.5**	**0**	**1.36**	**0**	**6.8**	**0**	**290**	**5**	**430**
Max	**345.58**	**4.2**	**2150**	**177**	**319.6484**	**2**	**21.4**	**50.29762**	**21.5**	**31.00897**	**36.6**	**69.10046**	**1299**	**14**	**1912**
75% CI	**195.2783**	**3.837707**	**1522.415**	**95.61056**	**152.5926**	**0**	**12.29828**	**20.48734**	**7.014239**	**12.91588**	**20.86445**	**33.13989**	**811.7161**	**9.466147**	**1227.82**
90% CI	**211.3115**	**3.882574**	**1590.657**	**101.6047**	**165.7661**	**0**	**12.98391**	**22.32494**	**7.7601**	**14.16909**	**22.10619**	**35.91764**	**857.4114**	**10.11073**	**1294.158**

Table 7: Water Chemistry on Mon 48A

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/24/2006	15.79	3	2390	186	35.21685	0	7.06	1.336726	9.05	1.713508	35.6	6.740429	1525	<6.2	2443
8/21/2006	14.2	3	2640	207	35.24635	0	8.27	1.408151	10.2	1.736776	39.7	6.759806	1480	<6.2	2353
9/28/2006	21.87	3.6	2360	152	39.86096	0	1.24	0.325182	16.1	4.222115	41.8	10.96176	1538	<6.2	2304
10/23/2006	28	3.2	2200	142	47.67622	0	5.41	1.816397	9.76	3.2769	30.6	10.27389	1230	10	1796
11/22/2006	50.36	3.3	2280	158	95.41095	0	4.51	2.723439	11.4	6.884081	33.4	20.16915	1285	7.1	1690
12/19/2006	20	3.3	2510	158	37.89156	0	6.04	1.448513	11.2	2.685984	39.5	9.47289	1528	<6.2	1701
1/23/2007	40.86	3.3	2310	163	79.86222	0	4.71	2.307675	11.3	5.536461	31	15.18852	1275	<5.0	1943
2/21/2007		3.6	2370	152		0	1.68		14.3		36.8		1418	<5.0	2130
3/28/2007	60	3.3	2300	142	102.1633	0	3.33	2.395802	12.1	8.705466	31.5	22.66299	1327	<5.0	1838
4/24/2007	61.6	3.3	2130	126	93.06935	0	2.89	2.134686	8.27	6.108599	28.2	20.82981	1214	<5.0	1529
5/22/2007	22.8	3.2	2470	160	43.74317	0	3.69	1.008827	10.4	2.843306	32.8	8.967349	1429	7	2080
6/20/2007	33.4	3.1	2270	158	63.27891	0	4.16	1.666078	8.38	3.356185	32.5	13.01623	1244	<5.0	1943
Average	**33.53455**	**3.266667**	**2352.5**	**158.6667**	**61.21999**	**0**	**4.415833**	**1.688316**	**11.03833**	**4.438654**	**34.45**	**13.18571**	**1374.417**	**8.033333**	**1979.167**
Min	**14.2**	**3**	**2130**	**126**	**35.21685**	**0**	**1.24**	**0.325182**	**8.27**	**1.713508**	**28.2**	**6.740429**	**1214**	**7**	**1529**
Max	**61.6**	**3.6**	**2640**	**207**	**102.1633**	**0**	**8.27**	**2.723439**	**16.1**	**8.705466**	**41.8**	**22.66299**	**1538**	**10**	**2443**
75% CI	**39.52065**	**3.330517**	**2398.647**	**165.6156**	**70.43037**	**0**	**5.103993**	**1.927392**	**11.80767**	**5.220487**	**35.85193**	**15.17484**	**1416.035**	**9.164998**	**2074.841**
90% CI	**42.09392**	**3.357964**	**2418.485**	**168.6027**	**74.38967**	**0**	**5.399814**	**2.030164**	**12.13838**	**5.556575**	**36.45458**	**16.02992**	**1433.925**	**9.65147**	**2115.968**

Table 8: Water Chemistry on Mon 52A

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/24/2006	20.4	3.4	2260	111	27.15242	0	8	1.956931	3.53	0.863496	24.8	6.066487	1474	<6.2	2143
8/21/2006	99.9	3.2	2470	120	143.7481	0	11.6	13.89565	3.27	3.917136	27.8	33.30165	1472	<6.2	2241
9/28/2006	131.1	3.5	2220	92	144.6258	0	7.1	11.16134	4.23	6.649645	24	37.72848	1397	<6.2	2053
10/23/2006	131.1	3.6	2020	72	113.1854	0	5.59	8.787592	4.02	6.319521	20.1	31.5976	1180	11.4	1699
11/22/2006	364.8	3.8	2180	81	354.3197	0	2.86	12.51055	5.65	24.71489	21.1	92.29808	1317	<6.2	1840
12/19/2006	131.1	3.7	2380	78	122.6176	0	5.35	8.410308	6.39	10.04521	25.3	39.77211	1492	<6.2	2060
1/23/2007	323	3.9	2110	70	271.1165	0	2.73	10.57354	4.85	18.7845	18.4	71.26491	1232	<5.0	1787
2/21/2007	131.1	3.8	2380	87	136.7657	0	6.49	10.20241	7.18	11.2871	27.2	42.75895	1429	<5.0	2138
3/28/2007	458	3.9	2080	49	269.102	0	2.3	12.63132	4.7	25.81183	17.9	98.30462	1265	<5.0	1705
4/24/2007	364.8	3.8	2060	53	231.8388	0	2.67	11.67943	4.5	19.68443	17.9	78.30027	1191	<5.0	1705
5/22/2007	200.5	3.8	2250	76	182.7189	0	4.48	10.7708	6.28	15.09835	22.7	54.57524	1373	5	2000
6/20/2007	164.5	3.6	2220	78	153.8565	0	4.09	8.067605	4.99	9.842872	20.7	40.83115	1293	<5.0	2004
Average	**210.025**	**3.666667**	**2219.167**	**80.58333**	**179.254**	**0**	**5.271667**	**10.05396**	**4.965833**	**12.506**	**22.325**	**52.2333**	**1342.917**	**8.2**	**1947.917**
Min	**20.4**	**3.2**	**2020**	**49**	**27.15242**	**0**	**2.3**	**1.956931**	**3.27**	**0.863496**	**17.9**	**6.066487**	**1180**	**5**	**1699**
Max	**458**	**3.9**	**2470**	**120**	**354.3197**	**0**	**11.6**	**13.89565**	**7.18**	**25.81183**	**27.8**	**98.30462**	**1492**	**11.4**	**2241**
75% CI	**254.5025**	**3.737936**	**2265.603**	**87.39546**	**208.5402**	**0**	**6.180132**	**11.08443**	**5.363836**	**15.19183**	**23.48974**	**61.34192**	**1380.175**	**11.88112**	**2011.798**
90% CI	**273.6221**	**3.768573**	**2285.564**	**90.3238**	**221.1296**	**0**	**6.570657**	**11.52741**	**5.534927**	**16.3464**	**23.99043**	**65.25747**	**1396.191**	**13.46353**	**2039.259**

Table 9: Water Chemistry on Mon 52B

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/24/2006	0.69	3.1	2450	156	1.29071124	0	20.3	0.167958	0.78	0.006454	30.6	0.253178	1547	<6.2	2554
8/21/2006	5	3.1	2780	169	10.132395	0	24.1	1.444916	0.84	0.050362	33.7	2.020484	1621	<6.2	2393
9/28/2006	5	3.3	2350	138	8.27379	0	21.3	1.277042	1	0.059955	32.3	1.936547	1379	7.1	2047
10/23/2006	5	3.4	1730	84	5.03622	0	11.1	0.665501	1.09	0.065351	23.7	1.420934	905	11.4	1320
11/22/2006	20.72	3.5	1590	72	17.8886534	0	18.6	4.621235	1.3	0.32299	21.5	5.341751	811	<6.2	1164
12/19/2006	5	3.4	2270	105	6.295275	0	18.6	1.115163	2.64	0.158281	34.3	2.056457	1362	<6.2	2136
1/23/2007	5	3.5	1750	82	4.91631	0	14.8	0.887334	1.94	0.116313	23.1	1.384961	913	10	1401
2/21/2007	5	3.9	2200	109	6.535095	0	28.8	1.726704	2.87	0.172071	36.5	2.188358	1273	<5.0	1932
3/28/2007	5	3.6	1420	53	3.177615	0	7.57	0.453859	1.74	0.104322	17.3	1.037222	720	<5.0	1018
4/24/2007	19.37	3.6	1700	69	16.0263312	0	9.65	2.241364	1.75	0.406465	21.1	4.900806	881	6	1344
5/22/2007	5	3.5	2270	110	6.59505	0	13.9	0.833375	4.61	0.276393	32.5	1.948538	1274	6	1851
6/20/2007	5	3.3	2200	109	6.535095	0	10.1	0.605546	3.02	0.181064	27.9	1.672745	1190	<5.0	1859
Average	**7.148333**	**3.433333**	**2059.167**	**104.6667**	**7.72521174**	**0**	**16.56833**	**1.336666**	**1.965**	**0.168431**	**27.875**	**2.180165**	**1156.333**	**8.1**	**1751.583**
Min	**0.69**	**3.1**	**1420**	**53**	**1.29071124**	**0**	**7.57**	**0.167958**	**0.78**	**0.006454**	**17.3**	**0.253178**	**720**	**6**	**1018**
Max	**20.72**	**3.9**	**2780**	**169**	**17.8886534**	**0**	**28.8**	**4.621235**	**4.61**	**0.406465**	**36.5**	**5.341751**	**1621**	**11.4**	**2554**
75% CI	**9.192473**	**3.507363**	**2195.244**	**116.4715**	**9.34482052**	**#NUM!**	**18.71981**	**1.729697**	**2.343495**	**0.208609**	**29.96712**	**2.671056**	**1256.3**	**9.368518**	**1916.197**
90% CI	**10.07119**	**3.539186**	**2253.741**	**121.5461**	**10.0410468**	**0**	**19.64468**	**1.898651**	**2.5062**	**0.225881**	**30.86646**	**2.882076**	**1299.273**	**9.913819**	**1986.96**

Table 10: Water Chemistry on Mon 67

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/24/2006	131.05	3.3	1890	134	210.5704	0	10.3	16.18563	6.13	9.632808	23.6	37.08552	1148	<6.2	1659
8/21/2006	71.63	3.1	2440	174	149.4513	0	16	13.74265	8.29	7.120408	33.5	28.77366	1429	<6.2	2094
9/28/2006	131.95	3.4	2100	158	249.9896	0	13.8	21.83453	12.3	19.46121	35	55.37744	1257	<6.2	1861
10/23/2006	383.72	3.8	1060	61	280.6724	0	6	27.60712	4.83	22.22373	13.1	60.27554	514	11.4	806
11/22/2006	376.32	3.7	1420	110	496.3698	0	7.35	33.16653	9.56	43.13905	20.5	92.50529	754	<6.2	1084
12/19/2006	175.03	3.6	1770	119	249.7554	0	11.7	24.55578	8.22	17.25201	23.7	49.7412	1020	<6.2	1481
1/23/2007	280.5	3.8	1500	108	363.2554	0	8.99	30.23764	12.4	41.7071	25.1	84.42324	795	<5.0	1203
2/21/2007		3.7	1780	110	0	0	10.3	0	10.6	0	26.8	0	921	6	1429
3/28/2007	651.88	3.8	1380	84	656.6022	0	4.5	35.17512	8.86	69.2559	17.2	134.4471	737	<5.0	1033
4/24/2007	360.84	3.7	1400	80	346.1466	0	5.61	24.27353	7.18	31.06666	17.3	74.8542	682	<5.0	1082
5/22/2007	105.92	3.6	2180	147	186.7027	0	12.4	15.74908	13.1	16.63814	31.8	40.38876	1262	<5.0	1838
6/20/2007	139.13	3.4	1930	128	213.5434	0	7.01	11.69484	9.11	15.19828	25.8	43.04234	998	<5.0	1575
Average	**255.27**	**3.575**	**1737.5**	**117.75**	**283.5883**	**0**	**9.496667**	**21.1852**	**9.215**	**28.20659**	**24.45**	**58.40953**	**959.75**	**8.7**	**1428.75**
Min	**71.63**	**3.1**	**1060**	**61**	**0**	**0**	**4.5**	**0**	**4.83**	**0**	**13.1**	**0**	**514**	**6**	**806**
Max	**651.88**	**3.8**	**2440**	**174**	**656.6022**	**0**	**16**	**35.17512**	**13.1**	**69.2559**	**35**	**134.4471**	**1429**	**11.4**	**2094**
75% CI	**316.0248**	**3.650094**	**1869.643**	**128.7228**	**339.7831**	**0**	**10.676**	**24.55482**	**10.06259**	**34.57405**	**26.69867**	**69.94989**	**1051.345**	**11.80594**	**1559.623**
90% CI	**342.1417**	**3.682375**	**1926.448**	**133.4398**	**363.9397**	**0**	**11.18296**	**26.00333**	**10.42694**	**37.31125**	**27.66531**	**74.91079**	**1090.719**	**13.1411**	**1615.882**

Table 11: Water Chemistry on Mon 67A

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/24/2006	152.14	3.3	2010	124	226.2145	0	6.47	11.80329	6.29	11.47491	26.4	48.1618	1240	<6.2	1807
8/21/2006	247.29	3.1	2460	152	450.7187	0	8.78	26.03493	6.7	19.8672	30.6	90.73678	1426	<6.2	2096
9/28/2006	177.28	3.4	2170	126	267.8463	0	7.65	16.2621	9.02	19.1744	30.6	65.04839	1294	<6.2	1969
10/23/2006	290.82	3.6	1300	62	216.2078	0	4.21	14.68121	4.44	15.48327	14.8	51.61089	662	17.1	997
11/22/2006	761.84	3.8	1710	94	858.711	0	4.35	39.73822	7.25	66.23037	19.5	178.1369	947	<6.2	1386
12/19/2006	107.31	3.6	2050	91	117.0946	0	7.86	10.11389	8.69	11.18189	28	36.02912	1189	<6.2	1917
1/23/2007	447.68	3.8	1770	84	450.923	0	5.49	29.47104	9.57	51.37301	24.5	131.5192	975	<5.0	1437
2/21/2007		3.7	1960	101	0	0	6.46	0	9	0	26.5	0	1060	<5.0	1632
3/28/2007	482.46	3.8	1620	64	370.2514	0	3.09	17.8762	7.12	41.19047	18.1	104.7117	896	<5.0	1243
4/24/2007	745.01	3.8	1670	66	589.6054	0	3.66	32.6963	6.2	55.38717	17.8	159.0148	889	<5.0	1361
5/22/2007	240.56	3.6	2230	105	302.8783	0	6.01	17.33618	9.49	27.37443	25.9	74.70997	1299	9	1870
6/20/2007	224.18	3.4	2010	106	284.9431	0	4.34	11.66654	7.67	20.61805	25.4	68.27882	1105	<5.0	1708
Average	**352.4155**	**3.575**	**1913.333**	**97.91667**	**344.6162**	**0**	**5.6975**	**18.97332**	**7.62**	**32.2007**	**24.00833**	**83.99653**	**1081.833**	**13.05**	**1618.583**
Min	**107.31**	**3.1**	**1300**	**62**	**0**	**0**	**3.09**	**0**	**4.44**	**0**	**14.8**	**0**	**662**	**9**	**997**
Max	**761.84**	**3.8**	**2460**	**152**	**858.711**	**0**	**8.78**	**39.73822**	**9.57**	**66.23037**	**30.6**	**178.1369**	**1426**	**17.1**	**2096**
75% CI	**431.6907**	**3.651417**	**2017.765**	**107.0027**	**419.5268**	**0**	**6.299343**	**22.65556**	**8.144508**	**39.01103**	**25.73992**	**101.2241**	**1154.43**	**17.70891**	**1729.515**
90% CI	**465.769**	**3.684267**	**2062.657**	**110.9085**	**451.7289**	**0**	**6.558059**	**24.23845**	**8.36998**	**41.93861**	**26.48428**	**108.6297**	**1185.638**	**19.71166**	**1777.201**

Table 1: Water Chemistry of Mon 68

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/17/2006	49.5	6.4	808	4	2.374218	13	2.1	1.246464	0.82	0.486715	6	3.561327	382	34.3	647
8/21/2006	23.4	6.3	843	0	0	15	1.43	0.401243	0.33	0.092595	5.88	1.649866	397	<6.2	621
9/18/2006	98.5	6.4	714	-1	-1.18111	13	0.52	0.614179	0.65	0.767724	4.23	4.99611	343	8.6	493
10/15/2006	49.5	6.7	960	4	2.374218	16	1.72	1.020914	1.38	0.819105	6.29	3.733458	453	8.6	716
11/20/2006	370	5.9	740	18	79.86006	9	0.69	3.061302	1.35	5.989505	4.08	18.10161	359	<6.2	681
12/18/2006	98.5	6.3	872	15	17.7167	11	1.53	1.807104	1.2	1.417336	5.31	6.271713	430	<6.2	643
1/19/2007	318	5.7	786	9	34.31824	7	0.51	1.9447	1.81	6.90178	4.5	17.15912	392	<5.0	547
2/20/2007	35.4	6.1	980	10	4.244814	12	2.29	0.972062	7.91	3.357648	6.49	2.754884	482	47	764
3/21/2007	269	5.7	696	10	32.25579	7	0.63	2.032115	1.4	4.515811	3.47	11.19276	326	5	579
4/7/2007	269	6	623	13	41.93253	9	0.96	3.096556	1.38	4.451299	2.7	8.709063	292	<5.0	ND
5/14/2007	98.5	5.5	903	6	7.086681	13	2.7	3.189006	2.48	2.929161	5.25	6.200846	397	6	655
6/18/2007	35.4	6.3	774	11	4.669295	11	0.87	0.369299	0.63	0.267423	3.98	1.689436	388	8	551
Average	**142.8917**	**6.108333**	**808.25**	**8.25**	**18.80429**	**11.33333**	**1.329167**	**1.646245**	**1.778333**	**3.047021**	**4.848333**	**7.16835**	**386.75**	**16.78571**	**627**
Min	**23.4**	**5.5**	**623**	**-1**	**-1.18111**	**7**	**0.51**	**0.369299**	**0.33**	**0.092595**	**2.7**	**1.649866**	**292**	**5**	**493**
Max	**370**	**6.7**	**980**	**18**	**79.86006**	**16**	**2.7**	**3.189006**	**7.91**	**6.90178**	**6.49**	**18.10161**	**482**	**47**	**764**
75% CI	**184.7519**	**6.226344**	**844.1979**	**10.18179**	**26.8937**	**12.29717**	**1.577874**	**1.993102**	**2.447578**	**3.834406**	**5.247602**	**9.039215**	**404.3635**	**24.07433**	**654.6428**
90% CI	**202.7465**	**6.277073**	**859.6509**	**11.01222**	**30.37112**	**0**	**1.684787**	**2.142206**	**2.735268**	**4.172882**	**5.419237**	**9.84345**	**411.9351**	**27.20752**	**666.5257**

Table 2: Water Chemistry of Mon 71

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/19/2006	18	5.7	847	3	0.647514	11	0.07	0.01510866	0.66	0.14245308	1	0.215838	462	<6.2	771
8/21/2006	9.48	5.5	896	3	0.34102404	10	0.37	0.042059632	1.62	0.184152982	0.91	0.103443959	436	<6.2	680
9/18/2006	32.15	5.1	803	7	2.69857455	7	<0.05	#VALUE!	0.77	0.296843201	1.01	0.389365757	388	8.6	603
10/15/2006	20	5.6	971	4	0.95928	11	0.05	0.011991	0.72	0.1726704	1.09	0.2614038	527	<6.2	729
11/20/2006	109	5.1	998	23	30.061437	8	<0.05	#VALUE!	1.03	1.34622957	1.83	2.39184477	519	<6.2	783
12/18/2006	27.27	5.9	968	15	4.90491855	9	<0.05	#VALUE!	0.67	0.219086362	1.41	0.461062344	493	<6.2	719
1/19/2007	70.6	5.2	920	10	8.465646	7	<0.05	#VALUE!	0.83	0.702648618	1.63	1.379900298	447	<5.0	680
2/20/2007	27.27	5.7	959	8	2.61595656	9	<0.05	#VALUE!	0.71	0.232166145	1.32	0.431632832	461	6	713
3/21/2007	75	5.2	850	12	10.7919	7	<0.05	#VALUE!	0.63	0.56657475	1.2	1.07919	403	<5.0	645
4/7/2007	120	5.4	798	14	20.14488	8	0.05	0.071946	0.57	0.8201844	1.15	1.654758	354	5	ND
5/14/2007	50	4.6	903	9	5.39595	11	0.1	0.059955	0.65	0.3897075	1.33	0.7974015	384	<5.0	667
6/18/2007	35.3	5.5	882	12	5.0793876	10	<0.05	#VALUE!	0.47	0.198942681	0.93	0.393652539	374	6	653
Average	**49.50583**	**5.375**	**899.5833333**	**10**	**7.675539025**	**9**	**0.128**	**#VALUE!**	**0.7775**	**0.461543008**	**1.234166667**	**0.796624483**	**437.3333333**	**6.4**	**694.8181818**
Min	**9.48**	**4.6**	**798**	**3**	**0.34102404**	**7**	**0.05**	**#VALUE!**	**0.47**	**0.14245308**	**0.91**	**0.103443959**	**354**	**5**	**603**
Max	**120**	**5.9**	**998**	**23**	**30.061437**	**11**	**0.37**	**#VALUE!**	**1.62**	**1.34622957**	**1.83**	**2.39184477**	**527**	**8.6**	**783**
75% CI	**61.58795**	**5.492727**	**921.6606067**	**11.91550522**	**10.65453754**	**9.529812027**	**0.198387847**	**#VALUE!**	**0.876882635**	**0.582083704**	**1.328671767**	**1.028852379**	**456.4581812**	**7.286092655**	**713.6686131**
90% CI	**66.78173**	**5.543334**	**931.1510326**	**12.73892938**	**11.93512884**	**0**	**0.228645689**	**#VALUE!**	**0.919604556**	**0.633900906**	**1.369296966**	**1.128680903**	**464.6794387**	**7.667000046**	**721.7719063**

Table 3: Water Chemistry of Mon 79

Sample Date	Flow	pH (SU)	Specific	Total	Acid Load	Total Alk	Total Fe	Fe Load	Total Al	Al Load	Total Mn	Mn Load	Total	TSS	TDS

	(gpm)		Cond (umhos/cm)	Acidity (lbs/day)	(lbs/day)	(mg/l)	(mg/l)	(lbs/day)	(mg/l)	(lbs/day)	(mg/l)	(lbs/day)	Sulfate (mg/l)	(mg/l)	(mg/l)
7/26/2006	82.13	6.8	596	-4	-3.93928	18	0.58	0.571196	0.17	0.16742	0.93	0.915883	249	11.4	479
8/22/2006	102.33	6.9	523	-8	-9.81631	20	0.5	0.61352	0.14	0.171785	0.6	0.736223	230	7.1	360
9/27/2006	235.62	7.1	654	-6	-16.9519	22	0.33	0.932355	0.07	0.197772	1.14	3.220864	304	<6.2	473
10/23/2006	661.08	6.8	521	-3	-23.781	17	0.28	2.219563	0.09	0.713431	0.92	7.292849	230	7.1	347
11/22/2006	630.56	6.5	735	6	45.36627	17	0.44	3.32686	0.3	2.268313	1.8	13.60988	336	<6.2	506
12/20/2006	227.54	7.4	700	-4	-10.9137	19	0.81	2.21003	0.23	0.627539	1.26	3.437824	311	12.9	489
1/23/2007	596.9	6.9	748	0	0	17	0.39	2.791397	0.42	3.00612	1.96	14.02856	358	7	524
2/21/2007		6.8	744	-2	0	18	0.75	0	0.3	0	1.07	0	281	11	469
3/30/2007	676.34	6.8	699	-2	-16.22	15	0.58	4.703796	0.5	4.054996	1.62	13.13819	337	10	498
4/24/2007	575.59	6.8	728	-3	-20.7057	16	0.51	3.519969	0.29	2.001551	1.14	7.868166	283	5	483
5/22/2007	204.65	6.9	741	-3	-7.36187	16	0.29	0.711648	0.1	0.245396	0.68	1.668692	5	5	490
6/20/2007	223.5	6.7	621	1	2.679989	17	0.41	1.098795	0.13	0.348399	0.84	2.25119	261	<5.0	439
Average	**383.2945**	**6.866667**	**667.5**	**-2.33333**	**-5.13696**	**17.66667**	**0.489167**	**1.891594**	**0.228333**	**1.049439**	**1.163333**	**5.680693**	**265.4167**	**8.5**	**463.0833**
Min	**82.13**	**6.5**	**521**	**-8**	**-23.781**	**15**	**0.28**	**0**	**0.07**	**0**	**0.6**	**0**	**5**	**5**	**347**
Max	**676.34**	**7.4**	**748**	**6**	**45.36627**	**22**	**0.81**	**4.703796**	**0.5**	**4.054996**	**1.96**	**14.02856**	**358**	**12.9**	**524**
75% CI	**466.8213**	**6.939329**	**695.4274**	**-1.15429**	**0.852593**	**18.30517**	**0.545388**	**2.377326**	**0.273796**	**1.496495**	**1.306231**	**7.454681**	**296.0181**	**9.609191**	**481.4455**
90% CI	**502.7272**	**6.970565**	**707.4326**	**-0.64745**	**3.427342**	**0**	**0.569556**	**2.586129**	**0.293339**	**1.688672**	**1.367658**	**8.217271**	**309.1728**	**10.086**	**489.339**

Table 4: Water Chemistry of Mon 81

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/17/2006	3.74	7.2	1080	-64	-2.87017	80	1.93	0.086553	0.07	0.003139	7.12	0.319306	499	11.4	859
8/21/2006	2.57	7	1170	-87	-2.68107	101	2.05	0.063175	<0.05	#VALUE!	6.73	0.207398	547	<6.2	944
9/18/2006	17.65	6.8	1040	-45	-9.52385	57	1.43	0.302647	<0.05	#VALUE!	2.89	0.611643	495	8.6	821
10/15/2006	8	7.1	1150	-54	-5.18011	69	3.46	0.331911	0.12	0.011511	3.23	0.309847	461	<6.2	877
11/20/2006	80	6.9	872	-34	-32.6155	56	0.94	0.901723	0.21	0.201449	0.49	0.470047	406	<6.2	537
12/18/2006	25	7.1	803	-30	-8.99325	54	3.81	1.142143	1.67	0.500624	1.17	0.350737	343	50	556
1/19/2007	75	7.2	948	-41	-36.8723	55	0.51	0.458656	0.07	0.062953	0.38	0.341744	418	<5.0	706
2/20/2007		7.2	1100	-58	0	73	1.58	0	0.05	0	0.83	0	499	24	843
3/21/2007	40	7.1	866	-30	-14.3892	45	1.43	0.685885	0.59	0.282988	0.28	0.134299	379	8	653
4/7/2007	50	6.9	876	-44	-26.3802	63	0.28	0.167874	0.09	0.05396	0.22	0.131901	362	<5.0	ND
5/14/2007	23.1	5.5	1020	-66	-18.2815	85	1.95	0.540135	0.2	0.055398	0.81	0.224364	417	<5.0	747
6/18/2007	1	7.1	1110	-71	-0.85136	94	1.36	0.016308	0.06	0.000719	0.74	0.008873	446	6	836
Average	**29.64182**	**6.925**	**1002.917**	**-52**	**-13.2199**	**69.33333**	**1.7275**	**0.391417**	**0.313**	**0.111251**	**2.074167**	**0.25918**	**439.3333**	**18**	**761.7273**
Min	**1**	**5.5**	**803**	**-87**	**-36.8723**	**45**	**0.28**	**0**	**0.05**	**#VALUE!**	**0.22**	**0**	**343**	**6**	**537**
Max	**80**	**7.2**	**1170**	**-30**	**0**	**101**	**3.81**	**1.142143**	**1.67**	**#VALUE!**	**7.12**	**0.611643**	**547**	**50**	**944**
75% CI	**39.46166**	**7.080194**	**1044.565**	**-46.0833**	**-8.99809**	**75.16012**	**2.075273**	**0.513773**	**0.496087**	**#VALUE!**	**2.893231**	**0.318886**	**460.1658**	**25.95856**	**808.2066**
90% CI	**43.68295**	**7.146908**	**1062.469**	**-43.5399**	**-7.18325**	**0**	**2.224772**	**0.56637**	**0.574791**	**#VALUE!**	**3.245324**	**0.344552**	**469.1211**	**29.37972**	**828.1869**

Table 1: Water Chemistry of Mon 1

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/27/2006	6610.82	4.8	408	16	1268.325	6	0.41	32.50084	1.45	114.942	3.53	279.8243	176	<6.2	387
12/20/2006	4490.24	4.9	400	17	915.322	5	0.46	24.76754	1.36	73.22576	3.12	167.9885	173	<6.2	266
3/30/2007	25707.26	4.9	351	14	4315.581	5	0.34	104.807	1.43	440.8057	2.16	665.8324	138	<5.0	197
6/20/2007	10744.27	4.9	343	18	2319.022	5	0.27	34.78533	0.97	124.9695	2.4	309.2029	136	<5.0	215
Average	**11888.15**	**4.875**	**375.5**	**16.25**	**2204.562**	**5.25**	**0.37**	**49.21516**	**1.3025**	**185.6724**	**2.8025**	**355.712**	**155.75**	**#DIV/0!**	**266.25**
Min	**4490.24**	**4.8**	**343**	**14**	**915.322**	**5**	**0.27**	**24.76754**	**0.97**	**73.22576**	**2.16**	**167.9885**	**136**	**0**	**197**
Max	**25707.26**	**4.9**	**408**	**18**	**4315.581**	**6**	**0.46**	**104.807**	**1.45**	**440.8057**	**3.53**	**665.8324**	**176**	**0**	**387**
75% CI	**17393.58**	**4.903759**	**394.6139**	**17.2323**	**3083.669**	**5.537587**	**0.417662**	**70.67394**	**1.431914**	**283.2789**	**3.167011**	**479.6693**	**168.2316**	**#DIV/0!**	**315.5081**
90% CI	**19760.22**	**4.916121**	**402.8305**	**17.65456**	**3461.574**	**0**	**0.438151**	**79.89849**	**1.487546**	**325.2374**	**3.323704**	**532.9552**	**173.5972**	**#DIV/0!**	**336.6828**

Table 2: Water Chemistry of Mon 12

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/27/2006	6871.13	4.6	422	16	1318.268	6	0.85	70.03296	1.57	129.355	3.73	307.3211	179	<6.2	266
12/19/2006	4815.62	4.7	373	18	1039.394	5	0.55	31.75925	1.51	87.19359	3.24	187.0909	162	<6.2	231
3/30/2007	25420.03	4.8	333	16	4876.985	5	0.33	100.5878	1.59	484.6504	2.42	737.644	147	<5.0	204
6/20/2007	8361.14	4.5	331	18	1804.652	4	0.31	31.08011	1.04	104.2688	2.43	243.628	133	<5.0	213
Average	**11366.98**	**4.65**	**364.75**	**17**	**2259.825**	**5**	**0.51**	**58.36504**	**1.4275**	**194.5703**	**2.955**	**368.921**	**155.25**	**#DIV/0!**	**228.5**
Min	**4815.62**	**4.5**	**331**	**16**	**1039.394**	**4**	**0.31**	**31.08011**	**1.04**	**87.19359**	**2.42**	**187.0909**	**133**	**0**	**204**
Max	**25420.03**	**4.8**	**422**	**18**	**4876.985**	**6**	**0.85**	**100.5878**	**1.59**	**484.6504**	**3.73**	**737.644**	**179**	**0**	**266**
75% CI	**16820.09**	**4.724255**	**389.3613**	**17.66415**	**3279.723**	**5.469628**	**0.654597**	**77.64623**	**1.577368**	**303.6509**	**3.325337**	**513.1021**	**166.6221**	**#DIV/0!**	**244.2623**
90% CI	**19164.24**	**4.756175**	**399.941**	**17.94966**	**3718.15**	**0**	**0.716755**	**85.9347**	**1.641792**	**350.5418**	**3.484535**	**575.0817**	**171.5107**	**#DIV/0!**	**251.0381**

Table 3: Water Chemistry of Mon 22

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/27/2006	5099.49	4.7	408	16	978.3678	8	1.84	112.5123	2.14	130.8567	4.46	272.72	174	11.4	269
12/20/2006	5152.22	4.7	398	19	1173.825	5	0.53	32.74354	1.4	86.49238	3.22	198.9325	170	<6.2	246
3/30/2007	26151.58	4.7	310	17	5330.921	5	0.27	84.66757	1.44	451.5604	2.2	689.8839	135	<5.0	185
6/20/2007	7800.14	4.5	342	17	1590.035	4	0.27	25.2535	1.08	101.014	2.57	240.3759	136	<5.0	157
Average	**11050.86**	**4.65**	**364.5**	**17.25**	**2268.287**	**5.5**	**0.7275**	**63.79423**	**1.515**	**200.7539**	**3.1125**	**350.4781**	**153.75**	**11.4**	**214.25**
Min	**5099.49**	**4.5**	**310**	**16**	**978.3678**	**4**	**0.27**	**25.2535**	**1.08**	**86.49238**	**2.2**	**198.9325**	**135**	**11.4**	**157**
Max	**26151.58**	**4.7**	**408**	**19**	**5330.921**	**8**	**1.84**	**112.5123**	**2.14**	**451.5604**	**4.46**	**689.8839**	**174**	**11.4**	**269**
75% CI	**16886.46**	**4.707517**	**391.2544**	**17.97375**	**3451.783**	**6.496232**	**1.159874**	**87.87539**	**1.771947**	**300.6642**	**3.683275**	**481.7772**	**165.9094**	**#DIV/0!**	**244.2084**
90% CI	**19395.03**	**4.732243**	**402.7554**	**18.28486**	**3960.535**	**0**	**1.345739**	**98.22723**	**1.882402**	**343.6129**	**3.928635**	**538.2192**	**171.1364**	**#DIV/0!**	**257.0866**

Table 4: Water Chemistry of Mon 24

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/27/2006	4847.04	4.3	389	20	1162.417	6	0.39	22.66713	1.64	95.3182	3.9	226.6713	155	<6.2	243
12/19/2006	5843.38	4.5	360	16	1121.088	4	0.37	25.92515	1.51	105.8026	3.26	228.4216	148	<6.2	214
3/30/2007	21490.79	4.6	290	18	4638.529	4	0.22	56.69313	1.48	381.3902	2.2	566.9313	120	<5.0	167
6/20/2007	10133.9	4.4	316	19	2308.796	3	0.18	21.87281	1.07	130.0217	2.41	292.8526	122	<5.0	176
Average	**10578.78**	**4.45**	**338.75**	**18.25**	**2307.708**	**4.25**	**0.29**	**31.78956**	**1.425**	**180.7614**	**2.9425**	**328.7192**	**136.25**	**#DIV/0!**	**200**
Min	**4847.04**	**4.3**	**290**	**16**	**1121.088**	**3**	**0.18**	**21.87281**	**1.07**	**95.3182**	**2.2**	**226.6713**	**120**	**0**	**167**
Max	**21490.79**	**4.6**	**389**	**20**	**4638.529**	**6**	**0.39**	**56.69313**	**1.64**	**381.3902**	**3.9**	**566.9313**	**155**	**0**	**243**
75% CI	**14966.05**	**4.524255**	**364.194**	**19.2323**	**3255.873**	**4.973746**	**0.350689**	**41.39193**	**1.566863**	**259.1472**	**3.394476**	**421.763**	**146.5216**	**#DIV/0!**	**220.2267**
90% CI	**16852.03**	**4.556175**	**375.1317**	**19.65456**	**3663.464**	**0**	**0.376778**	**45.51973**	**1.627847**	**292.8432**	**3.588768**	**461.76**	**150.9371**	**#DIV/0!**	**228.9217**

Table 5: Water Chemistry of Mon 35

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/27/2006	3953.93	5.5	49	4	189.6463	10	0.09	4.267042	0.09	4.267042	0.05	2.370579	8	<6.2	29
12/19/2006	4582.25	5.5	47	9	494.5118	5	0.07	3.846203	0.11	6.044034	0.05	2.747288	8	<6.2	24
3/28/2007	23313.66	5	54	10	2795.541	5	<0.05	#VALUE!	0.18	50.31974	0.06	16.77325	9	<5.0	41
6/20/2007	8450.9	5.1	51	12	1216.017	4	<0.05	#VALUE!	0.08	8.106779	0.07	7.093432	9	<5.0	33
Average	**10075.19**	**5.275**	**50.25**	**8.75**	**1173.929**	**6**	**0.08**	**#VALUE!**	**0.115**	**13.89333**	**0.0575**	**7.246136**	**8.5**	**#DIV/0!**	**31.75**
Min	**3953.93**	**5**	**47**	**4**	**189.6463**	**4**	**0.07**	**#VALUE!**	**0.08**	**4.267042**	**0.05**	**2.370579**	**8**	**0**	**24**
Max	**23313.66**	**5.5**	**54**	**12**	**2795.541**	**10**	**0.09**	**#VALUE!**	**0.18**	**50.31974**	**0.07**	**16.77325**	**9**	**0**	**41**
75% CI	**15278.72**	**5.426268**	**51.96752**	**10.70757**	**1843.196**	**7.55758**	**0.091503**	**#VALUE!**	**0.140936**	**26.63108**	**0.063007**	**11.10166**	**8.832077**	**#DIV/0!**	**35.88099**
90% CI	**17515.57**	**5.491295**	**52.70583**	**11.54907**	**2130.896**	**0**	**0.096449**	**#VALUE!**	**0.152085**	**32.10669**	**0.065374**	**12.75905**	**8.974828**	**#DIV/0!**	**37.6568**

Table 6: Water Chemistry of Mon 39

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/27/2006	6637.75	4.8	140	8	636.7461	8	0.11	8.755259	0.47	37.40883	0.65	51.73562	35	<6.2	76
12/19/2006	6871.13	5	102	11	906.3089	5	0.13	10.71092	0.58	47.7872	0.57	46.96328	32	<6.2	57
3/30/2007	19253.52	4.8	131	13	3001.296	5	0.09	20.77821	0.77	177.7691	0.66	152.3735	38	<5.0	58
6/20/2007	8724.67	5	79	14	1464.645	4	0.07	7.323226	0.26	27.20055	0.32	33.47761	18	<5.0	47
Average	**10371.77**	**4.9**	**113**	**11.5**	**1502.249**	**5.5**	**0.1**	**11.8919**	**0.52**	**64.67129**	**0.55**	**71.1375**	**30.75**	**#DIV/0!**	**59.5**
Min	**6637.75**	**4.8**	**79**	**8**	**636.7461**	**4**	**0.07**	**7.323226**	**0.26**	**27.20055**	**0.32**	**33.47761**	**18**	**0**	**47**
Max	**19253.52**	**5**	**140**	**14**	**3001.296**	**8**	**0.13**	**20.77821**	**0.77**	**177.7691**	**0.66**	**152.3735**	**38**	**0**	**76**
75% CI	**13819.55**	**4.966415**	**129.0294**	**13.02177**	**2110.304**	**6.496232**	**0.114851**	**15.3917**	**0.642554**	**105.3094**	**0.641185**	**102.6033**	**35.83794**	**#DIV/0!**	**66.44192**
90% CI	**15301.66**	**4.994966**	**135.92**	**13.67594**	**2371.69**	**0**	**0.121235**	**16.89616**	**0.695237**	**122.7786**	**0.680383**	**116.1295**	**38.02511**	**#DIV/0!**	**69.42607**

Table 7: Water Chemistry of Mon 72

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/27/2006	5601.02	4.7	418	16	1074.589	8	1.09	73.2064	1.68	112.8319	3.84	257.9014	179	<6.2	270
12/20/2006	6148.56	4.8	407	19	1400.82	5	0.51	37.60097	1.29	95.10832	2.97	218.9703	176	<6.2	274
3/30/2007	26779.9	4.8	322	15	4816.767	5	0.31	99.54651	1.57	504.1549	2.45	786.7386	143	5	188
6/20/2007	9862.38	4.6	345	16	1892.157	4	0.27	31.93015	1.04	122.9902	2.5	295.6495	142	<5.0	230
Average	**12097.97**	**4.725**	**373**	**16.5**	**2296.083**	**5.5**	**0.545**	**60.571**	**1.395**	**202.368**	**2.94**	**389.815**	**160**	**5**	**240.5**
Min	**5601.02**	**4.6**	**322**	**15**	**1074.589**	**4**	**0.27**	**31.93015**	**1.04**	**95.10832**	**2.45**	**218.9703**	**142**	**5**	**188**
Max	**26779.9**	**4.8**	**418**	**19**	**4816.767**	**8**	**1.09**	**99.54651**	**1.68**	**504.1549**	**3.84**	**786.7386**	**179**	**5**	**274**
75% CI	**17832.07**	**4.780069**	**399.9085**	**17.49623**	**3281.774**	**6.496232**	**0.76253**	**78.84028**	**1.560673**	**315.8265**	**3.310471**	**543.0766**	**171.6464**	**#DIV/0!**	**263.648**
90% CI	**20297.01**	**4.803741**	**411.4757**	**17.92449**	**3705.495**	**0**	**0.85604**	**86.69375**	**1.631891**	**364.5993**	**3.469726**	**608.9597**	**176.6529**	**#DIV/0!**	**273.5986**

Table 1: Water Chemistry of Mon 29A

Sample Date	Flow (gpm)	pH (SU)	Specific Cond (umhos/cm)	Total Acidity (lbs/day)	Acid Load (lbs/day)	Total Alk (mg/l)	Total Fe (mg/l)	Fe Load (lbs/day)	Total Al (mg/l)	Al Load (lbs/day)	Total Mn (mg/l)	Mn Load (lbs/day)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
7/17/2006					0			0		0		0			
8/22/2006					0			0		0		0			
9/17/2006	34	3.9	770	46	18.75392	0	1	0.407694	5.65	2.303471	6.77	2.760088	297	<6.2	453
10/15/2006	7	4	891	62	5.204094	0	3.68	0.308888	9.78	0.820904	11.7	0.982063	411	<6.2	624
12/6/2006	6	4.1	815	65	4.67649	1	1.1	0.079141	9.33	0.671256	8.68	0.624491	401	<6.2	630
12/19/2006	4.5	4.1	779	60	3.23757	1	1.94	0.104681	8.19	0.441928	8.2	0.442468	407	20	557
1/28/2007	14	4	924	67	11.24756	0	0.48	0.08058	9.82	1.648523	7.78	1.30606	440	5	718
3/2/2007	54	4.7	354	25	16.18785	3	1.39	0.900044	3.11	2.013769	3.15	2.039669	142	81	
3/29/2007	69	4.1	830	55	45.50585	0	1.18	0.976307	8.52	7.049269	7.13	5.899212	392	<5.0	572
5/24/2007	3	3.9	1110	79	2.841867	0	1.04	0.037412	11	0.395703	10.5	0.377717	550	<5.0	843
6/22/2007	3	3.8	896	75	2.697975	0	2.33	0.083817	8.76	0.315123	10.1	0.363327	420	<5.0	759
Average	**21.61111**	**4.066667**	**818.7778**	**59.33333**	**10.03211**	**0.555556**	**1.571111**	**0.270779**	**8.24**	**2.135304**	**8.223333**	**1.345009**	**384.4444**	**35.33333**	**644.5**
Min	**3**	**3.8**	**354**	**25**	**0**	**0**	**0.48**	**0**	**3.11**	**0**	**3.15**	**0**	**142**	**5**	**453**
Max	**69**	**4.7**	**1110**	**79**	**45.50585**	**3**	**3.68**	**0.976307**	**11**	**7.049269**	**11.7**	**5.899212**	**550**	**81**	**843**
75% CI	**31.14823**	**4.16629**	**896.3235**	**65.5548**	**14.65796**	**0**	**1.93905**	**0.39343**	**9.169915**	**2.83806**	**9.184296**	**1.94786**	**427.2576**	**62.06779**	**695.0486**
90% CI	**35.24799**	**4.209115**	**929.6583**	**68.22924**	**16.64649**	**0**	**2.097218**	**0.446155**	**9.569661**	**3.140156**	**9.597388**	**2.207009**	**445.6618**	**73.56021**	**716.778**

Job name: McPherson
Permit #: 17820141 Point on permit: 4
Longitude: 78 29' 41" Latitude: 41 01' 02"
Description: Unnamed Trib

Table 1: Water Chemistry of MON 25

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/8/1996	18	3.8	3.8	1200	17	86	<1	0.79		23.3	902	1	
11/4/1996	5	4	3.7	1000	8	67	<1	0.33		14.1	713	1	
2/10/1997	14	4.1	3.8	900	6	29	<1	0.17		6.81	349	<1	
6/3/1997	44	4	3.9	780	12	36	<1	0.27		8.67	495	<1	
8/5/1997	2	3.7	3.5	1900	18	131	<1	1.97		40.2	1453	<1	
11/17/1997	8	4.4	3.8	840	5	40	<1	0.23		9.55	462	1	
3/3/1998	31	3.9	3.8	480	8	32	<1	0.11		4.81	292	1	
6/9/1998	8	3.9	3.6	1350	13	105	<1	0.62		23.3	995	2	
9/1/1998	5	3.5	3.3	2250	15	140	<1	2.89		39.5	1624	<1	
11/11/1998	4	3.6	3.5	2200	12	138	<1	1.36		42.3	1386	<1	
2/23/1999	32	4	3.8	900	3	44	<1	0.15		8.96	593	2	
6/14/1999	8	3.7	3.6	1600	14	137	<1	0.97		29.8	1383	<1	
8/23/1999	5	3.6	3.4	1850	16	134	<1	2.15		30.5	1599	3	
11/8/1999	8	3.8	3.7	1400	9	95	<1	0.87		21.8	1196	1	
2/29/2000	72	4.1	3.06	680	7	33	3	0.17		6.15	400	<1	
5/16/2000	12	4.1	3.8	1100	12	93	<1	0.38		15.4	785	<1	
8/14/2000	28	4	3.7	700	17	47	<1	0.53		10.5	571	<1	
11/7/2000	27	3.7	3.6	1200	10	85	<1	0.76		18.2	825	1	
2/13/2001	94	3.8	3.9	760	8	33	<1	0.27		5.93	329	<1	
6/11/2001	11	3.9	3.7	1200	18	137	<1	0.68		15.8	854	1	
8/14/2001	8	3.7	3.4	1400	23	109	<1	2.8		24.4	1124	<1	
12/4/2001	12	3.7	3.7	1300	7	142	<1	1.03		16.3	723	2	
3/25/2003	493	3.8	4.1	800	13	32	3	0.13		5.3	344	30	
6/10/2003	201	3.5	3.7	600	15	33	<1	0.26		5.79	348	1	
9/16/2003	101	3.9	3.8	950	17	44	<1	0.68		9.97	523	<1	
12/9/2003	75	4	4.1	880	9	35	4	0.38		9	458	2	
3/15/2004	116	3.9	4.1	580	7	25	4	0.17		5.64	367	3	
6/8/2004	43	3.9	3.8	1000	16	38	<1	0.57		9.89	546	3	
9/20/2004	527	4.1	4	820	14	41	3	0.47		5.96	438	1	
12/27/2004	ice covered	3.9	4	780	6	30	4	0.45		7.75	427	<2	
3/18/2005	ice covered	4.4	4.1	780	8	26	3	0.27		7	414	<1	
6/20/2005	20	4.1	3.6	1300	17	86	<1	1.48		18.3	982	2	
9/20/2005	15	3.7	3.5	1800	19	20	<1	2.29		23.04	1080	<1	
12/27/2005	61	4.2	3.9	500	7	25	<1	0.24		5.24	274	1	
3/21/2006	161	4.3	4.1	720	5	24	3	0.22		6.02	395	1	

Job name: McPherson
Permit #: 17820141 Point on permit: 4
Longitude: 78 29' 41" Latitude: 41 01' 02"
Description: Unnamed Trib

Table 1: Water Chemistry of MON 25 (cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/20/2006	21	3.9	3.6	1600	15	51	<1	1		16.9	841	1	
9/19/2006	44	4.1	3.8	600	15	22	<1	0.42		6.07	333	<1	
12/26/2006	121	4.6	4.1	680	8	23	5	0.25		5.23	317	<1	
3/19/2007	323	4.4	4.2	480	6	21	5	0.11		3.67	274	<1	

Job name: McPherson
Permit #: 17820141 Point on permit: 28
Longitude: 78 29' 27" Latitude: 41 01' 01"
Description: seep

Table 2: Water Chemistry of MON 26

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/8/1996	<1	3.7	3.9	1600	16	166	<1	0.18		0.18	<0.20		
11/4/1996	insufficient	amount	for	sample							3.51		
2/10/1997	insufficient	amount	for	sample							<0.20		
6/3/1997	<1	4	3.89	1100	12	62	<1	0.08		0.08	3.51		
8/5/1997	insufficient	amount	for	sample							<0.20		
11/17/1997	<1	4.2	3.84	1300	6	112	<1	0.09		0.09	3.51		
3/3/1998	<1	3.8	3.84	760	9	66	<1	<0.07		<0.07	<0.20		
6/9/1998	insufficient	amount	for	sample							3.51		
9/1/1998	insufficient	amount	for	sample							<0.20		
11/11/1998	insufficient	amount	for	sample							3.51		
2/23/1999	<1	4	3.88	1050	5	100	<1	<0.07		<0.07	<0.20		
6/15/1999	1	3.8	3.81	1900	13	189	<1	0.21		0.21	3.51		
8/23/1999	insufficient	amount	for	sample							<0.20		
11/9/1999	insufficient	amount	for	sample							3.51		
2/29/2000	1	4.2	4.06	760	9	56	2	<0.07		<0.07	<0.20		
5/16/2000	<1	4.1	3.9	1400	14	148	<1	0.12		0.12	3.51		
8/15/2000	<1	4	3.85	1000	19	127	<1	0.43		0.43	<0.20		
11/7/2000	<1	4	3.8	1450	10	139	<1	0.12		0.12	3.51		
2/13/2001	<1	4	4.1	1000	9	74	4	<0.07		<0.07	<0.20		
6/12/2001	<1	4	3.9	1450	19	176	<1	0.33		0.33	3.51		
8/14/2001	<1	3.8	3.7	1500	19	155	<1	0.62		0.62	<0.20		
12/4/2001	<1	4.1	3.6	1300	12	279	<1	0.14		0.14	3.51		
3/25/2003	1	3.7	4	1000	13	75	2	0.07		0.07	<0.20		
6/10/2003	1	3.6	3.8	760	14	51	<1	0.08		0.08	3.51		
9/16/2003	<1	3.9	3.8	1300	14	79	<1	0.43		0.43	<0.20		
12/9/2003	<1	3.9	4	1100	9	93	4	0.14		0.14	3.51		
3/17/2004	1	4.2	4.1	1000	7	69	4	0.12		0.12	<0.20		
6/8/2004	<1	3.9	3.8	1300	16	66	<1	0.17		0.17	3.51		
9/20/2004	2	4.2	4	920	14	46	5	0.18		0.18	<0.20		
12/27/2004	Frozen										3.51		
3/18/2005	inaccessible	due to	snow								<0.20		
6/20/2005	insufficient	amount	for	sample							3.51		
9/20/2005	insufficient	amount	for	sample							<0.20		
12/27/2005	inaccessible	due to	snow								3.51		
3/21/2006	<1	4.3	4.1	1200	5	69	3	0.12		0.12	<0.20		
6/20/2006	insufficient	amount	for	sample							3.51		

Job name: McPherson
Permit #: 17820141 Point on permit: 28
Longitude: 78 29' 27" Latitude: 41 01' 01"
Description: seep

Table 2: Water Chemistry of MON 26 (cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/19/2006	<1	4	3.8	1200	15	43	<1	0.17		0.17	<0.20		
12/26/2006	1	4.1	4.2	730	8	34	6	<.10		<.10	3.51		
3/20/2007	inaccessible	due to	snow								<0.20		
11/7/2006	Aluminum	only							<0.20		3.51		
1/16/2007	Aluminum	only		1600					3.51		<0.20		

Job name: McPherson
Permit #: 17820141 Point on permit: 18A
Longitude: 78 29' 32" Latitude: 41 01' 00"
Description: seep

Table 3: Water Chemistry of MON 27

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/8/1996	Dry												
11/4/1996	insufficient	amount	for	sample									
2/10/1997	insufficient	amount	for	sample									
6/3/1997	<1	3.7	3.6	1450	1450	132	<1	0.24		20.9	911		
8/5/1997	insufficient	amount	for	sample									
11/17/1997	insufficient	amount	for	sample									
3/3/1998	insufficient	amount	for	sample									
6/9/1998	insufficient	amount	for	sample									
9/1/1998	insufficient	amount	for	sample									
11/11/1998	insufficient	amount	for	sample									
2/23/1999	Frozen												
6/15/1999	1	3.7	3.6	2400	2400	228	<1	0.17		62.5	1762		
8/23/1999	insufficient	amount	for	sample									
11/9/1999	insufficient	amount	for	sample									
2/29/2000	<1	3.8	3.7	1000	1000	108	<1	0.16		16.6	688		
5/16/2000	<1	3.9	3.7	1600	1600	182	<1	0.21		32	1545		
8/15/2000	<1	3.9	3.6	1400	1400	174	<1	0.21		31.6	1367		
11/7/2000	insufficient	amount	for	sample									
2/13/2001	<1	3.6	3.7	1400	1400	132	<1	0.15		20.5	1011		
6/12/2001	<1	3.8	3.6	2000	2000	196	<1	0.21		32.5	1535		
8/14/2001	<1	3.8	3.4	1600	1600	179	<1	0.36		36.8	1611		
12/4/2001	<1	3.8	3.6	1700	1700	210	<1	0.15		28.4	1227		
3/25/2003	<1	3.4	3.7	1200	1200	93	<1	0.11		15.1	829		
6/10/2003	<1	3.4	3.7	1000	1000	91	<1	0.21		18.3	952		
9/16/2003	<1	3.7	3.6	1800	1800	134	<1	0.23		24.1	1131		
12/9/2003	<1	3.7	3.6	1600	1600	113	<1	0.2		23.8	1054		
3/17/2004	<1	3.8	3.8	1500	1500	96	<1	0.07		20	955		
6/8/2004	<1	3.6	3.6	1700	1700	87	<1	0.15		23.7	1100		
9/20/2004	1	3.8	3.7	1100	1100	90	<1	0.22		12.5	717		
12/1/2704	Frozen												
3/18/2005	Inaccessible	due to	snow										
6/20/2005	insufficient	amount	for	sample									
9/20/2005	insufficient	amount	for	sample									
12/27/2005	Inaccessible	due to	snow										
3/21/2006	<1	4.2	3.7	1250	1250	76	<1	0.1		21.6	1014		
6/20/2006													

Job name: McPherson
Permit #: 17820141 Point on permit: 18A
Longitude: 78 29' 32" Latitude: 41 01' 00"
Description: seep

Table 3: Water Chemistry of MON 27

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/19/2007	<1	3.9	3.6	1600	15	82	<1	0.13		21.9	984		
12/26/2006	<1	3.8	3.8	1300	9	5	<1	<0.10		13.9	663		
3/20/2007	Inaccessible	due to	snow										
11/7/2006	Aluminum	only							10				
1/16/2007	Aluminum	only							5.51				

Job name: McPherson
Permit #: 17820141 Point on permit: 18
Longitude: 78 29' 38" Latitude: 41 00' 59"
Description: Unnamed Trip

Table 3: Water Chemistry of MON 28

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/8/1996	16	3.7	3.7	1500	17	75	<1	1.07		16.7	814	2	
11/4/1996	3	3.9	3.8	1000	9	61	<1	0.5		12.2	667	<1	
2/10/1997	12	4.2	3.9	1000	7	27	1	0.2		6.07	348	<1	
6/3/1997	29	4.1	3.8	1200	12	33	<1	0.34		7.56	454	<1	
8/5/1997	2	3.5	3.3	1950	18	129	<1	3.75		12	1519	1	
11/17/1997	6	4.4	3.9	800	5	36	<1	0.3		8.5	445	1	
3/3/1998	22	4.1	4.1	475	9	28	3	0.12		4.34	284	<1	
6/9/1998	5	3.6	3.5	1300	14	158	<1	1.17		19.6	967	<1	
9/1/1998	4	3.4	3.2	2350	18	198	<1	4.54		38.5	1580	<1	
11/11/1998	2	3.5	3.3	2200	12	166	<1	2.38		40.3	1582	1	
2/23/1999	26	4	3.9	870	4	39	<1	0.19		8.28	560	3	
6/15/1999	11	3.4	3.4	1600	14	139	<1	2.11		31	1369	1	
8/23/1999	3	3.5	3.3	2190	19	172	<1	3.62		34.3	1915	3	
11/9/1999	6	3.7	3.5	1350	13	101	<1	1.34		21.5	1114	1	
2/29/2000	67	4.1	4.1	680	8	34	3	0.14		6.08	376	<1	
5/16/2000	14	4	3.6	1000	14	81	<1	0.75		15.1	762	<1	
8/15/2000	18	4	3.8	1000	19	73	<1	0.57		10.7	576	1	
11/7/2000	22	3.6	3.5	1300	10	89	<1	1.02		17.6	835	<1	
2/13/2001	79	3.9	4	720	9	22	2	0.23		5.01	295	<1	
6/12/2001	9	3.7	3.6	1100	19	130	<1	1.02		15.9	886	2	
8/14/2001	5	3.6	3.3	1500	20	127	<1	4.35		28	1336	2	
12/4/2001	9	3.8	3.9	1000	12	209	<1	1.22		17.6	897	<1	
3/25/2003	463	3.8	4.1	750	14	34	4	0.15		5.23	192	<1	
6/10/2003	174	3.6	4.1	540	14	25	4	0.26		5.45	350	<1	
9/16/2003	89	3.8	3.8	1000	14	48	<1	0.64		9.72	539	2	
12/9/2003	60	3.9	3.8	840	8	35	<1	0.4		8.56	488	<1	
3/17/2004	98	4	4.1	800	7	27	6	0.22		6.12	442	2	
6/8/2004	33	3.8	3.7	1000	17	34	<1	0.51		9.58	570	3	
9/20/2004	438	4.1	4.1	840	15	40	3	0.31		5.73	503	<1	
12/27/2004	56	3.9	4	700	7	27	3	0.39		6.99	426	<1	
3/18/2005	inaccessible	due to	snow										
6/20/2005	16	3.5	3.4	1400	19	82	<1	1.7		19.3	1074	<2	
9/20/2005	11	3.6	3.4	1850	18	22	<1	3.82		24	1155	1	
12/27/2005	inaccessible	due to	snow										
3/21/2006	115	4.4	4.1	700	5	23	4	0.2		5.51	371	1	
6/20/2006	12	3.8	3.5	1700	16	50	<1	1.25		19.6	904	2	

Job name: McPherson
Permit #: 17820141 Point on permit: 18
Longitude: 78 29' 38" Latitude: 41 00' 59"
Description: Unnamed Trip

Table 3: Water Chemistry of MON 28

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/19/2006	31	4	3.8	660	15	22	<1	0.35		5.68	347	<1	
12/26/2006	89	3.9	4.1	590	8	23	7	0.28		5.18	342	2	
3/20/2007	inaccessible	due to	snow										
11/7/2006	Aluminum	only							2.16				
1/16/2007	Aluminum	only							1.85				

Job name: Montgomery Job
Permit #: 17850106 Point on permit: 13
Longitude: 78 28' 37" Latitude: 41 01' 4"
Description: unnamed above house

Table 1: Water Chemistry of MON 73

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
5/22/1991	25		4.8	380		34	4	1.05		0.83	258	1.7	
9/20/1991	3	6.7	6.3	425	15	0	16	0.01		0.65	270	4.7	
10/16/1991	3	4.8	4	510	8	44	0	1.49		2.15	314	2	
1/2/1992	9	4.8	4	500	5	28	0	0.14		1.64	241	1.3	
4/23/1992	18	5	4.2	400	12	16	2	0.02		1.19	281	1.3	
7/24/1992	22	4.3	4	430	17	14	0	0.21		1.09	367	1.7	
12/30/1992	1	4.3	4.6	416	7	18	6	0.25		2.22	241	2.3	
2/2/1993	21	4.1	4.4	380	4	12	2	0.06		1.12	241	0.3	
4/16/1993	28	5.5	5.3	276	9	0	6	0.21		0.64	193	1	
7/12/1993	12	4.3	4.1	542	10	24	2	0.4		1.1	258	1.7	
10/13/1993	3	4	3.9	616	7	52	0	0.62		1.48	376	0.3	
3/11/1994	not	accessible											
4/20/1994	25	5.2	5.3	442	13	4	8	0.22		0.67	307	2	
8/8/1994	12	3.1	4.1	435	15	20	2	0.19		0.64	220	0.3	
10/11/1994	22	5.4	5.2	405	9	8	8	0.17		0.76	206	0.7	

Job name: Montgomery Job
Permit #: 17850106 Point on permit: 16
Longitude: 78 28' 37" Latitude: 41 00' 56"
Description: natural drainage

Table 1: Water Chemistry of MON 75

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
10/16/1991	12	4.9	4.4	440	19	21	5	0.45		2.67	367	0.3	
1/2/1992	8	5.2	4.5	600	5	14	6	0.05		2	314	1	
4/23/1992	22	5	4.5	405	15	6	6	0.04		1.22	294	1	
7/24/1992	21	4	4.4	450	17	10	6	0.35		1.54	352	7.7	
12/30/1992	10	4.4	4.6	384	7	6	6	0.02		1.13	236	2.3	
2/2/1993	23	4.3	4.5	378	5	8	4	0.05		1.09	252	0.3	
4/16/1993	32	5.2	5	252	8	6	6	0.18		0.68	179	3.3	
7/12/1993	12	4.3	4.5	530	12	14	6	0.35		1.49	258	0.3	
10/13/1993	8	4.2	4.4	602	10	22	4	0.34		2.49	359	0.3	
3/11/1994	38	4.8	5	302	7	0	10	0.01		0.56	236	3	
4/20/1994	35	5.1	5.1	350	11	2	6	0.01		0.53	247	0.3	
8/8/1994	12	3.7	4.4	441	17	16	4	0.21		1.13	231	2	
10/26/1994	12	4.5	4.7	540	10	8	8	0.06		1.62	239	3	

Job name: Kramer #1
Permit #: 17713099 Point on permit: 22
Longitude: 78 28' 29" Latitude: 41 1' 42"
Description: deep mine discharge into unnamed trib

Table 1: Water Chemistry of MON 50

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/23/1996	<1	6.7	6.72	400	22	4	46	<0.02		<0.04	104		
12/11/1996	3	6.1	5.93	290	8	4	15	<0.02		<0.04	89		
3/10/1997	33	6.5	6.08	280	12	6	15	<0.07		<0.05	74		
6/6/1997	3	6.5	6.19	270	17	7	22	<0.07		<0.05	90		
8/26/1997	1	6.3	6.16	260	20	4	28	<0.07		<0.05	104		
11/21/1997	<1	7	6.09	222	8	4	21	<0.07		<0.05	85		
3/6/1998	2	6.5	5.89	200	11	5	13	<0.07		<0.05	75		
6/8/1998	1	5.3	6.19	680	18	7	25	<0.07		<0.05	132		
8/25/1998	<1	6.6	6.27	375	18	15	45	0.08		0.07	133		
11/9/1998	<1	6.9	6.27	540	10	5	39	<0.07		<0.05	183		
2/22/1999	4	6.5	5.99	265	8	5	15	<0.07		<0.05	119		
6/14/1999	<1	7.5	6.45	320	18	4	35	<0.07		<0.05	114		
8/25/1999	<1	6.6	6.39	260	12	16	47	<0.07		0.05	122		
11/8/1999	<1	7.2	6.6	310	13	3	37	<0.07		0.06	102		
3/1/2000	3	6.4	6.32	185	10	5	16	<0.07		<0.05	74		
5/15/2000	1	6.6	6.36	320	16	7	23	<0.07		<0.05	96		
8/14/2000	3	6.4	5.98	220	21	6	21	<0.07		<0.05	94		
11/8/2000	<1	6.4	6	260	13	5	27	<0.07		<0.05	102		
2/15/2001	4	6.2	5.8	280	8	4	17	<0.07		<0.05	79		
6/11/2001	<1	6.2	5.9	310	17	16	24	<0.07		<0.05	110		
8/14/2001	<1	6.1	6	300	24	7	33	<0.07		0.08	105		
12/10/2001	<1	6.4	6.6	260	13	8	27	<0.07		<0.05	114		
4/4/2002	6	6.1	6.8	340	11	2	16	<0.07		<0.05	89		
6/17/2002	3	5.6	6.5	310	18	2	23	<0.07		<0.05	176		
9/18/2002	1	6.2	7.2	400	19	3	38	<0.07		<0.05	107		
12/16/2002	4	6.4	6.5	370	11	4	23	<0.07		<0.05	137		
3/26/2003	9	5.6	6.2	240	12	3	15	<0.07		<0.05	144		
6/11/2003	10	5.5	6.4	300	14	7	21	<0.07		<0.05	102		
9/17/2003	4	6.3	6.5	400	17	3	28	<0.07		<0.05	110		
12/10/2003	3	6.1	6.4	240	10	2	25	<0.07		<0.05	114		
3/15/2004	10	5.6	6.7	210	8	2	24	<0.07		<0.05	92		
6/9/2004	2	5.9	6.6	310	19	5	26	0.08		0.07	109		
9/20/2004	18	5.8	6.5	240	17	3	18	<0.07		<0.05	95		
12/26/2004	4	6.7	6.6	260	5	3	17	<0.07		<0.05	98		
3/16/2005	6	6.3	6.5	230	11	3	16	<0.07		<0.05	81		

Job name: Kramer #1
Permit #: 17713099 Point on permit: 22
Longitude: 78 28' 29" Latitude: 41 1' 42"
Description: deep mine discharge into unnamed trib

Table 1: Water Chemistry of MON 50 (cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/21/2005	1	6.4	7.1	390	22	4	36	<0.07		0.07	158		
9/20/2005	<1	5	5.8	500	21	5	9	0.4		0.37	140		
12/27/2005	7	6.7	6.5	220	8	6	21	<.1		<0.05	89		
3/21/2006	5	5.4	6.4	330	6	2	17	<0.1		<0.05	99		
6/20/2006	<1	7.2	6.6	410	15	5	32	0.11		0.1	133		
9/19/2006	12	6	6.1	300	15	3	23	<.10		<0.05	99		
12/27/2006	12	6.2	6.1	300	6	3	21	<.10		<0.05	89		
3/20/2007	12	6.3	6.1	240	5	3	15	0.1		<0.05	75		
10/25/2006	Aluminum	only							<0.20				
1/16/2007	Aluminum	only							<0.20				
4/5/2007	Aluminum	only							<0.20				

Job name: Montgomery Job
Permit #: 17850106 Point on permit: 6
Longitude: 78 28' 16.18" Latitude: 41 1' 20.55"
Description: outflow from culvert

Table 2: Water Chemistry of MON 68

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
10/16/1991	15	6.2	6.4	950	8	0	20	0.35		9.08	613	1.7	
1/2/1992	25	5.9	5	1100	6	10	8	0.43		10.2	646	3	
4/23/1992	38	5.4	4.9	1245	10	12	10	0.58		10.8	784	1.7	
7/24/1992	32	4.5	4.8	900	16	4	8	0.19		5.97	646	2.3	
12/30/1992	20	4.5	4.3	1050	7	64	4	0.22		9.81	646	2	
2/2/1993	38	4	4.4	1050	2	32	4	0.27		9.72	646	0.7	
4/16/1993	355	4.8	5	1370	7	20	10	0.17		9.82	832	20.3	
7/12/1993	15	5.3	5.5	1000	21	12	8	0.48		8.91	513	1.7	
10/13/1993	6	6.7	6.5	528	9	0	16	0.29		1.88	376	1.7	
3/11/1994	not	accessible											
4/20/1994	12	5.6	6.2	453	11	0	10	0.01		0.81	275	0.7	
8/8/1994	2	4.7	6.3	481	16	0	14	0.58		1.38	270	1.3	
10/11/1994	5	6.8	6.6	350	9	0	20	0.69		1.41	212	1.7	

Job name: Montgomery Job
Permit #: 17850106 Point on permit: 7
Longitude: 78 28' 17.98" Latitude: 41 01' 21.18"
Description: Spring below road

Table 3: Water Chemistry of MON 69

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
1/30/1991	6	4.9	6	550	8	0	8	0.08		2.05	376	3.3	
4/4/1991	6	6.2	6.1	625	7	0	10	0.06		1.52	401	2.3	
9/20/1991	1	6.5	6.3	675	16	0	26	1.25		2.09	468	5.7	
1/16/1991	3	6	6.3	690	10	0	18	0.37		3.64	478	0.3	
1/2/1992	7	5.9	5.9	725	7	0	12	0.01		1.03	458	1	
4/23/1992	5	5.6	5.5	680	12	0	8	0.15		1.94	438	2	
7/24/1992	12	6.3	6	600	15	0	10	0.11		1.42	429	1.7	
12/30/1992	-1	6	5.4	519	6	0	14	0.11		1.2	258	2.3	
2/2/1993	12	6.1	5.9	535	4	0	8	0.02		1.4	344	0.3	
4/16/1993	20	5.6	5.4	602	8	2	8	0.08		1.89	359	0.3	
7/12/1993	2	6.5	6.3	583	13	0	10	0.63		1.34	275	14.7	
10/13/1993	12	6.2	6.4	859	8	0	14	0.29		8.51	478	3.3	
3/11/1994	not	accessible											
4/20/1994	55	5.2	5.1	1100	13	16	8	0.33		8.48	700	3.3	
8/8/1994	21	4	5	925	21	22	6	0.21		8.71	458	2.3	
10/11/1994	25	5.7	5.9	760	11	45	10	0.12		7.45	536	3.3	

Job name: Montgomery Job
Permit #: 17850106 Point on permit: 8
Longitude: 78 28' 15.2" Latitude: 41 01' 4.52"
Description: spring from upper branch

Table 4: Water Chemistry of MON 70

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/20/1991	18	6.5	6.2	1000	15	0	17	1.21		9.45	681	4.7	
10/16/1991	20	6.1	6.3	910	9	0	22	1.02		8.09	629	0.3	
1/2/1992	34	5.9	5.5	1050	6	4	10	1		8.97	681	9.7	
4/23/1992	58	5.5	4.9	1250	15	16	8	0.63		10.9	886	2.7	
7/24/1992	68	5	5.2	875	17	2	8	0.57		5.81	629	3	
12/30/1992	1000+	5.1	4.8	1040	7	12	8	0.17		6.5	613	3	
2/2/1993	75	4.3	4.5	1120	5	22	4	0.42		9.35	700	0.3	
4/16/1993	500	4.8	5	1380	6	18	10	0.29		10.3	886	24	
7/12/1993	38	5.8	6	976	12	2	10	0.82		8.23	513	3.7	
10/13/1993	20	6.6	6.4	828	7	0	16	0.67		7.75	513	2.3	
3/11/1994	60	6	6.8	590	5	0	20	0.35		1.94	376	41	
4/20/1994	125	5.3	5.1	1080	13	12	8	0.32		7.99	700	5.3	
8/8/1994	30	4.5	5.3	895	17	12	8	0.48		8.29	448	2.7	
10/11/1994	60	6.4	6.2	742	10	0	12	0.57		7.11	558	3	

Job name: Montgomery Job
Permit #: 17850106 Point on permit: 10
Longitude: 78 28' 21.41"Latitude: 41 00' 58.18"
Description: spring from pipe and reservoir

Table 5: Water Chemistry of MON 71

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/20/1991	5	6.3	6	625	16	0	10	0.05		1.76	438	6	
10/16/1991	12	6.1	6.2	420	12	0	12	0.07		1.1	270	11.7	
1/2/1992	12	5.5	5.7	925	5	0	12	0.01		2.47	582	7.7	
4/23/1992	15	5.8	5.9	1045	14	0	4	0.01		5.46	720	3	
7/24/1992	15	5.5	5.8	870	15	0	10	0.02		2.93	784	5	
12/30/1992	50	5.3	5.5	1190	6	0	10	0.01		7.83	646	3.7	
2/2/1993	15	6.4	6.1	1020	6	0	10	0.01		5.4	663	2	
4/16/1993	38	6.3	6.1	519	7	0	10	0.12		2.42	294	35.7	
7/12/1993	10	6.6	6.4	922	9	0	22	0.05		1.59	478	1	
10/13/1993	10	7.1	6.9	837	10	0	24	0.04		1.21	489	7	
3/11/1994	16	5.9	5.6	939	5	0	12	0.01		4.07	553	3	
4/20/1994	21	6	6.6	1000	12	0	14	0.01		5.24	629	2.7	
8/8/1994	10	4.7	6.7	880	13	0	24	0.03		2.39	458	2.7	
10/11/1994	12	7	6.8	800	9	0	20	0.01		1.89	583	2.3	

Job name: Montgomery Job
Permit #: 17850106 Point on permit: 29
Longitude: 78 28' 14.87" Latitude: 41 01' 3.78"
Description: discharge from strip cut

Table 6: Water Chemistry of MON 78

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
5/20/1991	2.6		5.3	187		8	6	0.04		0.13	96	4.3	
9/20/1991	dry												
10/16/1991	dry												
1/2/1992	6	5.6	5.2	350	7	10	8	0.01		0.1	105	1.7	
4/23/1992	8	5.8	4.9	270	12	0	6	0.01		0.13	215	0.7	
7/24/1992	10	4.5	4.9	280	17	0	6	0.01		0.22	236	1.3	
12/30/1992	10	4.8	5	230	6	0	6	0.01		0.09	70	0.3	
2/2/1993	6	5	4.8	229	4	2	2	0.01		0.07	83	1	
4/16/1993	25	6	5.8	202	9	0	8	0.01		0.07	64	2.7	
7/12/1993	dry												
10/13/1993	dry												
3/11/1994	29	5.5	5.7	206	7	0	10	0.01		0.1	88	2.7	
4/20/1994	12	5.7	5.6	212	13	0	8	0.01		0.02	96	0.3	
8/8/1994	dry												
10/26/1994	dry												

Job name: Montgomery Job
Permit #: 17850106 Point on permit: 30
Longitude: 78 28' 16.67" Latitude: 41 00' 50.95"
Description: mouth of trib

Table 7: Water Chemistry of MON 79

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/15/1989	75	6.4	6.7	900	16	9	14	0.06		3.67	629	6	
10/11/1989	275	6	6.6	820	13	6	20	0.13		5.08	489	0.3	
1/12/1990	n/m	6.7	6.6	720	6	2	12	0.15		2.53	384	4.7	
4/25/1990	185	5.9	5.2	875	16	12	10	0.17		5	526	6.7	
9/21/1990	112	6.4	6.5	690	14	4	12	0.29		4.72	468	1.3	
12/28/1990	n/m	6	5.2	860	11	16	10	0.2		5.94	489	15.3	
1/30/1991	185	5.2	6.1	830	4	0	8	0.2		5	468	13	
4/4/1991	96	6.4	6.2	875	12	0	10	0.15		5.17	613	6.7	
9/20/1991	5	6.3	6.1	840	15	0	16	0.27		3.84	567	3.7	
10/16/1991	32	5.9	6.2	825	9	0	18	0.26		3.74	553	4	
1/2/1992	45	5.6	6.4	850	5	0	16	0.03		3.04	478	8	
4/23/1992	200	5.8	5.9	930	12	0	10	0.1		4.76	646	8.3	
7/24/1992	n/m	6.4	6.6	790	18	0	18	0.19		3.08	582	7	
12/30/1992	100	4.3	4.5	440	7	12	8	0.5		4.84	247	4	
2/2/1993	255	5.4	5.2	977	6	2	4	0.48		5.73	553	14	
4/16/1993	n/m	6.2	6.4	473	7	0	12	0.3		2.28	275	46	
7/12/1993	28	6.2	6.4	965	17	0	14	0.49		4.35	500	35.3	
10/13/1993	35	6.5	6.7	873	12	0	20	0.12		3.48	500	0.3	
3/11/1993	228	5.8	6.5	595	5	0	18	0.03		1.79	384	39	
4/20/1994	265	6.1	6.4	946	14	0	12	0.14		4.91	597	4.7	
8/8/1994	60	5.3	6.5	890	16	0	16	0.77		4.1	500	3	
10/26/1994	700	6.5	6.3	875	10	0	20	0.1		3.32	485	4	

Job name: Swisher
Permit #: 17030110 Point on permit: 9
Longitude: 78 27' 53" Latitude: 41 01' 05"
Description: Headwaters (partially impounded) of mined out unnamed tributary "C"

Table 8: Water Chemistry of MON 81

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/25/2002	static	7.5	7.5	1050	16	0	116	0.11	0.11	0.08	503	1.3	
10/22/2002	static	7.6	7.8	1150	13	0	118	0.03	0.04	0.01	526	1.7	
11/25/2002	static	7.6	7.5	1120	12	0	120	0.02	0.01	0.01	586	3	
12/12/2002													
1/10/2003													
2/10/2003	static	7.5	7.6	1080	1	0	76	0.06	0.04	0.37	615	8	
3/12/2003	static	7.5	7.3	1150	3	0	114	0.1	0.05	0.39	614	27.1	
4/16/2003	static	7.5	7.4	1000	6	0	102	0.25	0.22	0.03	542	<1.4	
12/30/2004	10	5.7	7.9	1070	6	-67	80	0.52	0.34	0.25	453	10	
3/7/2005	5	6.8	7.5	964	5	-62	77	0.41	0.17	0.07	303	<5.7	
5/4/2005	5	6.1	7.9	1060	9	-80	93	1.28	0.21	0.35	439	5.7	
7/18/2005	0.1	5.9	7.7	1130	19	-79	93	0.81	0.016	1.06	546	10	
10/26/2005	8	6.7	7	977	14	-37	52	0.79	0.1	2.55	42	<6.2	
2/2/2006	8	5.4	7.4	1010	7	-55	68	1.02	0.15	0.9	482	<6.2	

Job name: Gill
Permit #: 17030110 Point on permit: 9
Longitude: 78 27' 53" Latitude: 41 1' 5"
Description: headwaters (partially impounded) of Last Trib

Table 9: Water Chemistry of MON 82

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/25/2002	static	7.5	7.5	1050	16	0	116	0.11	0.11	0.08	503	1.3	
10/22/2002	static	7.6	7.8	1150	13	0	118	0.03	0.04	0.01	526	1.7	
11/25/2002	static	7.6	7.5	1120	12	0	120	0.02	0.01	0.01	586	3	
12/12/2002													
1/10/2003													
2/10/2003	static	7.5	7.6	1080	1	0	76	0.06	0.04	0.37	615	8	
3/12/2003	static	7.5	7.3	1150	3	0	114	0.1	0.05	0.39	614	27.1	
4/16/2003	static	7.5	7.4	1000	6	0	102	0.25	0.22	0.03	542	<1.4	
12/30/2004	10	5.7	7.9	1070	6	-67	80	0.52	0.34	0.25	453	10	
3/7/2005	5	6.8	7.5	964	5	-62	77	0.41	0.17	0.07	303	<5.7	
5/4/2005	5	6.1	7.9	1060	9	-80	93	1.28	0.21	0.35	439	5.7	
7/18/2005	>1	5.9	7.7	1130	19	-79	93	0.81	0.16	1.06	546	10	
10/26/2005	8	6.7	7	977	14	-37	52	0.79	0.1	2.55	42	<6.2	
2/2/2006	8	5.4	7.4	1010	7	-55	68	1.02	0.15	0.9	482	<6.2	
4/10/2007	12.7	5.6	7.4	1070	11	-57	71	0.73	<0.05	1.24	485	7.1	
8/15/2006	0.5	6.7	7.1	1140	20	-82	104	2.94	<0.05	9.19	573	24.3	
12/7/2006	5	7.5	7.3	1020	8	-64	84	5.59	0.12	1.96	461	10	
2/8/2007	5	6.7	7.2	1030	2	-64	79	0.6	<0.05	0.79	465	8	

Job name: McPherson #2
Permit #: 17850145 Point on permit: 32
Longitude: 78 28' 27" Latitude: 41 00' 19"
Description: Seep

Table 1: Water Chemistry of MON 2

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/6/1996	1.2	8.4	6.57	190	19	3	46	0.07		<.04	53		
11/4/1996	<1	7.3	6.45	200	9	3	36	<.02		<.04	61		
2/10/1997	2	7	6.23	370	7	3	22	0.07		<.04	57		
6/3/1997	3	7	6.39	160	12	3	24	0.08		<.05	52		
8/5/1997	<1	7	6.74	380	17	3	64	<.07		<.05	53		
11/17/1997	1	7.3	6.09	200	6	6	24	<0.07		<.05	50		
3/3/1998	3	6.6	6.02	140	8	5	20	<.07		<.05	40		
6/9/1998	1	7.4	6.45	220	12	3	39	0.11		<.05	57		
9/1/1998													
11/11/1998	<1	7.3	6.36	260	12	8	46	<0.07		<.05	48		
2/23/1999	5	6.9	6.11	200	4	2	22	<.07		<.05	73		
6/15/1999	<1	7.4	6.58	205	16	4	46	<.07		<.05	57		
8/23/1999	<1	7.3	6.64	210	16	4	52	<.07		<.05	81		
11/9/1999	<1	7.2	6.69	205	12	2	47	<.07		<.05	68		
2/29/2000	5	6.6	6.46	155	6	3	18	<.07		<.05	44		
5/16/2000	1	7.1	6.61	185	10	2	34	<.07		<.05	64		
8/15/2000	3	7.3	6.27	220	17	3	33	<.07		<.05	71		
11/7/2000	1	7.1	6.2	310	10	2	42	<.07		<.05	61		
2/13/2001	5	6.4	6	190	8	2	21	<.07		<.05	54		
6/12/2001	1	7.1	6.3	260	15	6	44	<.07		2.39	52		
8/14/2001	<1	7.2	6.3	240	19	5	47	<.07		<.05	62		
12/4/2001	<1	6.5	6.9	210	8	2	26	<.07		<.05	86		
4/2/2002	6	6.5	7.2	240	10	2	26	<.07		<.05	56		
6/18/2002	5	6.4	6.8	260	15	2	33	<.07		<.05	137		
9/17/2002	<1	6.4	7	300	15	4	69	<.07		<.05	99		
12/17/2002	2	7.1	6.9	220	7	2	32	<.07		<.05	41		
3/25/2003	6	6.4	6.6	200	15	2	22	<.07		<.05	51		
6/10/2003	5	6	6.6	180	12	2	25	<.07		<.05	63		
9/16/2003	5	6.9	6.8	260	17	2	36	<.07		0.07	61		
12/9/2003	6	6.5	6.8	210	8	1	36	<.07		<.05	62		
3/29/2004	8	5.6	6.6	210	7	2	25	<.07		<.05	55		
6/3/2004	2	6.9	8	200	16	<1	39	<.07		<.05	54		
9/20/2004	12	6.1	6.6	170	12	4	25	<.07		<.05	56		
12/27/2004	3	6.3	6.8	185	6	2	28	<.07		<.05	50		
3/15/2005	4	6.7	9	180	9	2	27	<.07		<0.05	63		

Job name: McPherson #2
Permit #: 17850145 Point on permit: 32
Longitude: 78 28' 27" Latitude: 41 00' 19"
Description: Seep

Table 1: Water Chemistry of MON 2(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/8/2005	<1	6.5	7.5	230	16	3	52	<.07		<0.05	62		
9/20/2005	insufficient	amount	to	sample									
12/27/2005	4	6.2	6.7	165	8	3	25	<.10		<0.05	81		
3/21/2006	5	5.9	6.7	230	5	2	25	<.10		<.05	76		
6/20/2006	<1	7	7	280	15	3	54	<0.10		<0.05	110		
9/19/2006	5	6.8	6.9	340	15	1	39	<0.10		<0.05	114		
12/26/2006	3	6.8	6.5	180	8	2	30	<0.10		<0.05	47		
3/20/2007	5	6	6.4	200	6	2	21	<0.10		<0.05	71		

Job name: McPherson #2
Permit #: 17850145 Point on permit: 33
Longitude: 78 28' 26" Latitude: 41 00' 19"
Description: Seep

Table 2: Water Chemistry of MON 3

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/6/1996	<1	6.9	6.34	170	16	3	31	0.07		<.04	59		
11/4/1996	<1	6.8	6.32	210	9	3	26	<.02		<.04	67		
2/10/1997	<1	6.9	6.08	320	7	4	15	<.02		0.06	63		
6/3/1997	1	6.9	6.33	215	12	4	22	<.07		<.05	58		
8/5/1997													
11/17/1997	<1	6.9	6.04	205	7	6	20	<.07		<.05	62		
3/3/1998	2	6.3	5.95	160	8	5	17	<.07		<.05	51		
6/9/1998	<1	6.8	6.24	260	12	4	25	0.13		<.05	59		
9/1/1998													
11/11/1998													
2/23/1999	2	6.5	6.02	235	4	3	17	<.07		<.05	86		
6/15/1999	<1	7.1	6.37	180	15	6	28	<.07		<.05	53		
8/23/1999													
11/9/1999	<1	7.1	6.54	180	12	2	32	<.07		<.05	49		
2/29/2000	3	6.5	6.34	160	6	3	15	<.07		<.05	50		
5/16/2000	<1	6.8	6.44	200	11	2	22	<.07		<.05	64		
8/15/2000	2	7	6.1	225	17	4	25	<.07		<.05	82		
11/7/2000	<1	6.4	6	285	10	3	28	<.07		<.05	65		
2/13/2001	3	6.4	5.9	210	9	<1	16	0.09		<.05	59		
6/12/2001	<1	6.6	6	200	14	5	24	<.07		<.05	50		
8/14/2001	<1	6.8	6.7	220	20	7	32	<.07		<.05	63		
12/4/2001	<1	6.4	6.8	170	8	6	15	<.07		<.05	85		
4/2/2002	4	6.6	6.8	280	10	3	16	<.07		<.05	69		
6/18/2002	3	6.3	6.5	300	15	3	26	<.07		<.05	146		
9/17/2002	<1	6.3	6.9	260	17	3	38	<.07		<.05	68		
12/17/2002	1	6.6	6.6	240	7	2	23	<.07		<.05	48		
3/25/2003	3	6.1	6.3	220	15	2	15	<.07		<.05	57		
6/10/2003	3	6	6.5	200	13	2	21	<.07		<.05	73		
9/16/2003	3	6.3	6.6	260	17	3	28	<.07		<.05	67		
12/9/2003	3	6.6	6.5	210	9	2	26	<.07		<.05	59		
3/17/2004	3	5.7	6.5	200	7	2	17	<.07		<.05	61		
6/3/2004	1	6.3	6.7	200	16	5	24	<.07		0.07	57		
9/20/2004	4	6	6.4	210	14	2	19	0.11		<.05	73		
12/27/2004	2	5.8	6.7	210	7	3	20	<.07		0.16	61		
3/15/2005	3	5.9	6.6	180	9	2	17	<0.07		<0.05	79		

Job name: McPherson #2
Permit #: 17850145 Point on permit: 33
Longitude: 78 28' 26" Latitude: 41 00' 19"
Description: Seep

Table 2: Water Chemistry of MON 3(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/8/2005	<1	6.6	6.9	180	16	2	27	<0.07		<0.05	56		
9/20/2005	insufficient	amount	to	sample									
12/27/2005	2	6.3	6.5	200	8	4	19	<.10		<0.05	79		
3/21/2006	3	6.3	6.5	240	5	2	18	<.1		<.05	85		
6/20/2006	<1	6.7	6.7	220	15	4	29	<0.10		<0.05	55		
9/19/2006	3	6.6	6.6	380	15	2	27	<0.10		<0.05	140		
12/26/2006	3	6.4	6.4	210	9	2	23	<0.10		<0.05	53		
3/20/2007	3	6.2	6.2	230	6	3	18	<0.10		<0.05	83		

Job name: McPherson #2
Permit #: 17850145 Point on permit: 15
Longitude: 78 28' 15" Latitude: 41 00' 33"
Description: unnamed trib mouth

Table 3: Water Chemistry of MON 5

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/7/1996	22	6.5	6.21	400	22	6	29	1.21		1.83	213	15	
11/4/1996	16	6.4	6.03	435	7	4	14	0.24		0.97	199		
2/10/1997	24	6.3	6.19	380	7	3	8	0.1		0.77	180	2	
6/3/1997	70	6.7	6.08	280	12	4	14	0.32		0.52	135	3	
8/5/1997	1	6.2	6.28	370	17	3	24	<0.07		<0.05	157		
11/17/1997	18	6.1	5.45	385	5	5	7	0.22		1.21	210	3	
3/3/1998	27	5.6	5.32	320	7	7	7	0.11		0.98	179	4	
6/9/1998	10	6.4	5.82	485	12	4	10	0.2		1.39	233	1	
9/1/1998													
11/11/1998	10	5.5	5.31	790	12	8	8	0.13		2.12	312	<1	
2/23/1999	18	6	5.58	500	5	3	9	<0.07		0.73	254	<1	
6/15/1999	4	5.9	5.88	320	20	6	12	<0.07		2.22	167		
8/23/1999	1	6.5	6.08	320	16	5	16	<0.07		0.78	235		
11/9/1999	6	6.2	6.06	440	12	6	15	0.17		0.58	243	<1	
2/29/2000	81	5.7	5.84	360	6	4	9	0.09		1.01	192	5	
5/16/2000	10	6.5	6.02	365	10	<1	10	0.26		2.01	215	5	
8/15/2000	47	6.4	5.76	460	17	4	11	0.45		1.85	258	<1	
11/7/2000	12	6	5.8	490	9	5	13	0.46		0.71	219	<1	
2/13/2001	47	5.9	5.5	360	10	7	9	0.18		0.56	172	3	
6/12/2001	10	6.1	5.7	480	15	5	10	0.17		0.68	233	7	
8/14/2001	4	6.4	5.7	500	21	6	15	0.13		0.82	295	3	
12/4/2001	18	5.9	6.4	380	7	3	10	0.2		0.6	150	<1	
4/2/2002	105	5.4	4.9	520	9	7	12	0.29		1.49	226	9	
6/18/2002	47	5.6	6.2	460	15	2	11	0.3		1.44	242	3	
9/17/2002	7	5.1	5.6	1000	17	7	10	0.16		4.32	613	20	
12/17/2002	134	5.7	5.8	380	8	5	8	0.1		0.79	166	7	
3/25/2003	336	4.5	4.9	480	15	11	7	0.11		1.68	253	3	
6/10/2003	125	4.7	5.4	280	12	6	10	0.17		1.36	178	<1	
9/16/2003	134	5.7	6	380	17	4	8	0.7		2.74	173	3	
12/9/2003	80	5.6	5.8	320	8	2	10	0.4		1.36	170	9	
3/17/2004	100	5.4	5.1	330	6	27	9	0.28		1.15	167	16	
6/3/2004	26	5.4	6.2	360	17	3	11	0.32		0.87	178	6	
9/20/2004	136	5.1	5	380	13	13	6	0.31		1.79	201	<1	
12/27/2004		5.6	6.3	280	6	2	9	0.35		0.82	141	3	
3/15/2005	86	6.4	6	210	8	2	8	0.18		0.73	142	2	

Job name: McPherson #2
Permit #: 17850145 Point on permit: 15
Longitude: 78 28' 15" Latitude: 41 00' 33"
Description: unnamed trib mouth

Table 3: Water Chemistry of MON 5(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/8/2005	3	5.8	6.2	320	16	3	9	<0.07		0.41	172	7	
9/20/2005	4	6.4	6.3	430	19	5	14	0.28		0.74	209	8	
12/27/2005	251	5.6	5.9	210	6	5	18	0.19		0.38	110	9	
3/21/2006	107	4.9	5.9	370	5	3	7	<.1		0.61	160	1	
6/20/2006	7	6.1	6.4	410	15	3	16	0.15		0.59	158	7	
9/19/2006	134	6.3	6.1	380	15	2	11	0.18		1.16	178	2	
12/26/2006	314	5.7	6.1	300	8	3	12	0.17		0.43	117	<1	

Job name: McPherson #2
Permit #: 17850145 Point on permit: 5
Longitude: 78 28' 24" Latitude: 41 00' 44"
Description: unnamed stream middle

Table 4: Water Chemistry of MON 6

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/7/1996	18	6.5	6.4	520	22	8	48	0.3		1.65	277	13	
11/4/1996	3	6.3	6.46	560	8	3	35	1.09		1.17	291	5	
2/10/1997	5	6	5.63	490	7	5	7	0.37		1.08	249	20	
6/3/1997	31	6.4	6.1	360	12	4	15	0.36		0.69	201	<1	
8/5/1997	1	6.6	6.55	600	18	7	64	<.07		1.56	290		
11/17/1997	10	6	5.24	460	6	6	7	<.07		1.76	293		
3/3/1998	18	4.9	4.87	425	8	10	6	0.22		1.45	243	12	
6/9/1998	5	6.2	5.8	600	13	5	11	0.52		2.34	313	1	
9/1/1998	insufficient	amount	to	sample									
11/11/1998	5	5.5	5.16	800	10	19	9	0.38		3.47	312	7	
2/23/1999		5.5	5.3	620	3	7	6	<.07		1.26	328	3	
6/15/1999	4	4.5	4.86	560	17	9	8	1.09		5.15	343	3	
8/23/1999	2	7.1	6.55	500	16	5	44	0.27		0.63	384	8	
11/9/1999	5	6.3	6.15	390	11	5	17	0.17		0.58	283	<1	
2/29/2000	40	5.4	5.66	520	7	11	10	0.14		1.74	278	5	
5/16/2000	8	6.3	5.98	510	10	6	10	0.52		2.54	296	1	
8/15/2000	31	6.2	5.67	440	19	4	10	0.68		1.96	296	<1	
11/7/2000	7	6.1	5.8	610	9	6	15	0.55		0.52	291	<1	
2/13/2001	38	5.8	5.4	460	8	3	8	0.12		0.94	232	5	
6/12/2001	8	6.1	5.7	640	15	9	11	0.14		0.68	302	2	
8/14/2001	insufficient	amount	to	sample									
12/4/2001	12	5.9	6.5	400	7	8	8	0.08		0.71	290	2	
4/2/2002	54	5.2	5.1	660	11	12	16	0.18		1.9	284	4	
6/18/2002	39	5.4	5.8	520	16	4	9	0.3		1.68	248	7	
9/17/2002	5	4.6	4.8	1100	17	32	16	0.21		6.74	722	15	
12/17/2002	52	4.9	5	560	10	10	8	0.07		1.28	273	6	
3/25/2003	127	4.3	4.6	580	15	25	7	0.11		2.13	279	8	
6/10/2003	98	4.3	4.8	340	12	11	8	0.17		1.79	232	2	
9/16/2003	92	4.4	4.3	480	18	11	15	0.32		3.08	220	<1	
12/9/2003	57	5.2	4.9	410	8	4	8	0.25		1.61	217	10	
3/17/2004	58	5.7	4.9	380	6	9	8	0.08		1.36	196	8	
6/3/2004	18	5.2	5.4	440	16	6	8	0.17		0.88	225	4	
9/20/2004	98	4.9	4.5	430	14	20	14	0.46		2.25	236	3	
12/27/2004		6.2	5.4	360	6	4	6	1.1		1.09	189	10	
3/15/2005		5.5	4.8	280	9	6	8	0.25		1.03	189	<1	

Job name: McPherson #2
Permit #: 17850145 Point on permit: 5
Longitude: 78 28' 24" Latitude: 41 00' 44"
Description: unnamed stream middle

Table 4: Water Chemistry of MON 6(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/8/2005	4	5.6	6.3	480	15	3	10	0.34		0.67	257	7	
9/20/2005	2	6.6	6	600	18	3	24	0.17		0.55	269	1	
12/27/2005	182	5.2	5.1	300	8	7	9	<.1		0.75	149	5	
3/21/2006	48	5	5.3	420	5	5	7	<.1		0.78	199	4	

Job name: McPherson #2
Permit #: 17850145 Point on permit: 30
Longitude: 78 28' 26" Latitude: 41 00' 44"
Description: swamp-beginning unnamed

Table 5: Water Chemistry of MON 7

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/8/1996	<1	6.3	6.41	360	20	10	61	0.81		0.05	142	44	
11/4/1996	<1	5.8	5.71	390	8	13	13	1.06		2.76	184	<1	
2/10/1997	<1	5.6	5.27	450	6	8	6	0.17		1.41	199		
6/3/1997	3	5.7	5.52	370	12	6	9	0.34		4.12	196	<1	
8/5/1997	<1	6.2	6.27	375	17	10	42	0.19		1.72	163	32	
11/17/1997	<1	6.4	5.74	380	5	6	10	0.07		0.24	208		
3/3/1998	<1	5.5	5.51	320	9	6	8	<.07		0.36	179		
6/9/1998	<1	6.5	6.15	345	13	5	22	5.48		1.6	161		
9/1/1998	insufficient	amount	to	sample									
11/11/1998	1	6.4	5.87	640	11	9	18	0.11		1.92	254		
2/23/1999	frozen												
6/15/1999	1	6.5	6.21	410	15	11	27	<.07		2.39	204		
8/23/1999	<1	6.7	6.34	550	15	9	42	<0.07		5.12	263		
11/9/1999	<1	6.5	6.09	520	12	2	16	<0.07		0.58	294		
2/29/2000	2	6	6.01	400	7	6	13	0.21		2.57	209		
5/16/2000	1	6.3	6.11	420	10	8	13	1.36		1.64	224		
8/15/2000	1	6.8	6.22	380	19	8	40	0.33		5.11	203		
11/7/2000	2	6	5.7	600	9	8	13	<.07		0.91	272		
2/13/2001	2	5.5	5.5	600	8	3	12	<.07		1.92	289	1	
6/12/2001	<1	5.7	5.7	500	14	5	13	<.07		2.31	247	10	
8/14/2001	<1	6.5	6.3	560	22	13	31	<.07		7.86	269	23	
12/4/2001	2	5.6	5.9	670	6	5	72	<.07		1.61	337	<1	
4/2/2002	2	5.5	5.6	520	9	2	21	<.07		1.63	171	1	
6/18/2002	2	5.5	6.2	470	16	3	15	<.07		3.36	245	3	
9/17/2002	<1	5.7	6.1	700	18	5	12	<.07		6.8	324	30	
12/17/2002	3	5.5	6	630	7	5	9	<.07		2.35	293	2	
3/25/2003	4	5	5.8	460	13	5	9	<.07		2.64	241	<1	
6/10/2003	5	4.7	5.6	300	12	4	16	<.07		1.75	208	<1	
9/16/2003	5	6.3	6.7	460	17	12	61	<.07		11.8	167	18	
12/9/2003	4	5.7	6	380	8	2	13	<.07		3.12	211	139	
3/17/2004	2	5.9	5.8	420	7	6	11	<.07		1.75	202	3	
6/8/2004	2	6.2	6.7	420	16	13	37	<.07		5.7	185	10	
9/20/2004	unable to gauge flow	5.7	6.5	290	14	5	24	<.07		2.55	131	15	
12/27/2004	frozen												
3/15/2005	frozen												

Job name: McPherson #2
Permit #: 17850145 Point on permit: 30
Longitude: 78 28' 26" Latitude: 41 00' 44"
Description: swamp-beginning unnamed

Table 5: Water Chemistry of MON 7(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/8/2005	<1	5.6	6.6	450	15	4	22	<0.07		5.26	238	14	
9/20/2005	insufficient	amount	to	sample									
12/27/2005		5.7	5.7	340	5	7	9	<.1		1.57	181	109	
3/21/2006		5.7	5.9	530	5	3	8	<.1		2.24	253	3	
6/20/2006	<1	5.3	5.1	600	16	13	8	<0.10		4.04	228	4	
9/19/2006		6.1	6.1	480	16	3	13	<0.10		4.03	248	15	
12/26/2006		5.5	6	429	9	8	10	<0.10		1.1	189	<1	
3/20/2007	5	5.6	5.5	320	5	7	8	0.12		0.89	116	2	

Job name: McPherson #2
Permit #: 17850145 Point on permit: 12
Longitude: 78 28' 32" Latitude: 41 00' 44"
Description: Spring

Table 6: Water Chemistry of MON 8

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/8/1996	<1	4.8	4.9	500	15	20	11	0.04		1.66	384		
11/4/1996	1	5.9	4.93	560	9	13	7	<.02		1.33	357		
2/10/1997	<1	5.1	4.73	580	7	16	6	0.03		1.57	369		
6/3/1997	1	4.7	4.88	560	11	14	8	<0.07		1.39	316		
8/5/1997	<1	4.9	4.88	685	17	13	8	<0.07		1.44	445		
11/17/1997	<1	5.3	4.69	600	6	16	6	0.08		1.48	390		
3/3/1998	3	4.9	4.93	500	8	17	7	<0.07		1.32	306		
6/9/1998	<1	4.9	4.8	620	12	13	6	0.21		1.18	400		
9/1/1998	<1	4.8	4.81	960	15	15	8	0.14		1.4	468		
11/11/1998	<1	4.9	4.73	1000	12	18	7	<0.07		1.11	457		
2/23/1999	2	5.3	5.01	560	5	11	6	<0.07		1.38	280		
6/15/1999	1	4.8	4.89	740	12	15	8	<0.07		1.19	374		
8/23/1999	<1	5	4.89	560	15	12	9	<0.07		0.99	330		
11/9/1999	<1	5	5.02	545	12	11	8	<0.07		1.08	313		
2/29/2000	5	4.9	5.1	370	7	19	9	<0.07		0.72	221		
5/16/2000	2	5.2	4.93	520	10	20	7	<0.07		1.41	384		
8/15/2000	<1	4.9	4.74	600	18	21	7	<0.07		1.72	392		
11/7/2000	<1	4.7	4.8	780	10	34	8	<0.07		1.98	459		
2/13/2001	2	4.7	4.8	620	8	14	7	<0.07		0.95	288		
6/12/2001	<1	4.7	4.7	800	14	21	7	<0.07		1.59	444		
8/14/2001	<1	4.8	4.6	840	19	25	8	<0.07		1.77	497		
12/4/2001	1	4.8	5	460	8	14	5	<0.07		1.08	307		
4/2/2002	4	5.1	5	680	9	11	12	0.07		1.59	296		
6/18/2002	4	4.6	4.9	700	15	13	7	<0.07		1.75	400		
9/17/2002	<1	4.5	4.5	900	17	17	8	0.09		1.61	485		
12/17/2002	2	4.9	5	540	9	12	8	<0.07		0.91	262		
3/25/2003	6	4.5	5.1	620	15	11	8	<0.07		1.23	300		
6/10/2003	4	4.3	5	600	12	16	9	<0.07		1.52	303		
9/16/2003	3	4.6	4.8	680	17	18	8	0.52		1.95	357		
12/9/2003	1	4.8	4.9	650	8	7	9	<0.07		1.68	350		
3/17/2004	4	5	5	630	7	13	9	<0.07		1.25	324		
6/8/2004	1	4.6	4.8	680	15	12	<5	<0.07		1.34	362		
9/20/2004	11	4.9	5.5	400	15	7	7	<0.07		0.59	205		
12/27/2004	3	5.3	4.9	580	7	10	7	<0.07		1.24	291		
3/15/2005	2	5.4	4.9	480	9	10	10	<0.07		1.1	358		

Job name: McPherson #2
Permit #: 17850145 Point on permit: 12
Longitude: 78 28' 32" Latitude: 41 00' 44"
Description: Spring

Table 6: Water Chemistry of MON 8(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/8/2005	1	4.7	4.8	660	15	13	8	<0.07		0.88	400		
9/20/2005	<1	4.9	4.7	770	15	19	8	0.4		1.12	435		
12/27/2005	5	5.3	5	300	7	20	8	<.1		0.47	163		
3/21/2006	1	4.8	4.9	630	4	12	8	<.1		1.02	303		
6/20/2006	<1	4.9	4.6	760	15	23	6	<0.10		0.95	408		
9/19/2006	<1	5.2	4.9	570	15	10	10	<0.10		0.98	288		
12/12/2006	3	5.4	5.1	480	8	17	13	<0.10		0.75	233		
3/20/2007	4	5.4	5.1	360	6	22	9	<0.10		0.62	205		

Job name: McPherson #2
Permit #: 17850145 Point on permit: 14
Longitude: 78 28' 34" Latitude: 41 00' 44"
Description: Intermittent flow

Table 7: Water Chemistry of MON 9

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/8/1996	<1	5.4	5.52	330	16	6	12	0.18		0.24	196	9	
11/4/1996	insuffient	amount	for	sample									
2/10/1997	<1	5.7	5.45	360	7	12	8	<0.02		0.14	137		
6/3/1997	1	5.5	5.48	320	11	7	9	<0.07		0.24	148	5	
8/5/1997	<1	5.6	5.84	420	17	3	11	0.78		0.62	237	17	
11/17/1997	<1	5.7	5.52	300	5	8	9	0.08		0.13	161	4	
3/3/1998	2	5.4	5.44	225	8	8	8	<0.07		0.1	122	1	
6/9/1998	<1	5.7	5.49	400	13	5	8	0.21		0.21	237		
9/1/1998	<1	5.9	5.72	490	15	4	10	<0.07		0.28	210		
11/11/1998	<1	5.6	5.37	920	12	8	9	<0.07		0.3	415		
2/23/1999	3	5.6	5.6	340	5	4	9	<0.07		0.09	160		
6/15/1999	1	5.4	5.52	380	14	5	9	<0.07		0.26	223	<1	
8/23/1999	<1	6	5.65	380	15	6	10	<0.07		0.11	256		
11/9/1999	<1	5.4	5.64	375	14	5	9	<0.07		0.13	162		
2/29/2000	3	5.5	5.62	180	7	4	8	<0.07		0.07	88	<1	
5/16/2000	<1	5.6	5.83	400	11	13	8	<0.07		0.21	222	<1	
8/15/2000	<1	5.8	5.63	300	17	6	9	<0.07		0.13	164	<1	
11/7/2000	<1	5.2	5.3	620	9	21	8	0.07		0.5	288	2	
2/13/2001	3	5.1	5.3	280	8	7	8	<0.07		0.08	109	3	
6/12/2001	1	5.4	5.4	380	14	8	9	<0.07		0.17	193	10	
8/14/2001	<1	5.5	5.2	840	20	6	8	<0.07		0.34	260	58	
12/4/2001	1	5.5	5.7	240	9	4	6	<0.07		0.12	116	4	
4/2/2002	3	5.6	4.8	330	10	2	12	<0.07		0.1	127	1	
6/18/2002	2	5	5.9	400	14	2	9	<0.07		0.15	259	3	
9/17/2002	<1	5.3	6	540	17	3	9	<0.07		0.29	230	13	
12/17/2002	2	5.4	6	280	8	9	10	<0.07		0.1	107	9	
3/25/2003	3	4.9	5.6	320	14	5	10	<0.07		0.08	140	7	
6/10/2003	2	4.8	5.7	220	11	8	9	<0.07		0.24	135	<1	
9/16/2003	2	5.6	5.9	370	16	8	11	<0.07		0.14	185	4	
12/9/2003	3	5.1	5.5	440	8	4	10	<0.07		0.36	237	39	
3/17/2004	5	5.2	5.4	440	7	13	9	<0.07		0.41	224	<1	
6/8/2004	2	5	5.5	500	15	5	10	0.1		0.62	267	5	
9/20/2004	5	5.1	6.2	220	15	4	9	0.08		0.08	97	3	
12/27/2004	2	5.2	5.7	410	7	4	7	<0.07		0.53	238	<1	
3/15/2005	3	5.6	5.5	360	8	4	9	<0.07		0.55	219	2	

Job name: McPherson #2
Permit #: 17850145 Point on permit: 14
Longitude: 78 28' 34" Latitude: 41 00' 44"
Description: Intermittent flow

Table 7: Water Chemistry of MON 9(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/8/2005	2	4.9	5.2	500	15	7	9	<0.07		0.61	298	4	
9/20/2005	<1	5.1	5.3	610	15	9	9	0.08		0.45	293	<1	
12/27/2005	3	4.3	5.8	250	7	13	9	<0.1		0.14	98	4	
3/21/2006	3	5	5.6	420	4	5	9	<0.10		0.39	216	2	
6/20/2006	<1	6.5	6.5	780	16	9	46	<0.10		0.59	320	1	
9/19/2006	3	6.2	6.5	380	16	4	39	<0.10		0.18	164	2	
12/26/2006	6	6.7	6.6	340	8	4	25	<0.10		0.15	125	<1	
3/20/2007	6	6	6.2	310	7	15	22	<0.10		0.09	144	<1	

Job name: McPherson #2
Permit #: 17850145 Point on permit: 24
Longitude: 78 28' 32" Latitude: 41 00' 39"
Description: Spring

Table 8: Water Chemistry of MON 10

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/8/1996	2.6	4.5	4.67	210	15	10	8	0.11		1.68	110		
11/4/1996	1	4.8	4.61	310	9	10	5	0.22		1.23	99		
2/10/1997	3	4.8	4.49	500	7	10	4	0.17		1.02	90		
6/3/1997	4	4.8	4.6	265	12	10	6	0.13		0.99	93		
8/5/1997	<1	4.7	4.63	270	17	8	6	0.21		3.73	119		
11/17/1997	3	5.1	4.39	215	6	12	4	0.48		1.48	102		
3/3/1998	4	4.7	4.5	180	8	12	5	0.09		0.97	87		
6/9/1998	1	4.7	4.56	225	11	11	5	0.2		1.35	110		
9/1/1998	<1	4.8	4.65	310	16	9	6	0.37		4.58	119		
11/11/1998	<1	4.5	4.28	760	12	79	6	0.37		10.3	349		
2/23/1999	7	4.7	4.61	245	5	10	6	<0.07		1	116		
6/15/1999	2	4.6	4.48	240	14	14	6	0.11		2.1	119		
8/23/1999	<1	5.3	4.59	240	17	9	6	0.24		6.08	161		
11/9/1999	2	4.5	4.55	260	12	15	6	0.09		1.91	141		
2/29/2000	10	4.6	4.52	310	7	16	5	<0.07		1.4	128		
5/16/2000	2	4.7	4.54	245	10	14	6	0.15		1.51	112		
8/15/2000	7	4.6	4.45	240	16	15	5	0.11		1.94	122		
11/7/2000	3	4.6	4.6	340	9	13	6	0.13		1.68	121		
2/13/2001	5	4.5	4.5	260	8	11	9	0.47		1.17	109		
6/12/2001	2	4.3	4.4	260	14	15	5	0.09		1.87	111		
8/14/2001	<1	4.7	4.6	300	20	10	5	0.25		5.29	144		
12/4/2001	4	4.5	4.6	280	9	10	4	0.09		1.62	117		
4/2/2002	18	4.8	4.4	320	10	11	9	0.12		1.51	113		
6/18/2002	8	4.2	4.5	270	14	10	6	0.12		1.54	111		
9/17/2002	1	4.9	4.9	410	16	10	8	0.39		5.71	216		
12/17/2002	5	4.7	4.6	280	7	9	7	0.09		1.25	107		
3/25/2003	21	4.1	4.4	280	14	12	5	<0.07		1.55	111		
6/10/2003	16	4.1	3.7	190	11	16	<1	0.08		1.16	109		
9/16/2003	10	4.4	4.4	240	17	13	6	0.15		1.68	103		
12/9/2003	6	5	5.7	480	10	4	12	<0.07		1.18	237		
3/17/2004	16	4.9	4.5	210	7	10	7	0.07		1.12	88		
6/8/2004	4	4.3	4.5	200	15	8	7	0.16		1.47	93		
9/20/2004	28	4.3	4.5	230	15	15	5	0.2		1.59	105		
12/27/2004	6	4.9	4.6	180	7	7	7	0.18		1.25	82		
3/21/2006	6	5.4	4.7	200	5	8	5	<0.10		0.71	84		

Job name: McPherson #2
Permit #: 17850145 Point on permit: 24
Longitude: 78 28' 32" Latitude: 41 00' 39"
Description: Spring

Table 8: Water Chemistry of MON 10(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/20/2006	2	4.6	4.6	360	16	10	5	<0.10		1.7	97		
9/19/2006	6	4.6	4.7	240	15	7	8	0.17		1.36	95		
12/26/2006	8	4.9	4.6	220	9	8	8	0.13		0.92	81		
3/20/2007	inaccessible	due to	snow	and ice									

Job name: McPherson #2
Permit #: 17850145 Point on permit: 36
Longitude: 78 28' 34" Latitude: 41 00' 38"
Description: Seep

Table 9: Water Chemistry of MON 11

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/7/1996	3	5.8	5.45	580	19	15	14	0.24		2.32	356		
11/4/1996	2	5.1	4.79	740	11	24	7	<0.02		1.79	354		
2/10/1997	4	6.2	6.02	980	7	10	22	0.07		1.55	319		
6/3/1997	3	4.9	4.8	535	11	26	9	<0.07		1.66	288		
8/5/1997	1	4.9	5.03	580	16	24	11	0.09		2.14	353		
11/17/1997	3	5.1	4.68	620	6	36	7	0.08		2.77	354		
3/3/1998	4	4.6	4.68	500	8	35	7	<0.07		1.77	303		
6/9/1998	3	4.9	4.89	510	12	19	8	<0.07		1.45	316		
9/1/1998	1	5.8	6.04	740	15	5	20	0.07		2.11	376		
11/11/1998	<1	7.2	6.96	1000	11	8	117	<0.07		0.29	288		
2/23/1999	9	5.8	5.89	680	6	5	17	<0.07		1.57	355		
6/15/1999	4	6.5	6.43	600	12	10	54	<0.07		1.42	363		
8/23/1999	2	7.1	7.39	640	16	8	150	0.62		1.12	447		
11/9/1999	2	5	5.19	600	13	9	11	<0.07		2.1	350		
2/29/2000	7	4.6	4.69	560	7	43	7	<0.07		2.55	377		
5/16/2000	4	4.9	4.91	550	11	34	8	<0.07		1.68	329		
8/15/2000	6	4.9	4.9	470	16	28	9	0.07		1.68	338		
11/7/2000	5	5	5	750	9	59	9	<0.07		1.41	372		
2/13/2001	7	4.8	4.9	580	8	32	9	<0.07		1.42	281		
6/12/2001	4	4.8	5	580	14	19	9	<0.07		1.43	323		
8/14/2001	3	5.3	5.1	510	17	21	10	<0.07		1.44	354		
12/4/2001	3	5.1	5.3	620	11	16	7	<0.07		2.09	132		
4/2/2002	16	5	4.6	800	10	22	9	<0.07		2.63	377		
6/18/2002	9	4.9	6.2	560	13	4	11	<0.07		1.4	276		
9/17/2002	2	5	5.9	700	16	7	10	0.07		1.84	380		
12/17/2002	3	5	5	750	9	22	7	<0.07		1.72	335		
3/25/2003	11	4	4.2	580	15	30	11	<0.07		2.2	286		
6/10/2003	15	4.5	5	350	11	16	8	<0.07		1.28	258		
9/16/2003	14	4.7	4.8	510	16	26	9	<0.07		1.32	249		
12/9/2003	8	4.6	4.5	190	7	5	7	0.08		1.31	92		
3/17/2004	9	4.7	4.7	440	7	24	7	<0.07		1.23	215		
6/3/2004	6	5.2	6.3	420	15	6	12	<0.07		0.85	215		
9/20/2004	31	4.4	4.4	480	15	26	5	<0.07		1.83	239		
12/27/2004	9	5.3	6.3	400	7	3	10	<0.07		0.96	186		
3/15/2005	14	5.1	5	300	10	7	9	<0.07		0.76	175		

Job name: McPherson #2
Permit #: 17850145 Point on permit: 36
Longitude: 78 28' 34" Latitude: 41 00' 38"
Description: Seep

Table 9: Water Chemistry of MON 11(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/8/2005	5	4.9	5	400	15	7	8	<0.07		0.86	232		
9/20/2005	3	6.4	7.1	580	15	7	66	0.2		0.8	236		
12/27/2005	inaccessible	due	to ice	and snow									
3/21/2006	8	5.3	5.9	400	5	4	9	<0.10		0.84	198		
6/20/2006	5	5.3	5	520	15	22	9	<0.10		0.91	198		
9/19/2006	11	4.7	4.9	460	15	19	5	<0.10		1.01	240		
12/26/2006	10	5.1	4.9	460	8	14	10	<0.10		1.01	213		
3/20/2007	inaccessible	due	to ice	and snow									
4/5/2007	Aluminum	only							<0.20				

Job name: McPherson #2
Permit #: 17850145 & 17803108 Point on permit: 8 & 2
Longitude: 78 28' 39" Latitude: 41 00' 51"
Description: Mont Run below road trib

Table 10: Water Chemistry of MON 12

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/6/1996	1669	4	6.12	580	19	4	21	0.84		8.16	356	8	
11/4/1996	3837	4.6	4.38	480	9	19	4	0.61		3.97	183	1	
2/10/1997	1212	4.8	4.46	625	6	18	4	0.43		3.4	181	<1	
6/3/1997	5600	5.5	5.51	375	12	5	8	0.67		1.6	107	5	
8/5/1997	156	3.9	3.6	1300	16	85	<1	2.86		21.7	834	<1	
11/17/1997	2345	5.5	4.67	620	7	15	6	1.32		4.58	354	5	
3/3/1998	6612	4.9	4.64	205	8	12	5	0.3		1.62	93	<1	
6/9/1998	762	4.5	4.06	680	13	36	2	2.11		9.41	514	<1	
9/1/1998	466	4	3.75	1200	16	54	<1	0.83		11.7	574	1	
11/11/1998	162	3.6	3.47	2250	12	163	<1	5.31		44.5	1378	4	
2/23/1999	4218	5.5	4.69	640	3	18	5	1.5		4.14	335	4	
6/15/1999	491	4.2	4.02	780	15	32	2	2.35		9.38	506	<1	
8/23/1999	236	4.1	3.72	1000	15	71	<1	4.75		17.3	994	12	
11/9/1999	600	5.1	4.8	460	12	15	7	1.97		5.13	260	1	
2/29/2000	11122	5.1	5.08	190	7	8	6	0.47		1.37	76	4	
5/16/2000	1392	4.7	4.36	540	11	24	6	1.48		5.83	289	1	
8/15/2000	2812	5.3	4.79	640	21	22	8	1.78		5.99	369	9	
11/7/2000	2066	4.9	4.8	590	9	19	7	2.14		4.99	253	4	
2/13/2001	4491	5.9	5.5	380	11	6	10	0.96		1.81	162	7	
6/12/2001	2235	4.6	4.6	280	16	17	6	1.19		3.16	173	4	
8/14/2001	534	4.1	3.8	1000	21	81	<1	3.49		16.2	807	6	
12/4/2001	6828	5.7	6	310	9	3	6	1.54		2.75	134	6	
4/2/2002	16142	5.2	4.8	390	10	9	14	0.65		2.2	146	3	
6/18/2002	9182	4.6	4.9	480	16	9	7	1.28		3.02	232	9	
9/17/2002	2513	4	3.9	1100	18	47	<1	2.94		12.6	723	2	
12/17/2002	9300	5.7	5.4	540	9	7	8	1.31		3	243	9	
3/25/2003	>20000	4.7	4.9	480	16	13	7	0.6		2.2	256	10	
6/10/2003	16837	4.6	5	220	13	7	8	0.68		1.67	112	4	
9/16/2003	15674	4.8	4.6	440	19	13	7	<0.07		3.34	201	38	
12/9/2003	6817	5.7	5.8	460	9	3	10	1.6		3.15	230	12	
3/17/2004	14350	4.7	5.1	590	8	9	8	1.22		2.59	227	13	
6/3/2004	8136	4.8	4.7	400	17	7	8	1.05		3.11	196	5	
9/20/2004	>20000	5	4.7	1000	14	54	7	0.79		7.61	696	15	
12/27/2004	9342	5.6	5.7	390	7	4	7	1.61		2.43	155	7	
3/21/2006	14167	5.5	4.7	240	4	10	7	0.48		1.81	92	1	

Job name: McPherson #2
Permit #: 17850145 & 17803108 Point on permit: 8 & 2
Longitude: 78 28' 39" Latitude: 41 00' 51"
Description: Mont Run below road trib

Table 10: Water Chemistry of MON 12(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/20/2006	6821	4.8	4.4	380	16	13	5	0.67		3.34	140	4	
9/19/2006	>20000	5.7	6.1	380	15	2	13	1.06		1.94	180	3	
12/27/2006	>20000	6.3	6.4	380	8	6	18	0.67		1.4	145	2	
3/20/2007	>20000	6.3	5.5	420	5	7	9	0.6		2.15	175	<2	

Job name: McPherson #2
Permit #: 17850145 Point on permit: 2
Longitude: 78 28' 18" Latitude: 41 00' 50"
Description: Mont Run b4 trib

Table 11: Water Chemistry of MON 22

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/8/1996	2423	4.1	4.24	840	22	32	6	2		8.63	376	12	
11/4/1996	3913	4.7	4.35	420	7	18	4	0.61		3.89	178	1	
2/10/1997	2154	4.9	4.48	370	7	18	4	0.4		3.38	162	1	
6/3/1997	6031	5	4.73	225	12	9	6	0.24		1.28	64	<1	
8/5/1997	160	4	3.73	1250	17	49	<1	1.23		19.1	797	<1	
11/17/1997	2370	5	4.41	345	6	20	5	0.52		3.24	153	2	
3/3/1998	8155	4.7	4.57	180	8	13	5	0.2		1.48	81	<1	
6/9/1998	780	4.3	4.05	680	13	36	2	0.75		8.89	487	1	
9/1/1998	482	4	3.74	1300	16	54	<1	0.44		11.8	587	3	
11/11/1998	188	3.6	3.55	2150	12	152	<1	2.62		31.7	1271	<1	
2/23/1999	4330	5.2	4.63	300	3	15	5	0.38		2.58	140	4	
6/15/1999	673	4.1	4.08	760	15	32	3	0.54		9.29	577	1	
8/23/1999	314	3.9	3.68	1000	15	60	<1	1.26		17.7	969	3	
11/9/1999	617	4.8	4.53	420	12	16	6	0.82		4.82	221	<1	
2/29/2000	11489	5	4.86	190	6	10	6	0.17		1.1	56	<1	
5/16/2000	1488	4.7	4.37	560	10	26	5	0.6		5.68	271	<1	
8/15/2000	2908	4.8	4.37	440	21	24	5	0.46		5.2	238	<1	
11/7/2000	2800	4.6	4.5	460	10	17	7	0.74		4.27	183	4	
2/13/2001	4577	4.8	4.8	220	10	12	6	0.3		1.44	80	2	
6/12/2001	3231	4.5	4.6	325	16	18	6	0.32		2.65	128	1	
8/14/2001	610	4.1	3.8	1000	20	100	<1	0.94		15.6	734	<1	
12/4/2001	7138	4.9	4.8	180	9	20	4	0.35		1.42	99	2	
4/2/2002	16336	5	4.6	270	10	10	6	0.25		1.71	87	3	
6/18/2002	11202	4.4	4.6	320	17	13	7	0.27		2.62	199	2	
9/17/2002	2611	4	3.8	1000	17	51	<1	1.47		13.4	872	2	
12/17/2002	9424	4.9	4.7	410	8	14	7	0.54		3.19	155	4	
3/25/2003	>20000	4.4	4.5	270	13	22	6	0.17		1.83	95	4	
6/10/2003	17054	4.4	4.8	190	14	10	9	0.21		1.52	93	2	
9/16/2003	16964	4.6	4.5	360	17	15	9	2.4		3.35	149	8	
12/9/2003	9127	4.8	4.6	300	8	7	8	0.36		2.84	133	3	
3/17/2004	14630	4.6	4.6	310	8	17	7	0.25		2.36	127	5	
6/3/2004	8202	4.5	4.5	320	17	12	6	0.31		2.93	167	4	
9/20/2004	>20000	4.7	4.3	320	15	20	11	0.29		2.66	156	4	
12/27/2004	10482	5	4.8	240	7	11	6	0.35		2.15	95	1	
3/21/2006	15079	5.8	4.7	245	4	9	6	0.28		1.82	101	2	

Job name: McPherson #2
Permit #: 17850145 Point on permit: 2
Longitude: 78 28' 18" Latitude: 41 00' 50"
Description: Mont Run b4 trib

Table 11: Water Chemistry of MON 22(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/20/2006	7001	5.4	4.4	380	15	12	6	0.25		3.3	176	1	
9/19/2007	>20000	5.9	4.8	240	16	9	8	0.28		1.77	89	<1	
12/26/2006	>20000	5.4	4.8	230	8	10	8	0.27		1.56	90	5	
3/20/2007	>20000	5.5	4.8	280	7	11	7	0.26		1.71	98	11	

Job name: McPherson #2
Permit #: 17850145 Point on permit: 6
Longitude: 78 28' 14" Latitude: 41 00' 50"
Description: deep mine discharge

Table 12: Water Chemistry of MON 23

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/8/1996	insufficient	amount	to	sample									
11/4/1996	insufficient	amount	to	sample									
2/10/1997	insufficient	amount	to	sample									
6/3/1997	27	6.4	5.68	820	12	28	16	37.7		3.94	324		
8/5/1997	8	6.1	5.64	760	16	35	18	32.8		4.11	349		
11/17/1997	5	6.9	5.8	760	6	37	21	39.8		1.01	334		
3/3/1998	8	6.3	5.56	770	9	34	18	46.3		3.85	329		
6/9/1998	16	6.5	5.55	800	13	12	11	34.6		4.03	404		
9/1/1998	insufficient	amount	to	sample									
11/11/1998	11	6.4	5.85	940	11	38	33	32.8		3.56	248		
2/23/1999	27	6.4	5.62	945	6	33	16	38.4		3.76	305		
6/15/1999	21	6.4	5.66	980	13	26	15	36.4		4.29	324		
8/23/1999	14	6.5	5.83	840	15	34	25	38.3		4.49	478		
11/9/1999	16	6.5	5.65	900	13	35	17	33.7		4.63	343		
2/29/2000	16	6.4	5.68	860	7	55	18	37.8		4.58	321		
5/16/2000	10	6.4	5.31	920	11	46	7	38.6		4.66	328		
8/15/2000	21	6.5	5.19	800	15	31	9	39.9		4.8	391		
11/7/2000	18	6.2	5.4	1000	10	78	14	40.4		4.83	397		
2/13/2001	14	6.1	5.4	1000	8	60	19	40.8		4.67	379		
6/12/2001	21	6.2	5.3	1000	14	50	12	40.3		4.78	400		
8/14/2001	12	6.3	5.6	940	18	54	25	42.1		4.93	361		
12/4/2001	14	6.1	5.8	950	10	138	9	40.7		5.18	546		
4/2/2002	16	6.4	5	1000	10	26	7	41.8		5.1	464		
6/18/2002	22	5.9	4.7	1000	13	25	8	38.9		5.24	418		
9/17/2002	7	5.9	4.6	1000	14	34	7	42		5.08	406		
12/17/2002	22	6.3	5.4	1000	7	68	9	42.8		5.28	397		
3/25/2003	21	5.8	5.6	1000	16	61	11	41.3		5.37	446		
6/10/2003	18	5.7	5.2	1000	12	45	10	43.6		5.5	427		
9/16/2003	21	6	5	960	15	39	10	41.9		5.58	448		
12/9/2003	15	5.8	5.5	880	7	23	12	40.1		5.6	464		
3/17/2004	26	6	5.6	950	7	52	15	42.3		5.42	430		
6/8/2004	29	6.2	3.5	870	15	24	<1	45		5.42	439		
9/20/2004	27	6.1	3.6	860	14	29	<1	41.5		5.34	442		
12/27/2004	18	6.1	3.5	900	7	38	<1	43.9		5.68	373		
3/21/2006	14	5.7	3.8	1100	4	35	<1	42.2		5.79	428		

Job name: McPherson #2
Permit #: 17850145 Point on permit: 6
Longitude: 78 28' 14" Latitude: 41 00' 50"
Description: deep mine discharge

Table 12: Water Chemistry of MON 23(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/20/2006	21	6	5.6	1100	15	60	15	43.8		5.77	394		
9/19/2006	21	6.2	3.6	780	15	30	<1	38.6		5.5	480		
12/26/2006	31	6.1	4.7	1100	8	42	8	37.4		5.05	434		
3/20/2007	28	6.3	5.6	1000	5	73	14	37.1		5.46	466		

Job name: McPherson #2
Permit #: 17850145 Point on permit: 7
Longitude: 78 28' 43" Latitude: 41 00' 51"
Description: Mont Run above 23

Table 13: Water Chemistry of MON 24

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/8/1996	1077	4.1	4.12	660	20	34	4	0.61		8.83	355	3	
11/4/1996	3808	4.6	4.26	640	8	19	4	0.33		3.7	155	<1	
2/10/1997	1156	4.8	4.38	440	6	16	4	0.3		2.76	120	<1	
6/3/1997	5522	5	4.61	200	11	10	6	0.25		1.25	59	<1	
8/5/1997	148	3.8	3.58	1400	17	61	<1	1.64		27.7	838	<1	
11/17/1997	2311	5	4.32	260	7	17	4	0.34		2.87	116	<1	
3/3/1998	6522	4.8	4.5	175	7	13	5	0.15		1.5	72	<1	
6/9/1998	722	4.2	3.92	780	13	39	<1	0.75		9.61	469	<1	
9/1/1998	451	4	3.8	1150	16	53	<1	0.7		11.7	540	1	
11/11/1998	138	3.5	3.43	2400	12	171	<1	4.14		44.9	1449	<1	
2/23/1999	4150	4.9	4.58	300	4	17	5	0.23		2.89	141	4	
6/15/1999	435	4.1	4.05	720	15	32	3	0.55		8.95	379	<1	
8/23/1999	210	3.8	3.56	1000	15	78	<1	1.73		19.6	960	3	
11/9/1999	561	4.7	4.47	380	11	17	6	0.54		4.66	199	<1	
2/29/2000	10968	4.7	4.76	140	7	10	6	0.16		1.08	32	<1	
5/16/2000	1343	4.5	4.31	460	11	26	4	0.44		5.51	244	<1	
8/15/2000	2708	4.6	4.28	410	21	24	6	0.38		5.08	212	<1	
11/7/2000		4.4	4.6	420	9	17	6	0.45		4.17	167	<1	
2/13/2001	4369	4.5	4.6	220	8	10	5	0.19		1.44	69	<1	
6/12/2001	2154	4.2	4.4	280	15	16	6	0.22		2.66	123	2	
8/14/2001	284	3.9	3.7	1000	21	90	<1	1.06		15.1	658	2	
12/4/2001	6645	4.5	4.5	180	9	9	4	0.33		1.34	91	2	
4/2/2002	15864	4.9	4.6	240	11	10	5	0.19		1.68	76	1	
6/18/2002	9019	4.1	4.5	340	16	13	6	0.2		2.54	118	4	
9/17/2002	2417	3.8	3.7	1100	18	59	<1	1.32		14.1	706	2	
12/17/2002	9075	4.7	4.5	380	9	16	6	0.36		3.18	144	2	
3/25/2003	>20000	4.3	4.5	320	16	11	7	0.15		1.81	89	5	
6/10/2003	16270	4.2	4.7	170	13	10	7	0.16		1.46	75	<1	
9/16/2003	15410	4.4	4.3	360	19	18	6	0.9		3.38	150	19	
12/9/2003	6615	4.5	4.5	260	8	7	7	0.26		2.77	126	4	
3/17/2004	14050	4.3	4.5	300	8	14	13	0.23		2.35	120	3	
6/8/2004	7985	4.4	4.4	310	17	13	6	0.22		2.94	141	2	
9/20/2004	>20000	4.4	4.4	280	14	19	6	0.27		2.4	128	4	
12/27/2004	9263	5.1	4.7	230	7	11	5	0.24		2.18	109	2	
3/15/2005	5144	4.7	4.5	300	8	13	6	0.31		2.73	149	<1	

Job name: McPherson #2
Permit #: 17850145 Point on permit: 7
Longitude: 78 28' 43" Latitude: 41 00' 51"
Description: Mont Run above 23

Table 13: Water Chemistry of MON 24(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/8/2005	4835	4.6	4.5	290	16	10	7	0.27		2.85	150	1	
9/20/2005	577	3.7	3.5	1500	18	20	<1	2.94		18.9	831	2	
12/27/2005	11407	4.6	4.6	170	9	10	6	0.21		1.75	80	6	
3/21/2006	13741	5.9	4.7	240	4	11	8	0.17		1.79	95	2	
6/20/2006	6751	4.8	4.4	340	16	12	6	0.25		3.34	158	68	
9/19/2006	>20000	4.7	4.7	220	16	8	9	0.19		1.72	80	<1	
12/26/2006	>20000	5.1	4.8	200	8	8	10	0.21		1.45	72	3	
3/20/2007	>20000	5.1	4.6	220	6	12	7	0.17		1.74	90	<1	

Job name: Otto #1
Permit #: 4574SM33 Point on permit: 4
Longitude: 78 30' 12" Latitude: 41 00' 30"
Description: mainstream above plant trib

Table 14: Water Chemistry of MON 35

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/23/1996	266	6.2	5.88	200	20	3	10	0.09		<.04	12	2	
12/11/1996	2428	5.3	5.08	40	7	4	5	0.03		0.06	10	<1	
3/10/1997	12440	5.2	5.06	200	11	5	7	<.07		0.05	15	<1	
6/6/1997	3140	5.5	5.23	65	13	3	7	<.07		0.05	14	<1	
8/26/1997	202	6.3	5.85	55	22	3	9	0.13		<0.05	12	<1	
11/21/1997	700	5.8	4.99	135	8	4	7	0.12		0.1	6	6	
3/6/1998	4192	5	4.97	45	10	5	6	<.07		0.07	4	<1	
6/8/1998	444	5.9	5.22	55	15	4	6	<.07		<0.05	14	<1	
8/24/1998	80	6.7	5.86	410	20	6	14	1.52		1.52	141	1	
11/9/1998	5	6.5	5.98	180	10	5	15	<.07		<0.05	13	<1	
2/22/1999	2244	5.8	5.6	60	4	3	7	<.07		0.07	6	<1	
6/14/1999	282	6.7	6.08	285	20	4	11	<.07		<0.05	9	2	
8/25/1999	33	7.2	6.64	140	18	5	37	0.17		<0.05	21	<1	
11/8/1999	314	6.4	6.06	70	10	3	9	0.26		0.05	7	<1	
3/1/2000	7878	5.2	5.34	160	9	5	5	<.07		0.09	9	<1	
5/15/2000	848	6.6	6.08	80	15	2	8	<.07		0.06	5	1	
8/14/2000	1616	5.7	5.71	50	17	4	8	<.07		0.07	11	<1	
11/7/2000	1795	5.9	5.9	60	11	2	9	0.21		0.1	14	2	
2/15/2001	15079	4.9	5.3	120	7	3	8	0.1		0.08	9	1	
6/11/2001	1660	5.1	5.2	60	18	3	6	<0.07		0.06	10	<1	
8/13/2001	150	6.4	5.7	100	23	4	8	0.09		<0.05	15	<1	
12/10/2001	5342	5.4	5.6	60	9	3	8	0.13		0.05	9	<1	
4/4/2002	12987	5	5.1	130	10	3	6	<0.07		0.06	13	<1	
6/17/2002	7843	6	5.3	140	17	3	7	<0.07		0.06	15	<1	
9/18/2002	66	6.1	6.7	80	18	1	19	<0.07		<0.05	15	1	
12/16/2002	1795	5.8	5.7	60	7	2	8	0.07		<0.05	1	<1	
3/26/2003	>20000	4.2	4.8	210	11	5	7	<0.07		0.09	17	1	
6/11/2003	12138	4.6	5.2	60	12	4	8	<0.07		0.06	15	<1	
9/17/2003	8281	4.6	5.4	50	16	3	11	<0.07		0.07	8	<1	
12/9/2003	4398	4.4	5.2	40	7	4	9	<0.07		0.06	11	<1	
3/15/2004	9873	4.6	5	40	8	4	8	<0.07		0.06	12	<1	
6/9/2004	6283	4.8	5.4	50	16	3	8	<0.07		0.07	25	<1	
9/20/2004	>20000	4.4	4.9	60	16	5	6	0.08		0.09	12	2	
12/26/2004	6481	4.6	5.3	40	7	3	6	<0.07		0.06	7	<1	
3/16/2005	4308	4.7	5.4	70	8	3	8	1.96		0.06	<1	<1	

Job name: Otto #1
Permit #: 4574SM33 Point on permit: 4
Longitude: 78 30' 12" Latitude: 41 00' 30"
Description: mainstream above plant trib

Table 14: Water Chemistry of MON 35(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/20/2005	2692	5.7	6.3	260	21	2	11	0.07		0.05	13	<1	
9/20/2005	250	5.2	6.2	250	18	2	12	0.1		0.06	26	<1	
12/27/2005	7124	4.5	5.1	40	7	4	10	<.1		0.05	16	3	
3/21/2006	7824	4.6	5.3	100	6	3	6	<.1		0.07	11	<1	
6/20/2006	3141	5	5.6	80	17	2	7	<0.10		0.06	19	1	
9/19/2006	17952	5.2	5.3	100	15	3	10	<0.10		0.07	10	1	
12/27/2006	>20000	4.8	5.2	60	6	3	3	<0.10		0.06	11	<1	
3/19/2007	>2000	5.1	5	60	6	5	8	<0.10		0.09	10	<1	
11/17/2006	Aluminum	only							<0.20				
1/16/2007	Aluminum	only							0.29				

Job name: Otto #1
Permit #: 4574SM33 Point on permit: 6
Longitude: 78 29' 32" Latitude: 41 01' 07"
Description: mouth of killer trib

Table 15: Water Chemistry of MON 38

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/23/1996	160	3.7	3.49	2400	24	169	<1	5.44		48.3	1786	4	
12/11/1996	256	3.6	3.62	1700	7	153	<1	3.64		33.5	1351	3	
3/10/1997	323	4	3.71	1400	11	99	<1	2.51		25.7	966	2	
6/6/1997	155	3.8	3.49	1500	12	121	<1	3.4		30.8	1121	<1	
8/26/1997	54	4	3.38	2000	20	164	<1			45.8	1594	3	
11/21/1997	108	4	3.51	1950	7	173	<1	4.75		50	1437	3	
3/6/1998	166	3.6	3.58	1600	9	177	<1	3.48		41.9	1315	<1	
6/8/1998	109	3.5	3.4	2250	14	222	<1	4.24		46.6	1883	1	
8/24/1998	71	3.3	3.18	3000	20	314	<1	5.96		50.4	2018	<1	
11/9/1998	21	3.2	3.22	2850	11	240	<1	7.8		55.1	2054	1	
2/22/1999	81	3.5	3.44	1600	3	185	<1	3.9		39.7	1471	2	
6/14/1999	77	3.7	3.32	2740	15	198	<1	4.78		49.5	2066	4	
8/25/1999	23	3.3	3.1	2580	17	245	<1	6.42		52.4	2283	<1	
11/8/1999	49	3.5	3.37	1700	9	178	<1	7.39		40.5	1548	<1	
3/1/2000	123	3.8	3.61	1250	10	82	<1	3.32		22	776	1	
5/15/2000	81	3.6	3.43	2000	11	186	<1	4.35		41.7	1687	2	
8/14/2000	174	3.7	3.46	1000	17	159	<1	3.45		34.5	1441	<1	
11/7/2000	109	3.5	3.4	1700	10	161	<1	5.86		40.8	1527	1	
2/15/2001	697	3.8	3.7	1000	8	142	<1	2.22		15.2	608	3	
6/11/2001	102	3.6	3.4	2000	18	193	<1	3.9		35	1561	1	
8/13/2001	71	3.6	3.3	2000	22	192	<1	3.89		44.3	1794	1	
12/10/2001	100	3.6	3.4	1900	9	116	<1	4.87		31.6	1260	<1	
4/4/2002	285	3.9	3.6	2000	7	108	<1	3.07		26.7	1122	<1	
6/17/2002	603	3.4	3.5	1800	16	127	<1	2.32		32	1674	<1	
9/18/2002	161	3.3	3.2	2400	17	157	<1	5.28		40	1911	2	
12/16/2002	392	3.7	3.5	1600	7	97	<1	2.92		22	858	<2	
3/26/2003	872	3.4	3.5	1400	11	123	<1	2.14		24.8	1250	4	
6/11/2003	673	3.4	3.5	1200	13	105	<1	2.01		22.6	1057	<1	
9/17/2003	628	3.5	3.4	2200	17	141	<1	2.33		31	1403	2	
12/10/2003	471	3.7	3.5	1800	7	106	<1	2.89		28	1251	1	
3/15/2004	1184	3.7	3.7	1300	7	103	<1	2.53		23.4	1136	4	
6/9/2004	592	3.5	3.5	1900	16	105	<1	2.54		28.2	1177	1	
9/20/2004	4653	3.8	3.7	1600	13	129	<1	1.6		23	1113	3	
12/26/2004	807	3.7	3.8	1800	6	115	<1	2.56		28	1204	<1	
3/16/2005	785	3.8	3.6	1200	7	84	<1	3.03		22.9	1120	<1	

Job name: Otto #1
Permit #: 4574SM33 Point on permit: 6
Longitude: 78 29' 32" Latitude: 41 01' 07"
Description: mouth of killer trib

Table 15: Water Chemistry of MON 38(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/20/2005	552	3.5	3.3	2000	17	115	<1	3.52		30.3	1449	3	
9/20/2005	224	3.5	3.3	2300	18	84	<1	6.89		32.4	1507	3	
12/27/2005	1295	3.7	3.6	780	8	45	<1	1.71		12.9	490	1	
3/21/2006	423	3.9	3.5	1700	5	100	<1	3.66		23.6	1072	1	
11/7/2006	Aluminum	only							7.3				

Job name: Otto #1
Permit #: 4574SM33 Point on permit: 7
Longitude: 78 29' 23" Latitude: 41 01' 05"
Description: Mont. Run above Killer Trib

Table 16: Water Chemistry of MON 39

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/6/1996	1615	4.1	4.73	200	19	12	9	0.07		2.02	93	2	
11/4/1996	180	5.1	4.71	190	8	8	5	0.06		0.63	33	2	
2/10/1997	178	5.1	4.73	670	7	9	5	0.1		0.73	139	<1	
6/3/1997	5300	5.1	4.9	105	12	6	6	0.08		0.3	26	<1	
8/5/1997	133	6.7	6.06	165	17	3	11	<.07		0.74	64	<1	
11/17/1997	2244	5.4	4.59	115	6	10	5	0.1		0.79	36	<1	
3/3/1998	5385	4.7	4.69	80	8	9	6	<0.07		0.43	23	<1	
6/8/1998	602	4.8	4.67	150	15	13	6	<0.07		1.08	64	<1	
8/25/1998	106	6.5	5.65	620	19	7	10	<0.07		0.79	144	<1	
11/9/1998	pooled	5.9	5.7	260	11	6	10	<0.07		1.49	86	4	
2/22/1999	3850	4.9	4.89	260	4	7	5	<0.07		0.63	37	3	
6/14/1999	336	6.3	5.92	140	16	3	10	<0.07		0.51	36	2	
8/25/1999	81	6.4	6.19	290	16	4	18	<0.07		1.88	120	5	
11/8/1999	485	5.8	5.86	145	9	3	8	0.15		0.66	33	<1	
2/29/2000	8011	4.9	4.58	110	7	7	4	<0.07		0.41	31	<1	
5/15/2000	1166	5	5.02	210	12	8	7	<0.07		0.88	58	1	
8/14/2000	2441	4.9	4.93	180	17	9	6	0.08		1.09	48	2	
11/7/2000	1841	5.1	5.2	210	11	7	7	0.08		0.65	40	2	
2/13/2001	3769	4.8	5	100	8	5	6	<0.07		0.34	22	1	
6/11/2001	1723	4.9	5	100	18	8	9	<0.07		0.38	25	1	
8/13/2001	302	4.8	4.8	300	24	12	7	0.08		2.06	115	1	
12/4/2001	6283	5.5	5.2	110	9	11	5	0.13		0.3	20	2	
4/2/2002	13787	5.1	4.7	130	9	7	5	0.07		0.63	36	3	
6/17/2002	8293	4.4	4.8	290	16	8	6	0.07		0.61	39	1	
9/17/2002	695	4.4	4.6	560	15	15	15	0.11		3.59	216	2	
12/16/2002	6911	4.7	4.6	240	7	8	14	0.07		0.8	41	<1	
3/25/2003	>20000	4.3	4.6	170	13	9	6	<0.07		0.63	43	2	
6/11/2003	14129	4.1	4.9	110	15	7	7	<0.07		0.45	37	<1	
9/16/2003	13823	4.9	4.8	120	17	7	7	<0.07		0.88	40	2	
12/9/2003	5924	4.4	4.9	90	7	7	7	<0.07		0.63	40	2	
3/15/2004	12566	4.3	4.8	90	8	9	9	<0.07		0.66	43	2	
6/8/2004	7405	5.5	4.9	100	16	7	7	<0.07		0.62	44	2	
9/20/2004	>20000	4.4	4.6	110	13	12	6	0.11		0.74	55	3	
12/26/2004	8239	4.5	5	100	6	6	6	<0.07		0.49	15	<1	
3/18/2005	4732	5.7	4.8	100	8	7	7	<0.07		0.63	27	<1	

Job name: Otto #1
Permit #: 4574SM33 Point on permit: 7
Longitude: 78 29' 23" Latitude: 41 01' 05"
Description: Mont. Run above Killer Trib

Table 16: Water Chemistry of MON 39(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/20/2005	4093	5.1	6.1	230	19	2	8	<0.07		0.23	23	<1	
9/20/2005	538	5.3	6.5	160	18	3	13	<0.07		0.32	41	<1	
12/27/2005	9898	4.9	4.7	80	9	7	8	0.18		0.51	30	7	
3/21/2006	10501	4.8	5	120	5	7	7	<0.10		0.4	27	8	
6/20/2006	4283	4.8	5.1	170	15	5	6	<0.10		0.57	35	1	
9/19/2006	>20000	5.6	5.1	110	15	5	10	0.14		0.52	36	1	
12/26/2006	>20000	5.5	5.1	100	8	5	12	<0.10		0.35	28	<1	
3/19/2007	>20000	4.5	4.8	140	6	8	8	<0.10		0.56	40	5	

Job name: Otto #1
Permit #: 4574SM33 Point on permit: 17
Longitude: 78 29' 47" Latitude: 41 01’ 23"
Description: unnamed trib

Table 17: Water Chemistry of MON 43

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/23/1996	<1	3.9	3.79	1200	18	119	<1	0.61		15.8	671	7	
12/11/1996	8	3.8	3.84	1600	7	130	<1	0.26		10.7	503	<1	
3/10/1997	26	4	3.78	1500	11	112	<1	0.27		9.58	456	<1	
6/6/1997	115	4	3.78	1600	13	114	<1	0.4		10.4	478	<1	
8/16/1997	insufficient	amount	to	sample									
11/21/1997	4	4.2	3.8	680	8	94	<1	0.31		11.6	499	1	
3/6/1998	6	3.7	3.75	780	9	105	<1	0.26		11.9	528	<1	
6/8/1998	3	3.7	3.64	1050	15	194	<1	0.42		15.7	729	<1	
8/24/1998	insufficient	amount	to	sample									
11/9/1998													
2/22/1999	12	3.8	3.79	950	4	113	<1	0.18		11.5	524	2	
6/14/1999	insufficient	amount	to	sample									
8/25/1999	insufficient	amount	to	sample									
11/8/1999	1	4.3	4.29	840	9	64	6	<0.07		9.73	464	<1	
3/1/2000	32	4	3.86	620	10	90	<1	0.24		8.16	396	<1	
5/15/2000	4	3.8	3.73	1000	13	168	<1	0.32		13.5	597	<1	
8/14/2000	10	3.8	3.65	600	17	151	<1	0.36		12.2	540	<1	
11/7/2000	2	3.8	3.7	1000	11	115	<1	0.23		12	516	<1	
2/15/2001	28	3.9	3.9	400	8	33	<1	0.22		3.93	198	<1	
6/11/2001	6	3.8	3.7	940	17	113	<1	0.35		10.7	537	<1	
8/13/2001	<1	3.8	3.6	1000	24	150	<1	0.67		15.2	715	<1	
12/10/2001	4	4.1	3.9	500	9	37	<1	0.2		8.87	458	<1	
4/4/2002	18	4	3.9	1000	9	126	<1	0.37		11.1	589	<1	
6/17/2002	18	3.6	3.7	1000	17	127	<1	0.41		11.5	563	<1	
9/18/2002	4	3.8	3.8	1000	17	94	<1	0.26		10.7	650	1	
12/16/2002	24	4	3.8	620	8	46	<1	0.22		5.59	258	<1	
3/26/2003	28	3.5	3.7	1000	11	138	<1	0.33		10.4	512	4	
6/11/2003	36	3.5	3.7	600	13	83	<1	0.33		8.62	402	<1	
9/17/2003	14	3.6	3.6	880	17	88	<1	0.43		10.9	527	1	
12/9/2003	14	3.7	3.8	720	8	87	<1	0.3		9.86	750	4	
3/15/2004	20	3.7	3.8	720	8	98	<1	0.29		9.78	556	1	
6/9/2004	8	3.6	3.3	840	17	90	<1	0.36		11.1	591	<1	
9/20/2004	41	3.8	3.7	700	17	76	<1	0.3		8.35	429	<1	
12/26/2004		3.8	3.9	740	6	70	<1	0.35		8.53	382	<1	
3/18/2005		3.9	3.9	600	6	65	<1	0.36		8.43	396	<1	

Job name: Otto #1
Permit #: 4574SM33 Point on permit: 17
Longitude: 78 29' 47" Latitude: 41 01’ 23"
Description: unnamed trib

Table 17: Water Chemistry of MON 43(contt.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/20/2005	1	3.8	3.6	1200	20	93	<1	0.44		9.7	498	<1	
9/20/2005	dry												
12/27/2005	26	3.7	3.9	340	5	28	<1	<0.10		3.3	149	<1	
3/21/2006	15	4.1	3.8	580	5	49	<1	0.24		6.07	287	2	
6/20/2006	3	3.9	3.6	1100	16	64	<1	0.41		9.45	488	<1	
9/19/2006	28	4.2	3.6	760	16	58	<1	0.44		7.76	367	2	
12/27/2006	32	4.1	4	510	6	34	2	0.12		3.84	187	2	
3/19/2007	56	4.2	3.8	580	7	71	<1	0.22		6.8	360	<1	

Job name: Montgomery Job
Permit #: 17850106 Point on permit: 12
Longitude: 78 28' 16.83" Latitude: 41 00’ 48.49"
Description: mont. Creek below trib

Table 18: Water Chemistry of MON 72

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
1/30/1991	N/M	5.1	5	700	4	8	8	0.35		5.52	438	9	
4/4/1991	N/M	5.8	4.9	650	9	12	8	0.29		4.32	367	1.7	
9/20/1991	N/M	4.1	3.9	1450	12	102	0	1.22		20.2	960	4.7	
10/16/1991	N/M	4.5	4	1325	9	114	0	2		21.6	832	0.3	
1/2/1992	N/M	5.6	4.7	425	5	6	8	0.38		3.26	241	2	
4/23/1992	N/M	5.7	5.2	590	11	6	4	0.13		3.37	438	6.7	
7/24/1992	165	5.2	5.6	610	17	0	8	0.27		3.23	539	7.3	
12/30/1992	1000+	6.3	6.5	923	7	0	16	0.17		4.38	500	35.3	
2/2/1993	N/M	5	4.6	764	5	12	4	0.41		5.56	458	5.3	
4/16/1993	N/M	4.8	4.6	262	6	14	4	0.58		2.55	186	32	
7/12/1993	N/M	3.9	4.1	1170	11	64	2	1		12.2	613	7.7	
10/13/1993	N/M	4.7	4.5	1140	11	38	6	1.55		13.25	700	2	
3/11/1994	N/M	4.7	5.1	359	2	0	10	0.2		2.21	264	9.3	
4/21/1994	N/M	4.2	5.3	780	11	6	8	0.25		4.72	458	8.3	
8/8/1994	N/M	3.6	4	767	18	52	0	0.96		9.46	393	3	
10/26/1994	N/M	4.7	4.9	860	10	28	10	1.83		10.3	463	5	

Job name: Montgomery Job
Permit #: 17850106 Point on permit: 15
Longitude: 78 28' 28.75" Latitude: 41 00’ 55.08"
Description: flow from pvc pipe sidehill

Table 19: Water Chemistry of MON 74

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/20/1991	Dry												
10/16/1991	2	5.1	4.6	960	9	19	7	0.06		2.15	720	0.3	
1/2/1991	1	5.4	4.9	915	6	6	8	0.01		1.12	613	10.7	
4/23/1992	2	5	4.6	895	14	10	6	0.01		1.81	629	8	
7/24/1992	4	4	4.6	850	18	10	6	0.07		1.55	720	5.7	
12/30/1992	5	5	5.4	76	8	0	8	0.26		0.16	26	143.8	
2/2/1993	6	5.1	4.5	985	3	18	4	0.01		2.53	597	1	
4/16/1993	15	4.7	4.9	682	8	20	6	0.04		2.13	393	0.3	
7/12/1993	<1	4.8	4.6	1130	14	18	6	0.06		1.86	613	0.3	
10/13/1993	Dry												
3/11/1994	12	4.6	4.7	306	7	0	8	0.01		0.52	215	2.7	
4/20/1994	<1	4.4	4.7	330	18	8	6	0.1		2.17	281	3	
8/8/1994	Dry												
10/26/1994	Dry												

Job name: Montgomery Job
Permit #: 17850106 Point on permit: 19
Longitude: 78 28' 59.44" Latitude: 41 01’ 0.17"
Description: seepage at road

Table 20: Water Chemistry of MON 76

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
10/16/1991	Dry												
1/2/1992	Dry												
4/23/1992	8	5.9	6.5	260	12	0	14	0.76		0.52	105	86.7	
7/24/1992	5	6.5	6.8	310	16	0	28	0.37		0.83	247	26.3	
12/30/1992	10	6.4	6.6	208	8	0	14	0.38		0.26	58	80.7	
2/2/1993	10	6.1	5.9	254	6	0	6	0.28		0.12	91	3	
4/16/1993	21	5.6	5.6	90	8	0	8	0.17		0.26	32	5.3	
7/12/1993	dry												
10/13/1993	dry												
3/11/1994	12	6.2	6.2	190	6	0	12	0.02		0.05	68	4.7	
4/20/1994	8	6.1	6.5	223	13	0	10	0.08		0.02	68	9.3	
8/8/1994	dry.												
10/26/1994	dry												

Job name: Montgomery Job
Permit #: 17850106 Point on permit: 19
Longitude: 78 28' 50.13" Latitude: 41 01’ 0.17"
Description: natural drainage

Table 21: Water Chemistry of MON 77

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
10/16/1991	4	5.3	4.8	850	10	21	7	0.2		3.67	613	2.3	
1/2/1992	8	5.3	4.6	500	6	20	6	0.01		1.62	336	6	
4/23/1992	18	5.2	4.4	250	11	10	4	0.01		0.69	110	1.7	
7/24/1992	18	4.6	4.8	260	17	8	6	0.07		0.95	236	1.3	
12/30/1992	5	7.3	7.1	272	7	0	32	0.82		0.78	72	50.3	
2/2/1993	185	3.8	4	222	5	14	0	0.01		0.7	85	0.3	
4/16/1993	35	5.3	5	175	7	2	6	0.05		0.53	56	18.3	
7/12/1993	<1	5.1	4.9	464	13	4	10	0.32		2.15	220	12	
10/13/1993	3	5.1	4.9	644	11	0	8	0.09		1.67	367	0.3	
3/11/1994	25	5.3	5.2	205	7	0	10	0.01		0.61	100	38	
4/20/1994	28	4.5	4.7	224	11	8	6	0.01		0.54	68	0.3	
8/8/1994	2	7.5	6.4	426	17	0	12	0.29		1.31	247	5.3	
10/26/1994	dry												

Job name: Otto #1
Permit #: 4574SM33 Point on permit: 3
Longitude: 78 30' 01" Latitude: 41 02' 02"
Description: Below fork, plant trib

Table 1: Water Chemistry of MON 31

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/23/1996	9	3.8	3.61	480	20	53	<1	1.38		6.3	155	1	
12/11/1996	58	4.1	3.85	440	7	34	<1	1.47		2.46	80	6	
3/10/1997	20	4.5	4.22	295	12	24	4	0.67		1.49	55	<1	
6/6/1997	94	4.4	4.07	130	13	19	3	0.56		1.23	49	<1	
8/16/1997	5	4.1	3.42	445	19	95	<1	1.95		6.81	182	<1	
11/21/1997	10	4.4	3.83	260	8	36	<1	1.46		2.53	84	1	
3/6/1998	21	4.3	4.04	140	10	29	2	0.85		1.55	55	<1	
6/8/1998	9	3.7	3.45	400	14	55	<1	1.24		4.74	145	<1	
8/24/1998	1	3.4	3.18	640	20	165	<1	1.25		11.3	233	1	
11/9/1998	3	3.3	3.08	825	10	148	<1	4.94		11.9	246	<1	
2/22/1999	59	4.1	3.98	140	4	22	1	0.66		1.31	49	<1	
6/14/1999	10	3.6	3.46	290	16	58	<1	0.4		4.2	123	1	
8/25/1999	3	3.3	3.07	680	18	155	<1	2.15		12.1	371		
11/8/1999	12	3.7	3.51	360	9	81	<1	2.24		5.95	163	<1	
3/1/2000	98	4.5	4.14	105	9	19	2	0.44		1.04	33	<1	
5/15/2000	15	4	3.68	225	13	30	<1	0.7		2.41	89	<1	
8/14/2000	36	3.9	3.56	240	17	70	<1	1		3.39	106	<1	
11/7/2000	21	3.7	3.7	280	11	33	<1	0.92		3.08	95	<1	
2/15/2001	215	4.1	4.2	120	8	14	5	0.47		0.87	32	2	
6/11/2001	62	3.9	3.8	230	17	34	<1	0.63		2.53	85	<1	
8/13/2001	8	3.7	3.4	440	24	92	<1	1.82		6.64	203	<1	
12/10/2001	42	4	3.6	200	8	32	<1	1.1		2.57	24	<1	
4/4/2002	143	5.4	4	210	6	20	4	0.78		1.35	58	<1	
6/17/2002	137	3.8	3.8	250	17	27	<1	0.83		2.23	74	<1	
9/18/2002	5	3.3	3.2	700	18	85	<1	2.82		10.7	277	<1	
12/16/2002	169	4	3.8	220	7	26	<1	0.82		1.95	72	<1	
3/26/2003	323	4.3	4.1	160	11	18	3	0.57		1.23	70	<1	
6/11/2003	403	3.7	3.9	160	17	22	<1	0.65		1.57	64	<1	
9/17/2003	82	3.8	3.6	260	17	31	<1	1.2		3.04	89	1	
12/9/2003	162	3.9	3.9	140	8	12	<1	0.89		1.7	63	2	
3/15/2004	359	4	4.1	140	8	20	4	1.13		1.4	58	2	
6/9/2004	105	3.7	3.8	210	16	26	<1	0.6		2.4	76	2	
9/20/2004	1722	4	4.1	110	17	15	4	0.74		1.19	42	4	
12/26/2004		4.1	4	160	6	21	2	0.76		1.81	64	<1	
3/16/2005	178	4	3.9	170	7	25	<1	1.16		2.03	68	<1	
6/20/2005	21	3.7	3.6	240	20	27	<1	0.45		2.7	93	<1	

Job name: Otto #1
Permit #: 4574SM33 Point on permit: 3
Longitude: 78 30' 01" Latitude: 41 02' 02"
Description: Below fork, plant trib

Table 1: Water Chemistry of MON 31(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/20/2005	15	3.7	3.4	600	18	70	<1	2.23		8.6		<1	
12/27/2005	inaccessible	due to	snow	and ice									
3/21/2006	204	4.3	4	250	5	19	2	0.74		1.33	55	1	
6/20/2006	41	3.7	3.4	420	15	45	<1	0.68		4.45	122	<1	
9/19/2006	538	4.3	3.8	220	16	21	<1	0.81		2.01	66	2	
12/27/2006	908	4.2	4.1	160	7	16	4	0.55		1.07	45	<1	
3/19/2007	1366	4.5	4.3	120	6	15	6	0.61		0.89	35	4	
10/25/2006	Aluminum	only							1.95	6.3	155	1	
1/16/2007	Aluminum	only							3.6	2.46	80	6	
4/5/2007	Aluminum	only							1.27	1.49	55	<1	

Job name: Otto #1
Permit #: 4574SM33 Point on permit: 5
Longitude: 78 30' 11" Latitude: 41 01' 31"
Description: Mouth Plant Trib

Table 1: Water Chemistry of MON 34

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/23/1996	24	5.6	6.16	250	21	5	17	0.39		4	108	11	
12/11/1996	65	4.1	4.06	380	7	27	2	0.39		1.8	70	<1	
3/10/1997	213	4.5	4.29	205	11	26	5	0.3		1.47	65	1	
6/6/1997	143	4.5	4.25	115	12	16	4	0.18		1.04	45	<1	
8/16/1997	7	4.5	3.82	315	20	43	<1	0.41		5.17	126	1	
11/21/1997	135	4.5	4	205	8	30	2	0.57		2.13	76	1	
3/6/1998	97	4.2	4.16	155	9	30	3	0.29		1.53	62	<1	
6/8/1998	17	4	3.8	325	15	44	<1	0.26		3.81	124	<1	
8/24/1998	insufficient	amount	to	sample									
11/9/1998	3	4.1	4.15	525	12	51	4	<.07		9.1	210	2	
2/22/1999	81	4.2	4.14	150	4	23	3	0.19		1.25	51	<1	
6/14/1999	10	4	3.61	260	18	38	<1	<0.07		3.11	86	2	
8/25/1999	5	4	3.75	360	18	60	<1	0.15		7.03	193	<1	
11/8/1999	17	4	3.86	265	9	52	<1	0.34		4.4	122	<1	
3/1/2000	149	4.4	4.27	105	10	15	3	0.17		0.91	24	<1	
5/15/2000	45	4.1	3.9	165	14	26	<1	0.16		2.1	66	<1	
8/14/2000	67	4	3.82	210	17	61	<1	0.31		2.91	88	<1	
11/7/2000	34	3.9	3.9	270	11	30	<1	0.34		2.72	84	<1	
2/15/2001	460	4.1	4.3	120	8	16	5	0.29		0.88	33	3	
6/11/2001	78	4	4	190	17	26	2	0.19		1.84	67	<1	
8/13/2001	11	4	3.7	310	24	65	<1	0.36		5.31	148	<1	
12/10/2001	113	4.1	3.8	220	8	28	<1	0.48		2.48	118	<1	
4/4/2002	448	4.3	4.2	470	8	21	4	0.28		1.56	61	<1	
6/17/2002	161	3.8	4	310	16	23	2	0.33		2.16	69	<1	
9/18/2002	27	3.8	3.7	430	18	34	<1	0.24		6.7	163	<1	
12/16/2002	326	4.3	4.1	210	7	21	3	0.33		1.82	55	<1	
3/26/2003	897	3.9	4.1	220	11	25	3	0.26		1.69	63	4	
6/11/2003	718	3.8	4.1	140	13	18	4	0.26		1.33	52	<1	
9/17/2003	251	3.9	3.8	230	17	26	<1	0.42		2.75	72	<1	
12/9/2003	228	3.8	3.8	140	8	21	<1	0.4		1.87	62	2	
3/15/2004	671	4	4.2	145	8	22	5	0.42		1.49	68	<2	
6/9/2004	188	3.9	4	180	16	20	3	0.22		2.02	63	<1	
9/20/2004	1938	4	4.2	170	16	21	3	0.44		1.58	68	1	
12/26/2004		4.9	4.2	145	7	17	4	0.34		1.62	43	<1	
3/16/2005	323	4.1	4.1	180	7	18	13	0.36		1.57	45	<1	

Job name: Otto #1
Permit #: 4574SM33 Point on permit: 5
Longitude: 78 30' 11" Latitude: 41 01' 31"
Description: Mouth Plant Trib

Table 1: Water Chemistry of MON 34(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/20/2005	36	4	3.7	200	19	21	<1	0.16		2.49	75	<1	
9/20/2005	25	5.8	4	240	17	25	4	0.16		4.98	107	<1	
12/27/2005	897	4	4.1	120	6	15	5	0.22		1.04	36	2	
3/21/2006	513	4.5	4.2	160	5	15	4	0.27		1.16	46	<1	
6/20/2006	64	4	3.7	280	15	29	<1	0.21		3.53	80	<1	
9/19/2006	700	4	3.8	270	15	18	<1	0.22		1.71	56	2	
12/27/2006	1795	4.4	4.2	140	6	19	4	0.18		1	40	3	
3/19/2007	1795	4.6	4.4	140	6	18	7	0.24		1.04	51	<2	
11/7/2006	aluminum	only							1.58				
1/16/2007	aluminum	only							1.17				
4/5/2007	aluminum	only							1.83				

Job name: McPherson #2
Permit #: 17850145, 17803108 Point on permit: 9,5
Longitude: 78 28' 40" Latitude: 41 00' 49"
Description: mouth of road trib

Table 1: Water Chemistry of MON 13

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/6/1996	34	6.9	5.85	1000	17	5	16	3.28		8.27	800	22	
11/4/1996	26	5.3	4.79	1400	8	26	7	3.14		11.5	940	<1	
2/10/1997	54	5.1	4.5	1350	7	51	6	1.55		14	879	15	
6/3/1997	98	6.8	6.32	620	11	4	24	1.52		2.8	303	14	
8/5/1997	7	6.2	5.42	1650	17	8	10	5.13		14.4	1177	13	
11/17/1997	28	5.8	4.89	1150	6	17	7	1.82		6.75	642	15	
3/3/1998	81	6.7	5.64	600	8	7	10	1.08		3.28	342	15	
6/9/1998	18	6.7	5.18	1200	13	9	7	5.43		10.2	820	17	
9/1/1998	11	5.7	4.14	2300	16	36	5	8.18		19.9	1494	22	
11/11/1998	12	6.3	5.65	1800	11	7	13	0.56		11.7	1091	<1	
2/23/1999	41	5.1	4.8	1100	4	23	6	2.67		6.57	720	12	
6/15/1999	35	5.7	4.57	1400	14	36	8	9.4		15.4	1198	14	
8/23/1999	12	6.6	5.99	1880	16	7	19	5.17		16.5	1594	17	
11/9/1999	20	6.6	6.11	1000	12	7	19	4.13		7.8	776	8	
2/29/2000	133	6.5	6.35	610	7	4	15	1.05		2.39	292	10	
5/16/2000	39	6.2	5.02	1000	10	12	7	5.03		9.03	797	15	
8/15/2000	75	6.6	5.66	1000	19	6	11	2.76		7.47	747	19	
11/7/2000	50	6.7	5.6	1250	9	11	13	5.63		9.72	750	17	
2/13/2001	193	6.4	5.7	800	8	3	17	1.81		2.4	303	13	
6/12/2001	54	6.5	5.6	1200	15	16	13	5.99		7.67	725	30	
8/14/2001	38	6.3	5.4	1400	21	31	12	10.8		18.6	1164	25	
12/4/2001	49	6.4	6.6	1000	8	4	14	4.2		7.29	606	13	
4/2/2002	242	6.3	6.4	1000	11	2	18	1.6		4.01	641	21	
6/18/2002	140	6.3	6.3	1000	14	3	19	3.96		4.7	569	18	
9/17/2002	76	6.4	6.3	1200	17	5	20	6.01		7.96	840	22	
12/17/2002	188	6.6	5.4	900	8	3	5	1.84		2.35	305	10	
3/25/2003	483	6	6.1	900	16	5	11	1.15		3.01	539	19	
6/10/2003	448	6.1	6.6	520	13	4	23	1.46		2.2	320	16	
9/16/2003	224	6.6	6.8	1000	17	4	21	3		4.12	604	16	
12/9/2003	157	6.3	6.4	900	9	2	25	3.14		3.52	493	17	
3/17/2004	188	5.7	6.2	1100	8	5	16	2.66		2.9	506	19	
6/3/2004	134	6.3	6.6	940	15	7	27	3.81		3.74	555	11	
9/20/2004	1963	4.6	4.7	1300	15	65	7	0.92		9.66	918	20	
12/27/2004	242	6	6.6	720	7	3	19	4.54		2.94	376	16	
3/15/2005	455	6.1	6.5	620	7	4	18	4.82		2.48	348	8	

Job name: McPherson #2
Permit #: 17850145, 17803108 Point on permit: 9,5
Longitude: 78 28' 40" Latitude: 41 00' 49"
Description: mouth of road trib

Table 1: Water Chemistry of MON 13(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
6/8/2005	91	6.2	6.1	1100	15	5	11	15.2		5.62	694	29	
9/20/2005	98	6.6	5.8	1200	16	10	16	15.3		4.48	605	18	
12/27/2005	724	6.2	6.7	460	8	4	24	1.61		1.23	169	8	
3/21/2006	376	6	6.3	700	5	3	17	4.64		2.42	325	7	
6/20/2006	40	5.9	6.2	1400	15	9	22	11.9		5.27	580	38	
9/19/2006	398	6.7	6.7	1100	15	2	38	2.55		2.09	528	6	
12/26/2006	605	6.1	6.9	650	9	4	35	0.92		1.15	255	3	
3/20/2007	1436	6.5	6.5	1200	6	7	27	0.81		2.98	530	352	
11/7/2006	Aluminum	only							<0.20				
1/16/2007	Aluminum	only							<0.20				

Job name: Reed #1
Permit #: 17803108 Point on permit: 24
Longitude: 78 29' 04" Latitude: 41 00' 43"
Description: Old Strip Mine Discharge

Table 2: Water Chemistry of MON 15

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
3/21/2006	<1	4.2	3.7	3200	5	160	<1	0.48		36.4	2579	1	
3/15/2005	1	4.3	1	2000	9	117	5	0.29		35.4	2446	<1	
6/20/2005	<1	3.7	3.6	3200	20	178	<1	2.1		44.1	2933	8	
9/20/2005	insufficient	amount	to	sample									
12/27/2005	1	4.1	4.1	2200	6	118	8	0.28		31.2	1986	2	
3/17/2004	3	4.2	4.1	3200	7	274	5	0.14		34.3	2464	8	
6/3/2004	<1	6.9	3.9	3300	16	117	<1	0.42		38.6	2543	8	
9/20/2004	21	4.2	4.2	2900	15	161	5	0.1		32.5	2343	<1	
12/27/2004	<1	3.9	4	3000	6	141	3	0.6		33.5	2505	2	
3/25/2003	6	3.7	4	2700	14	145	3	0.15		37.1	3064	3	
6/10/2003	3	3.5	3.8	2400	16	135	<1	0.3		30.2	2243	3	
9/16/2003	3	3.8	3.8	3500	15	156	<1	0.47		37.4	2585	2	
12/9/2003	1	3.8	3.8	2800	8	76	<1	0.3		39.5	2432	9	
4/2/2002	5	4.4	4.1	3000	11	116	9	0.19		38	2276	3	
6/18/2002	1	3.7	3.8	3500	13	192	<1	0.39		42.2	2379	4	
9/17/2002	<1	3.7	3.5	3600	16	174	<1	0.58		42.8	3194	10	
12/17/2002	<1	3.8	3.8	3100	8	183	<1	0.45		41.6	2329	7	
2/13/2001	2	3.9	3.9	2300	9	145	<1	0.28		42.4	2331	1	
6/12/2001	<1	4.1	3.8	2900	19	247	<1	0.14		45.2	2481	3	
8/14/2001	1	3.9	3.6	2200	18	255	<1	1.59		51.5	2932	4	
12/4/2001	<1	3.9	3.6	2800	12	166	<1	1.8		49.3	3003	7	
2/29/2000	3	4.1	4.01	2000	8	172	2	0.3		41.4	2125	2	
5/16/2000	2	4.1	3.87	2500	16	202	<1	0.21		49.6	2691	<1	
8/15/2000	4	4.1	3.77	2000	22	188	<1	0.5		42.9	2354	2	
11/7/2000	2	3.7	3.6	2300	10	328	<1	0.89		55.1	2482	1	
2/23/1999	6	3.9	3.88	3430	5	176	<1	0.33		55	3328	1	
6/15/1999	5	3.8	3.77	3650	14	247	<1	0.84		61.7	3113	4	
8/23/1999	1	3.8	3.57	3460	23	226	<1	1.75		28.9	4356	7	
11/9/1999	1	3.8	3.69	3360	15	185	<1	1.02		59.8	2830	<1	
3/3/1998	2	4	4.01	2600	9	163	3	0.23		51.7	2417	3	
6/9/1998	2	3.9	3.76	3610	16	198	<1	0.61		72	2962	<1	
9/1/1998	1	3.7	3.5	3850	20	279	<1	1.51		61.4	3302	9	
11/11/1998	1	3.6	3.61	4600	12	273	<1	1.83		72.1	3560	<1	
2/10/1997	1	4.2	4.01	3000	8	135	2	0.23		37.2	2366	<1	
6/3/1997	2	4.1	3.95	3100	12	163	2	0.39		39.7	2716	2	
8/5/1997	1	4	3.79	3300	17	177	<1	0.68		63.7	3102	6	

Job name: Reed #1
Permit #: 17803108 Point on permit: 24
Longitude: 78 29' 04" Latitude: 41 00' 43"
Description: Old Strip Mine Discharge

Table 2: Water Chemistry of MON 15(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
11/17/1997	<1	4.4	3.99	3000	6	161	2	0.29		47.6	2652	4	
8/6/1996	3	3.6	3.95	4000	19	153	2	0.77		55.7	2693	6	
11/4/1996	<1	4	3.78	4200	10	156	<1	0.61		45.8	2846	2	
3/20/2007	3	4.2	4.2	2200	6	125	8	<0.10		27.5	2092	4	

Job name: Reed #1
Permit #: 17803108 Point on permit: 24B
Longitude: 78 29' 00" Latitude: 41 00' 41"
Description: below mine after treatment

Table 3: Water Chemistry of MON 16

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/6/1996	48	7.7	6.44	860	16	5	44	0.61		2.05	547	6	
11/4/1996	26	6.7	6.32	720	9	6	42	0.44		1.03	397	2	
2/10/1997	77	6.9	6.14	845	8	4	23	0.8		1.57	418	3	
6/3/1997	82	7.1	6.48	625	11	5	35	0.44		0.81	234	1	
8/5/1997	6	7	6.69	1000	17	4	51	0.67		3.85	668	1	
11/17/1997	20	7.1	6.16	900	6	6	29	0.51		1.61	510	7	
3/3/1998	97	6.4	5.96	50	9	7	24	0.3		0.72	250	5	
6/9/1998	18	7.1	6.31	880	16	5	35	0.54		2.28	548	2	
9/1/1998	8	7.2	6.33	1400	18	6	43	0.65		5.36	802	3	
11/11/1998	6	6.7	6.26	1450	11	7	46	0.6		6.31	784	1	
2/23/1999	40	6.6	6.02	920	7	3	23	0.41		1.28	516	2	
6/15/1999	22	6.9	6.41	1000	14	6	35	0.52		3.7	710	2	
8/23/1999	8	7	7.06	1000	19	6	50	0.77		5.45	829	4	
11/9/1999	18	7	6.4	780	13	4	39	0.56		2.62	463	1	
2/29/2000	114	6.7	6.63	460	9	16	20	0.37		0.54	201	8	
5/16/2000	34	7.1	6.56	840	15	4	35	0.44		1.95	488	2	
8/15/2000	50	7	6.25	760	20	6	33	0.45		1.45	493	3	
11/7/2000	22	6.8	6	960	9	4	35	0.52		2.19	466	<1	
2/13/2001	96	6.4	5.9	580	9	9	23	0.32		0.59	224	5	
6/12/2001	26	6.8	6.1	1000	19	12	33	0.57		1.96	504	14	
8/14/2001	11	6.9	5.9	1100	21	22	33	0.7		6.48	802	7	
12/4/2001	38	6.8	6.9	400	11	4	24	0.78		2.43	281	<1	
4/2/2002	223	6.6	6.5	1000	11	2	26	0.56		0.92	452	10	
6/18/2002	99	6.4	6.9	1000	12	3	35	0.32		1.05	431	4	
9/17/2002	53	6.6	6.6	860	17	4	49	0.55		2.06	487	6	
12/17/2002	220	6.7	5.8	740	8	3	28	0.31		0.64	214	6	
3/25/2003	442	6.1	6.4	920	13	3	22	0.27		0.78	518	4	
6/10/2003	356	6.2	6.7	400	4	7	32	0.4		0.52	249	6	
9/16/2003	105	6.5	7.3	865	14	6	49	0.53		1.14	450	4	
12/9/2003	137	6.5	6.7	690	7	2	37	0.46		1.07	301	7	
3/17/2004	163	5.8	6.6	1000	8	54	27	0.33		0.81	396	5	
6/3/2004	102	6.4	6.8	760	16	6	36	0.53		1.22	407	7	
9/20/2004	1557	6	6.6	900	15	4	23	0.33		0.62	592	7	
12/27/2004	139	6.5	6.7	580	6	3	38	0.67		0.89	246	7	
3/15/2005	293	6.7	7.1	540	7	2	27	0.37		0.76	244	1	
6/8/2005	59	6.1	6.7	1300	18	4	25	12.1		7.01	835	20	

Job name: Reed #1
Permit #: 17803108 Point on permit: 24B
Longitude: 78 29' 00" Latitude: 41 00' 41"
Description: below mine after treatment

Table 3: Water Chemistry of MON 16

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/20/2005	28	6.3	6.9	1200	17	4	40	0.66		3.7	556	3	
12/27/2005	639	6.3	6.7	380	7	5	28	0.37		0.37	116	8	
3/21/2006	449	6.2	6.6	540	4	2	24	0.18		0.57	212	<1	
3/20/2007	1232	6.5	6.4	1000	8	4	27	0.41		0.53	331	32	

Job name: McPherson#2
Permit #: 17850145 Point on permit: 1
Longitude: 78 28' 59" Latitude: 41 00' 45"
Description: Road Trib Below 14, 15, 16

Table 4: Water Chemistry of MON 17

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/6/1996	48	6.4	6.23	1000	17	8	39	5.8		4.52	644	16	
11/4/1996	41	6.7	6.22	1000	9	6	29	4.11		4.8	595	12	
2/10/1997	81	6.7	5.99	860	7	7	20	1.83		2.5	421	7	
6/3/1997	86	7	6.39	725	11	5	33	2.25		1.71	257	8	
8/5/1997	6	6.3	5.96	1550	17	11	21	32		12.8	1034	21	
11/17/1997	22	7.1	6.06	1100	6	6	26	1.94		2.41	551	7	
3/3/1998	108	6.6	5.95	520	8	7	23	1.1		1.14	271	10	
6/9/1998	14	6.8	6.05	1050	16	5	24	7.33		6.41	764	7	
9/1/1998	9	6.5	5.66	2100	18	28	14	21.6		17.2	1334	45	
11/11/1998	9	6.4	5.85	2100	11	51	31	23.8		19.4	1518	33	
2/23/1999	46	6.7	5.81	1000	6	6	16	3.17		2.92	600	7	
6/15/1999	26	6.6	5.67	1200	14	8	17	14.2		11.2	1143	12	
8/23/1999	11	6.5	5.97	1750	20	16	25	21.8		16.2	1487	34	
11/9/1999	19	6.8	6.2	1000	14	10	27	9.19		7.23	684	13	
2/29/2000	121	6.4	6.27	520	9	8	20	0.81		0.84	226	7	
5/16/2000	36	6.7	6.21	1000	14	13	22	7.06		5.44	636	25	
8/15/2000	58	7	6.05	880	21	9	30	3.42		2.85	547	4	
11/7/2000	26	6.6	5.8	1100	9	15	25	8.89		6.24	637	4	
2/13/2001	104	6.4	5.7	680	10	9	23	1.66		1.21	236	9	
6/12/2001	28	6.6	5.8	1000	19	16	24	0.61		5.04	668	38	
8/14/2001	16	6.1	5.6	1600	21	29	22	14.3		20.2	1336	24	
12/4/2001	41	6.5	6.6	780	12	26	17	6.68		7.19	542	16	
4/2/2002	226	6.4	6.4	1000	11	2	24	1.43		1.8	479	7	
6/18/2002	103	6.2	6.5	1000	12	4	31	3.54		2.73	541	10	
9/17/2002	57	6.4	6.4	1100	18	5	36	9.08		6.13	845	42	
12/17/2002	226	6.5	6.5	880	7	4	25	2.67		1.99	245	14	
3/25/2003	449	6	6.2	930	13	8	20	1.14		1.29	483	11	
6/10/2003	362	6	6.6	440	14	4	32	0.89		0.81	258	11	
9/16/2003	112	6.2	6.7	1050	14	3	35	3.4		2.95	634	13	
12/9/2003	142	6.3	6.4	800	8	3	33	3.14		2.77	397	15	
3/17/2004	170	5.8	6.4	1100	7	6	26	1.99		1.81	448	16	
6/3/2004	108	6.4	6.7	920	17	7	32	5		3.54	486	19	
9/20/2004	1615	5.7	6.3	1100	15	5	14	0.76		3.83	678	15	
12/27/2004	143	6.3	6.6	700	6	4	24	3.14		2.41	366	10	
3/15/2005	314	6.6	7.3	580	8	3	21	2.27		1.8	336	4	
6/8/2005	63	6.5	7	920	18	5	37	0.38		2.17	526	3	
9/20/2005	32	6.3	6	1800	17	14	20	21.78		9.48	1080	31	

Job name: McPherson#2
Permit #: 17850145 Point on permit: 1
Longitude: 78 28' 59" Latitude: 41 00' 45"
Description: Road Trib Below 14, 15, 16

Table 4: Water Chemistry of MON 17(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
12/27/2005	646	6	6.5	410	7	5	32	1.16		0.81	159	9	
3/21/2006	454	6	6.4	640	5	3	22	2.33		1.82	282	4	
6/20/2006	32	6.4	6.4	1400	16	12	28	1.64		5.5	659	37	
9/19/2006	345	6.4	6.6	780	15	2	38	1.56		1.42	426	6	
12/26/2006	502	6.2	7.3	600	8	9	79	1.36		1.1	251	6	
3/20/2007	1303	6.2	6.4	1000	8	7	28	0.71		2.29	504	37	
11/7/2006	Aluminum	only							<0.20				
1/16/2007	Aluminum	only							<0.20				
4/5/2007	Aluminum	only							0.33				

Job name: Mcpherson #2
Permit #: 17850145 Point on permit: 34
Longitude: 78 29' 00" Latitude: 41 00' 39"
Description: Deep mine discharge

Table 5: Water Chemistry of MON 18

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/6/1996	6	6.2	6.22	320	15	12	47	0.11		0.27	112		
11/4/1996	6	6.2	6.15	360	10	28	49	0.17		0.55	112		
2/10/1997	3	6.1	6.01	315	8	21	32	0.17		0.32	97		
6/3/1997	10	6	6.18	345	11	13	32	0.17		0.29	93		
8/5/1997	3	6.1	6.5	315	16	6	62	0.48		0.91	125		
11/17/1997	3	6.4	6.15	280	7	14	41	0.27		0.6	106		
3/3/1998	10	5.5	5.81	220	9	31	27	<0.07		0.33	88		
6/9/1998	5	6.2	6.31	280	16	7	59	0.21		0.46	93		
9/1/1998	4	6.5	6.43	520	18	9	69	0.82		1.95	175		
11/11/1998	2	6.6	6.35	660	12	8	79	1.72		3.28	147		
2/23/1999	11	5.8	6.11	300	8	5	31	0.36		0.63	119		
6/15/1999	10	6	6.22	440	13	20	43	0.29		0.85	127		
8/23/1999	5	6.3	6.21	400	18	16	66	1.19		2.1	175		
11/9/1999	7	6.1	6.28	400	14	8	49	0.69		1.4	143		
2/29/2000	10	5.9	5.94	360	11	26	24	0.19		0.62	106		
5/16/2000	8	6.2	6.5	280	13	14	31	0.23		0.54	102		
8/15/2000	14	6	6.32	320	19	9	38	0.45		0.68	116		
11/7/2000	11	6	5.9	420	9	49	40	0.89		0.98	113		
2/13/2001	11	5.6	5.7	380	9	33	27	0.62		0.62	122		
6/12/2001	10	6	6	420	16	16	30	0.77		0.76	108		
8/14/2001	5	6.1	5.8	345	17	35	43	2.54		1.61	127		
12/4/2001	7	5.8	6.4	300	13	14	27	2.05		1.53	132		
4/2/2002	18	6	6.7	260	11	5	34	0.27		0.43	90		
6/18/2002	16	5.5	6.8	330	11	3	34	0.38		0.45	167		
9/17/2002	4	5.9	6.9	475	15	6	59	3.02		2.18	151		
12/17/2002	14	5.9	6.5	420	7	17	36	0.86		0.65	114		
3/25/2003	24	5.3	6.2	250	14	6	22	0.26		0.32	77		
6/10/2003	21	5.3	6.3	210	13	14	28	0.31		0.33	82		
9/16/2003	16	5.9	6.5	240	15	12	43	0.55		0.4	76		
12/9/2003	23	6	6.5	260	8	4	45	0.4		0.37	70		
3/17/2004	26	5.8	6.3	180	8	6	29	0.15		0.18	63		
6/3/2004	14	5.9	6.6	200	15	5	37	0.21		0.25	69		
9/20/2004	32	5.7	6.7	200	15	4	27	0.11		0.16	71		
12/27/2004	8	5.8	7	210	7	3	37	0.35		0.31	72		
3/15/2005	16	5.5	7	160	8	2	33	0.23		0.22	65		
6/8/2005	14	6	7.4	330	18	3	46	0.62		0.53	93		

Job name: Mcpherson #2
Permit #: 17850145 Point on permit: 34
Longitude: 78 29' 00" Latitude: 41 00' 39"
Description: Deep mine discharge

Table 5: Water Chemistry of MON 18(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/20/2005	6	6.5	6.6	420	15	16	57	0.07		<0.05	124		
12/27/2005	30	5.9	6.3	240	6	35	34	<.1		0.3	87		
3/21/2006	24	6.3	6.7	270	4	3	31	0.35		0.26	81		
6/20/2006	14	6.3	6.4	340	16	17	43	0.84		0.57	85		
9/19/2006	19	6	6.5	280	15	10	45	0.51		0.31	82		
12/26/2009	28	5.9	6.4	280	8	8	37	0.61		0.3	79		
3/20/2007	28	6.3	6.1	180	5	23	27	0.31		0.19	62		

Job name: Reed #1
Permit #: 17803108 Point on permit: 1
Longitude: 78 09' 04" Latitude: 41 00' 39"
Description: Above 14,15,16,18

Table 6: Water Chemistry of MON 19

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/6/1996	40	7.1	6.44	780	17	5	47	0.26		1	468	1	
11/4/1996	20	6.9	6.36	820	9	6	38	0.44		0.87	467	5	
2/10/1997	78	6.6	6.14	820	8	7	24	0.3		0.58	357	5	
6/3/1997	65	7	6.48	580	11	5	37	0.26		0.31	159	6	
8/5/1997	3	6.7	6.48	1100	16	6	52	0.55		1.75	706	10	
11/17/1997	16	6.7	6.1	940	6	7	30	0.39		0.61	482	9	
3/3/1998	74	6.3	5.94	465	8	7	24	0.19		0.29	236	6	
6/9/1998	8	7	6.36	860	16	6	39	0.33		0.98	502	1	
9/1/1998	3	6.8	6.37	1600	20	6	53	0.39		2.06	825	<1	
11/11/1998	3	6.8	6.31	1100	12	11	67	0.3		1.99	505	7	
2/23/1999	25	6.5	6.06	920	6	3	23	0.15		0.38	502	<1	
6/15/1999	10	6.9	6.44	1000	15	8	42	0.17		1.62	857	<1	
8/23/1999	3	7	7.06	1000	20	8	70	0.41		2.09	969	2	
11/9/1999	15	6.7	6.54	750	12	4	42	0.16		0.78	403	<1	
2/29/2000	80	6.5	6.28	470	9	4	22	0.19		0.14	186	6	
5/16/2000	24	7	6.49	820	15	6	38	1.16		0.62	483	22	
8/15/2000	34	7	6.17	740	22	6	34	0.19		0.35	505	5	
11/7/2000	11	6.6	6	860	9	8	37	0.14		0.61	439	1	
2/13/2001	82	6.4	5.8	580	11	10	24	0.15		0.15	200	4	
6/12/2001	14	6.8	6.1	1000	19	7	38	0.19		0.66	524	6	
8/14/2001	6	6.7	6	1000	20	27	52	0.29		1.37	653	6	
12/4/2001	30	7.2	7.1	320	12	4	24	0.27		0.19	122	1	
4/2/2002	205	6.4	6	900	13	2	26	0.19		0.2	430	4	
6/18/2002	64	6.3	6.9	1000	12	4	38	0.15		0.31	457	2	
9/17/2002	49	6.6	6.3	640	18	4	41	0.21		0.58	263	4	
12/17/2002	182	6.5	6.5	660	10	29	30	0.1		0.12	202	2	
3/25/2003	385	5.8	6.4	920	14	4	24	0.12		0.14	317	2	
6/10/2003	317	5.9	6.6	390	14	3	33	0.25		0.16	234	3	
9/16/2003	77	6.3	6.8	850	19	4	43	0.66		0.43	505	13	
12/9/2003	114	6.4	6.6	660	7	2	39	0.25		0.29	266	5	
3/17/2004	129	6	6.5	1000	8	6	28	0.21		0.21	413	9	
6/3/2004	21	6.7	7	730	16	<1	37	0.4		0.37	415	9	
9/20/2004	1483	6	6.6	880	15	5	23	0.29		0.32	622	9	
12/27/2004	126	6.5	7	540	7	3	28	0.5		0.22	251	13	
3/18/2005	278	6	6.9	580	8	2	27	0.23		0.19	235	2	
6/20/2005	16	6.6	7.7	760	21	3	45	0.16		0.72	443	2	
9/20/2005	3	6.8	7.3	940	18	8	78	0.43		0.69	338	5	

Job name: Reed #1
Permit #: 17803108 Point on permit: 1
Longitude: 78 09' 04" Latitude: 41 00' 39"
Description: Above 14,15,16,18

Table 6: Water Chemistry of MON 19(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
12/27/2005	609	6.2	6.6	360	7	6	26	0.14		0.09	101	10	
3/21/2006	428	6.3	6.6	520	4	2	25	<.1		0.15	204	<1	
3/20/2007	1204	6.5	6.4	700	7	6	27	0.31		0.12	233	26	

Job name: McPherson #2
Permit #: 17850145 Point on permit: 35
Longitude: 78 29' 19" Latitude: 41 00' 27"
Description: source of road trib

Table 7: Water Chemistry of MON 21

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
8/6/1996	13	7.1	6.79	360	17	4	80	0.43		0.06	74	13	
11/4/1996	3	7.5	6.55	480	9	<1	54	0.02		<.04	67		
2/10/1997	8	7.5	6.41	400	6	3	35	0.1		<.04	52	3	
6/3/1997	18	7.3	7.61	380	12	3	44	0.2		<.05	51	3	
8/5/1997	<1	7.7	7.7	420	19	3	132	<0.07		<.05	64		
11/17/1997	6	7.5	6.32	375	5	4	42	0.13		<.05	53	3	
3/3/1998	22	7.2	6.17	260	9	5	30	<0.07		<.05	38		
6/9/1998	3	7.8	6.76	500	15	3	65	0.21		<.05	71	2	
9/1/1998													
11/11/1998	1	7.2	6.63	640	11	5	99	0.13		0.05	52	13	
2/23/1999	12	7	6.26	360	6	2	33	<0.07		<.05	80	1	
6/15/1999	3	7.5	6.93	540	15	5	104	<0.07		<.05	71		
8/23/1999	1	7.6	7.49	630	19	3	122	0.71		0.07	115	29	
11/9/1999	3	7.5	6.94	580	13	2	72	0.15		0.06	89	5	
2/29/2000	34	7	6.63	350	9	4	27	0.13		<.05	40	4	
5/16/2000	6	7.4	6.97	440	14	3	49	0.21		<.05	79	20	
8/15/2000	10	7.6	6.55	380	22	6	61	0.22		0.06	67	9	
11/7/2000	5	7.2	6.7	480	10	3	60	0.13		<.05	73	1	
2/13/2001	42	6.9	6.6	450	10	4	29	0.22		<.05	47	12	
6/12/2001	3	7.9	6.6	520	20	5	58	0.22		<.05	70	27	
8/14/2001	1	7.2	6.4	640	22	11	84	0.31		0.18	73	57	
12/4/2001	8	7.4	7.3	380	12	4	29	0.15		0.05	56	1	
4/2/2002	42	6.6	7.4	330	12	1	39	0.16		<.05	55	5	
6/18/2002	14	6.4	7.8	430	12	3	59	0.14		<.05	145	6	
9/17/2002	2	6.6	7.5	780	20	4	83	<.07		<.05	117	124	
12/17/2002	28	7	5.7	580	7	3	17	0.08		<.05	56	3	
3/25/2003	57	6.4	7.3	350	13	3	20	0.19		<.05	55	12	
6/10/2003	52	6.5	7	290	14	2	46	0.18		<.05	55	12	
9/16/2003	22	7.1	7.3	320	17	3	61	0.18		0.05	60	7	
12/9/2003	31	6.4	6.8	360	8	1	60	0.15		0.06	60	8	
3/17/2004	32	6.4	6.8	1300	7	3	34	0.22		<.05	136	21	
6/3/2004	7	6.9	7.4	360	16	6	62	1.5		0.17	54	29	
9/20/2004	82	6.5	6.9	220	15	3	34	0.18		0.05	51	7	
12/27/2004	30	6.4	7	245	6	2	33	<.07		<.05	48	86	
3/15/2005	38	6.4	7.5	260	9	2	32	1.45		0.14	49	4	
6/8/2005	2	6.8	7.9	420	20	<1	88	0.73		0.08	47	30	

Job name: McPherson #2
Permit #: 17850145 Point on permit: 35
Longitude: 78 29' 19" Latitude: 41 00' 27"
Description: source of road trib

Table 7: Water Chemistry of MON 21(cont.)

Sample Date	Flow (gpm)	Field pH (SU)	Lab pH (SU)	Specific Cond (umhos/cm)	Temp C	Total Acidity (mg/l)	Total Alk (mg/l)	Total Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfate (mg/l)	TSS (mg/l)	TDS (mg/l)
9/20/2005	insufficient	amount	for	sample									
12/27/2005	51	6.2	6.7	360	7	3	19	<.1		<0.05	49	8	
3/21/2006	30	6.4	7.1	340	4	2	32	<0.10		<0.05	57	<1	
6/20/2006	2	7.3	7.3	540	15	3	89	<0.10		0.07	63	82	
9/19/2006	26	7.3	7.1	340	15	3	49	0.13		0.05	57	3	
12/26/2006	66	6.3	6.7	280	9	2	36	0.18		0.05	47	2	
3/20/2007	92	6.5	6.5	600	6	3	32	0.27		<0.05	40	42