

***Phase II Watershed Assessment and Restoration  
Plan for the Upper Two Lick Creek Watershed***

**Produced by:**

**The Blacklick Creek Watershed Association**

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## **Introduction**

The Upper Two Lick subwatershed is located in northern Indiana County, within the Blacklick Creek and Conemaugh drainages of western Pennsylvania. The Upper Two Lick drainage presently has significant stretches of moderately to severely acid mine drainage-contaminated surface water, mainly a product of past and present coal extraction activities. The Blacklick Creek Watershed Association (BCWA), a non-profit environmental group made up of local citizens, was established in 1993 with goals of working in this region to improve water quality and educate citizens regarding land and water resources. This document is an attempt by the BCWA and its partners to assess the extent and pattern of water contamination present in the Upper Two Lick basin, and to develop a rational and cost effective restoration plan for the area that will yield improvements in the surface water quality, aquatic habitats, and quality of life for its citizens.

## **Context/Watershed Description**

### Background

Upper Two Lick Creek, located in Clymer Borough and Cherryhill, East Mahoning, Grant, Green, and Rayne Townships in Indiana County, Pennsylvania, is one of nine management subwatersheds defined by the Pennsylvania Department of Environmental Protection (PADEP) and employed by the Blacklick Creek Watershed Association in its stewardship activities (see Appendix B – Project Maps and Figures, Figure 1). PADEP and BCWA also recognize 12 smaller subbasins within Upper Two Lick: Brown's Run, Buck Run, Dixon Run, North Branch Upper Two Lick Creek, Penn Run, Pompey Run, Repine Run, Rock Run, Sides Run, South Branch Upper Two Lick Creek, Whitaker Run, and the main stem of Upper Two Lick Creek (Appendix B - Figure 2). The Upper Two Lick subwatershed is part of HUC area 0510007, Conemaugh River, designated a Category I Watershed in the 1999/2000 Pennsylvania Unified Watershed Assessment. In 2000, several stream segments in the Upper Two Lick drainage were listed on PADEP's section 303-d list as being impaired as a result of acid mine drainage with pH and metals noted as principal contaminants. In PADEP's 2004 Integrated Monitoring and Assessment Report, many of the stream segments in the Upper Two Lick were included on List 3 (Unassessed) indicating that not enough data was available to determine whether steam segments met designated uses. Some stream segments in the Penn

Run and Two Lick (main stem) subwatersheds of the Upper Two Lick were designated as Category 5 (Pollutants) by PADEP in the 2004 report, indicating that they were impaired for one or more designated uses.

### Geology and Landuse

Coal and natural gas deposits are found throughout large parts of the Upper Two Lick drainage. Coal deposits occur on average intervals of 50 feet within the 300 foot thick Allegheny Group. A combination of folded rock strata and erosional downcutting by Two Lick Creek have resulted in exposure of some coal seams in narrow stream valleys. Large amounts of underground coal mining have been undertaken in the watershed in the past, extracting coal mostly from the Lower Kittanning and Lower Freeport coal beds. Voids formed by past deep mining in many cases have filled with large volumes of groundwater which contaminates much of the subwatershed in the form of acid mine drainage. Natural gas drilling is prevalent within the subwatershed, and in some cases disturbances of subsurface materials related to drilling causes increases in acid mine drainage contamination levels, as well as sedimentation.

The Upper Two Lick Creek watershed is largely rural in character. The only urban settlement of any size in the drainage is Clymer Borough, which had a population of 1,547 in 2000. Abandoned surface (strip) mines, and coal waste piles dot the landscape, as well as previously-farmed land that has reverted to forest. Small-scale dairy farming is common, as well as a significant amount of tree farming. The state transportation routes through the subbasin are Routes 286 and 403 (Appendix B – Figure 1).

### Water Quality Issues

By far the most pressing water quality issue in the Upper Two Lick Creek watershed is *acid mine drainage (AMD)*. There are at least 19 significant identifiable sources of AMD contamination in the Upper Two Lick, and many lesser sources (seeps and waste piles) that are dispersed in nature. Impacts of AMD that have been documented in the Upper Two Lick drainage include acid water (low pH), elevated metals (in particular iron and aluminum), and severely impacted aquatic ecosystems. Much of the groundwater in the subwatershed is contaminated by AMD as a result of past underground coal mining, causing water

supply problems for rural residents utilizing on-lot wells (see Appendix A – AMD Source Sampling Site Photographs and Descriptions, and Appendix B - Figure 3).

A second, much less urgent, problem in the watershed at this time is *untreated rural sewage*. Malfunctioning or non-existent on-lot sewage systems can be found throughout the Upper Two Lick basin, contributing raw sewage to the main stem and its tributaries. This problem is fairly typical in rural areas such as the subject watershed, and is far overshadowed by the AMD issues in the short term context of this plan.

## **Water Quality (AMD Contamination) Assessment Methodology**

The methodology used to assess water quality in the Upper Two Lick Creek watershed involved identifying sources of contamination, characterizing the severity of those sources as well as the quality of upstream and downstream surface waters, and analyzing contamination patterns to develop a restoration strategy for the watershed. The specific tasks carried out were: 1) identification of problem areas 2) detailed (12 month) monitoring of contamination sources 3) prioritization of water quality problems and development of restoration plan.

### Identification of Problem Areas from Existing Data

At the outset of the project, it was necessary to determine the location and nature of problem areas within the Upper Two Lick Creek drainage. This was accomplished mainly by working with conservation partners and local citizens. The Armstrong County Conservation District (ACCD) provided water quality data from their Phase I assessment of streams in Armstrong, Butler, Clarion, and Indiana Counties (funded through the Growing Greener program). The Phase I assessment provided a “snapshot” of water quality conditions and involved sampling tributaries contributing to main stem streams to determine whether specific subwatersheds were contaminated. The Phase I project funded by ACCD provided valuable coarse data to target activities for this project, as specific subwatersheds were identified as having AMD-related problems. The BCWA was also assisted by Lou Kopczyk of the Indiana County Conservation District, who personally drove areas of the watershed with project personnel to locate AMD sites. This data

was combined with historical data, such as that from the Operation Scarlift report, to develop a comprehensive survey of contamination sources impacting the Upper Two Lick Creek watershed.

#### Detailed Water Monitoring at Identified Contamination Sources

Based on the information collection and reconnaissance work described above, nineteen significant AMD contamination source sites were identified and located in the Upper Two Lick watershed (see Appendix A – AMD Source Sampling Site Photographs and Descriptions, and Appendix B - Figure 3). In addition, nineteen “control” sites for water quality monitoring were chosen upstream and downstream of the contamination sources, in order to gauge the impact of particular sources on water quality. There were 38 water sampling locations (including AMD origins and control sites) in the study area. The locations of these features were digitally recorded using GPS techniques, and incorporated into the geographic information system (GIS). The following procedure was used to monitor the sites and collect the data.

#### Water Monitoring Procedure and Chemical Analysis of Samples

Chemical testing of water is an often used method of determining water quality. With respect to Acid Mine Drainage contamination in particular, there are five chemical parameters that are normally used to gauge water quality: 1) acidity (pH) 2) aluminum 3) iron 4) manganese 5) sulfates. Water chemistry results are generally reported in two ways: 1) in terms of the concentration of a substance in water, which is often recorded in milligrams per liter (mg/L); and 2) in terms of the loading of a substance, or the total amount contributed to a water body or watershed over a particular time period, which in many cases is recorded in pounds per day (lbs./day)<sup>1</sup>. For the purposes of analyzing AMD contamination patterns and remediation, both methods of reporting are useful as they provide a total description of water quality and contamination contribution for sampling locations. In terms of evaluating remediation that may be required, and prioritizing locations for AMD remediation, loading data becomes of primary importance in that total amount of contamination can be gauged. Data on chemical parameters was gathered for AMD

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<sup>1</sup> The calculation of the loading contribution of any particular substance from a sampling location would be a product of the concentration of that substance in water, and the amount of the flow of water from that location.

contamination origins and discharge locations in the study area (see Appendices C – Summary Statistics of AMD-related Chemical Parameters by Source Location; D - Summary Statistics of AMD-related Chemical Loadings by Source Location; E – AMD Loading Data by Source Location, and F – Chemical Concentrations by Source Location).

### **Acidity**

pH is an important factor in determining the health of aquatic ecosystems. A key impact of AMD in many cases is to lower water pH, creating acid conditions. Most aquatic organisms have a defined range of pH tolerance within which they can survive. If pH falls below an organism's tolerance range, a disturbance in the balance of sodium and chloride ions in the blood will occur, causing death as a result of respiratory or osmoregulatory failure (Earle and Callaghan 1999; Kimmel 1983). For this study, a pH reading of below 6 was considered indicative of significant acid contamination based on water quality guidelines adapted from Chapter 93 Water Quality Standards of the Pennsylvania Code (PA DEP 1997) (Table 1).

Acid contamination was found to be prevalent throughout the study area. Fourteen of the nineteen AMD source sampling locations that field water samples were gathered for had average pH values less than 6 (outside of Pennsylvania drinking water standards) Appendices C – Summary Statistics of AMD-related Chemical Parameters by Source Location; D - Summary Statistics of AMD-related Chemical Loadings by Source Location; E – AMD Loading Data by Source Location, and F – Chemical Concentrations by Source Location). In fact, 13 of the 14 sampling locations had average pH values for the 12 month sampling period of 4 or below. In terms of the loading of acidity (or the amount of acid being contributed to the watershed at particular locations), some very identifiable geographic patterns were evident. Sampling locations 1 (Waste pile below Clymer, 6133.64 lbs.), 4 (Buck Run, 2391.72 lbs.), and 7 (no name, 748.88 lbs.) were found to contribute very large amounts of acidity to the study watershed. Locations 6, 9, 12, and 14 (no names) were found to have contributed over 300 pounds of acid daily (Appendix B, Figure 4). These results indicate that some very acid water conditions exist in the study area, and based on information in the literature these conditions very likely are impacting aquatic ecosystems.

**Table 1: Pennsylvania Guidelines for AMD-related Substances in Water**

| <b><u>Chemical Criteria</u></b> | <b><u>Acceptable Values</u></b>   |
|---------------------------------|---|
| pH                              | 6.0-9.0   |
| Total Iron                      | Maximum 1.5 mg/l  |
| Total Aluminum                  | If pH is > 6.0, Al levels > 0.7 mg/l are unacceptable<br>If pH is < 6.0, AL levels >0.6 mg/l are unacceptable |
| Total Manganese                 | Maximum 1.0 mg/L  |
| Sulfates                        | Maximum 250 mg/L  |

### **Aluminum**

Under pristine conditions, aluminum rarely occurs in water naturally at concentrations of greater than a few tenths of a milligram per liter. In combination with low pH, aluminum can have severe adverse effects on stream aquatic life. Aluminum ions compound the effect of low pH by interacting with hydrogen ions, decreasing sodium uptake and increasing sodium loss in blood and tissues. Research results reported by Earle and Callahan (1999) indicate that a combination of a pH of less than 5.5 and dissolved aluminum concentrations greater than 0.5 mg/L will generally eliminate all fish and most macroinvertebrates.

Precipitated aluminum is also problematic, as it coats stream substrate ruining macroinvertebrate habitat, accumulates on fish gills interfering with breathing, and under some conditions can be directly toxic to macroinvertebrates and fish (Brown and Sadler 1989).

Eighteen of the nineteen contamination source sampling locations for which data was collected (location 16 was the exception) in the study area exceeded state water quality limits for aluminum content. It is clear that aluminum contamination is a serious problem throughout the study area. Particularly high concentrations of aluminum (over 50 times higher than the state parameters at a pH of above 6) were found at 4 AMD origin and tributary sampling locations in the Upper Two Lick Creek basin (locations 1, 2, 4 and 5). The largest aluminum loading contributors in the study area (over 200 pounds per day) were the waste pile area below Clymer (location #1, 738.56 lbs./day) and the Buck Run source (location #4, 270.74 lbs./day). The combination of high aluminum concentrations and high flow at these locations makes them

the largest total contributors of aluminum in the study watershed. Very significant aluminum contributions (over 30 pounds per day) were also documented at sites 7, 9, 14, and 16 (Appendix B – Figure 5, Appendices C ,D, E, and F).

### **Iron**

Iron is commonly present in acid mine drainage, and can have detrimental effects on stream ecosystems and aquatic organisms. Although dissolved iron is not generally considered as toxic as aluminum in solution, severe impacts have been documented in water with pH lower than 3.5 (Letterman and Mitsch 1978; Wiederholm 1984). Iron precipitate from acid mine drainage may result in complete coverage or armoring of a stream bottom (regionally called “yellow boy”), adversely affecting both macroinvertebrates and fish. The severity of impacts from iron armoring in general are linked to the acidity of water – the lower the pH, the more severe the impact of iron (Earle and Callahan 1999; Hoehn and Sizemore 1977).

Iron was also present in average concentrations over the sampling period exceeding state parameters at a vast majority (17 out of 19) of the AMD contamination source sampling locations distributed throughout the study area. Only two sampling locations (16 and 17) did not yield values indicating significant iron contamination. One location that contributed a very large amount of iron (942 lbs./day) was noted – the waste pile area below Clymer (Sample ID 1). Other locations contributing over 100 pounds of iron per day were sampling locations 4, 7, and 16 (Appendix B - Figure 6, Appendices C ,D, E, and F).

### **Manganese**

Manganese is another heavy metal contaminant that is often associated with acid mine drainage. Manganese is persistent and can be carried downstream long distances from a source of acid mine drainage, because it is usually difficult to remove from contaminated water as the pH must be raised to above 10 before the metal will precipitate out. The specific impacts of manganese itself on aquatic life are not clear, as it tends to be associated with other metals that have a more pronounced impact (see above) or which may mask the effects of manganese. Research that has been done indicates that manganese tolerance of various fish species varies widely, and that the toxicity of dissolved manganese is lowest in water with low levels of hardness (Earle and Callahan 1999).

Nine of the nineteen AMD source sampling locations had 12-month averages that exceeded the state contamination level of 1.0 mg/L for manganese concentration in water (locations 1, 2, 4, 5, 6, 7, 11, 12, 13). Particularly high concentration levels of manganese (more than 5 times the state level) were recorded at three locations – 1, 4, and 5 (Appendix C) . In terms of manganese contribution to the study watershed, the largest single manganese loading location by far was number 16 at over 75 pounds per day, found at the upper end of the main stem Two Lick Creek subwatershed. The other large contributor of manganese in the study area was sampling location number 1, with an average loading of over 36 pounds per day (Appendix B - Figure 7).

### **Sulfates**

Sulfate contamination patterns again indicate the presence of AMD-associated sulfate contamination throughout the watershed, as 13 of the 19 sampling locations exceeded the state water quality standard of 250 mg/L. Sites with an average of over 1000 mg/L were documented at locations 1 and 5, with locations 2, 4, and 8 having average concentrations of over 500 mg/L of sulfates (Appendix C). In terms of sulfate loading, the two highest contributors are number 1 (8260.46 lbs./day) and number 16 (6210.52 lbs./day), with locations 4, 6, 7, 12, 14, and 18 contributing over 1000 lbs./day each (Appendix B – Figure 8, Appendix D).

### **Assessment and Prioritization of Water Quality Problems**

Once water quality data had been collected for a twelve month period, and entered into a GIS, it was possible to assess contamination sources and analyze patterns of water contamination within the Upper Two Lick Watershed.

### **Overall Water Chemistry Analysis**

In order to evaluate the overall level and geographic pattern of chemical contamination in the study area, two indices were developed based on the loading contribution amount of acidity, aluminum, iron, manganese, and sulfate at each of the AMD contamination source locations. To develop the first index, for each AMD contaminant type a rank of 1 to 16 was assigned to the sampling sites for which loadings could be calculated, with 16 being assigned to the location with the highest amount of loading

contribution of each substance and 1 assigned to the location with the lowest amount contributed. The rank for the loading of each of the five contaminants was then added up to obtain one total index score of chemical contamination for each of the 19 sampling locations. The results of the chemical contamination index calculations and ranking are shown in Table 2 – Chemical Contamination Indices for AMD Source Sampling Locations.

The top 3 ranked sites using the chemistry index method described above with index scores of over 70 are: Site Number 1 (the waste pile below Clymer), ranked as the worst single chemical contamination location, followed by Site Number 16, located at the upper end of the main stem Upper Two Lick Creek drainage ranked 2, and the Buck Run source location (Site Number 4) ranked 3. Each of these locations contributes large amounts of all of the AMD-related chemical substances to the study watershed. Other locations that were ranked highly based on the above approach include Site Number 7 below Number 16 on the Upper Two Lick main stem ranked 4, Site Numbers 9 and 12 which ranked 5 and 6 respectively, found in the North Branch Two Lick Creek subbasin.

The geographic distribution of the sampling locations discussed above is shown in Appendix B - Figures 9 and Figure 10. Site Number 1 is the most “downstream” sampling site in the study area to the southwest of Clymer borough, along the main stem of Upper Two Lick Creek. Although this AMD source is the largest absolute contributor of AMD contaminants in the study area, its downstream location may mean that it will make sense to address significant problems upstream. Site Number 4 is located along Buck Run, slightly less than a mile upstream from its confluence with the main stem of Upper Two Lick. Addressing this source would obviously have a direct positive impact on the areas of Buck Run downstream, with probably negligible impacts on the main stem of Upper Two Lick Creek. Site Number 16 is located in the upper portion of the main stem Upper Two Lick subbasin, almost 7 (linear stream) miles upstream of Site Number 1.

Table 2 - Water Chemistry Index Scores and Ranks by Sampling Location

| LOCATION | ACIDITY RANK | IRON | MANGANESE | ALUMINUM | SULFATES | INDEX TOTAL | OVERALL RANK |
|----------|--------------|------|-----------|----------|----------|-------------|--------------|
| 1        | 16           | 16   | 15        | 16       | 16       | 79          | 1            |
| 16       | 14           | 14   | 16        | 14       | 15       | 73          | 2            |
| 4        | 15           | 15   | 13        | 15       | 14       | 72          | 3            |
| 7        | 13           | 13   | 11        | 13       | 13       | 63          | 4            |
| 9        | 12           | 8    | 10        | 11       | 12       | 53          | 5            |
| 12       | 10           | 10   | 12        | 8        | 11       | 51          | 6            |
| 6        | 9            | 6    | 14        | 10       | 9        | 48          | 7            |
| 14       | 11           | 2    | 8         | 12       | 10       | 43          | 8            |
| 13       | 6            | 12   | 9         | 3        | 6        | 36          | 9            |
| 5        | 8            | 11   | 3         | 9        | 3        | 34          | 10           |
| 11       | 7            | 4    | 6         | 7        | 5        | 29          | 11           |
| 18       | 2            | 5    | 7         | 5        | 7        | 26          | 12           |
| 17       | 3            | 7    | 5         | 2        | 8        | 25          | 13           |
| 2        | 5            | 9    | 2         | 6        | 2        | 24          | 14           |
| 3        | 4            | 3    | 4         | 4        | 4        | 19          | 15           |
| 10       | 1            | 1    | 1         | 1        | 1        | 5           | 16           |

### Upper Two Lick Watershed: AMD Problem Assessment

In PADEP BAMR's AMD comprehensive plan document, many different types of problems relating to abandoned mine lands are discussed. For the Upper Two Lick watershed plan, the most prevalent aspect of AMD impact is *water pollution*. BAMR describes water pollution problems as those relating to streams that do not meet state water quality standards, with impact on streams the key impact to be considered (PADEP 1998, C-1). BAMR's suggested characterization of AMD-related water quality problems is based on 2 parameters: 1) distance of stream impacted by water pollution from any discharge or source; and 2) the percentage of stream pollution load contributed from any discharge or source. Combinations of these two parameters are used to characterize AMD water pollution problems from better to worse as *Moderate*, *Serious*, *Very Serious*, and *Critical* (PADEP 1998, C-3).

In order to be able to characterize AMD contamination locations using the above classification scheme, data about stream distance impacted had to be derived. As described above, the locations of all of the significant AMD discharges in the study watershed were determined. Those locations, in combination with spatial data about drainage in the watershed allowed for the calculation of stream distance between each contamination location.

To perform stream distance calculation, the steam system in the watershed was used to determine linear distance between locations where AMD contamination was entering the network. The primary piece

of data needed was the distance of stream downstream of any AMD discharge/source (each length of downstream distance ended at the location where the next source of contamination entered the stream). The stream distance data allows a comparison of AMD contamination locations in terms of the amount of stream impacted. The Network Analyst extension of the ArcView 3.3 GIS software package was used to calculate stream distance between each AMD discharge location. The GIS could calculate the distance between any contamination discharge/origin and the next downstream contamination location by using a data model called dynamic segmentation. Dynamic segmentation allows for the “re-segmentation” of a network based on user specification, or based on the location of “events.” For this analysis, the locations of AMD contamination discharges and origins were events, and the GIS measured the distance of the stream segments between them (Appendix B – Figure 11). Once this distance was calculated, it was stored as a piece of data associated with each AMD contamination discharge (Table 3 – Downstream Distances from AMD Contamination Sources).

**Table 3 – Downstream Distances from Contamination Sources**

| ID    | DOWNSTREAM DISTANCE<br>(meters) | DOWNSTREAM DISTANCE<br>(miles) | DOWNSTREAM PT. |
|-------|---------------------------------|--------------------------------|----------------|
| 2     | 3232.57                         | 2.01                           | 1              |
| 3,4   | 2789.4                          | 1.73                           | 2              |
| 5     | 426.16                          | 0.26                           | 6              |
| 6     | 986.11                          | 0.61                           | 3,4            |
| 7     | 1208.285                        | 0.75                           | 5              |
| 8     | 2328.86                         | 1.45                           | 7              |
| 9     | 1624.97                         | 1.01                           | 16             |
| 10    | 395.69                          | 0.25                           | 9              |
| 11    | 152.76                          | 0.09                           | 10             |
| 12    | 1296.21                         | 0.81                           | 18             |
| 13    | 896.16                          | 0.56                           | 12             |
| 14    | 1152.49                         | 0.72                           | 13             |
| 15,19 | 370.78                          | 0.23                           | 14             |
| 16    | 2496.33                         | 1.55                           | 8              |
| 17    | 1137.42                         | 0.71                           | 15,19          |
| 18    | 504.38                          | 0.31                           | 11             |
| 1     | 3005.35                         | 1.87                           | boundary       |

The percentage of pollution load being contributed to a stream by any discharge was calculated as a product of the loading of acidity, aluminum, iron, manganese, and sulfates recorded at any discharge location divided by the loading of those contaminants in the stream at a location directly upstream. The combination of stream distance data and AMD contaminant loading percentage derived by the GIS allowed a characterization of the water pollution problem caused by contamination at AMD discharge site. The criteria used by Pennsylvania Bureau of Abandoned Mine Reclamation (BAMR) to classify AMD discharge sites based on the level of water pollution problems they create are shown in Table 4 - BAMR AMD Water Pollution Problem Classifications.

**Table 4 – BAMR AMD Water Pollution Problem Classifications**

|                     |  |
|---------------------|--|
| <b>Moderate</b>     | <b>Discharge pollutes &lt; 1.0 miles of stream and contributes &lt; 25% of the pollution load to the stream.</b> |
| <b>Serious</b>      | <b>Discharge pollutes &gt; 1.0 miles of stream and contributes &gt; 25% of the pollution load to the stream.</b> |
| <b>Very Serious</b> | <b>Discharge pollutes &gt; 1.5 miles of stream and contributes &gt; 50% of the pollution load to the stream.</b> |
| <b>Critical</b>     | <b>Discharge pollutes &gt; 3.0 miles of stream and contributes &gt; 75% of the pollution load to the stream.</b> |

With the data on stream distance and percent of contamination loading available, it was possible to query for the AMD discharges that met BAMR problem criteria. In terms of the AMD water pollution classification, 12 discharges were classified as *moderate* water pollution sources, 3 as *serious* sources, and 3 as *very serious/critical*. The very serious/critical class is an amalgam of the *very serious* and *critical* BAMR classifications, as these discharges met the distance criteria for the very serious category and the percent loading criteria for the critical category (Table 5 – BAMR Problem Classification by Sampling Location).

The geographic distribution AMD discharge locations by problem classification is shown in Appendix B - Figure 12. There are three areas in the study watershed where *very serious/critical* AMD discharges are found: 1) Site Number 1 (the waste pile below Clymer); 2) Site Number 4; and 3) Site Number 16. Sites 1 and 16 are both located in the main stem drainage, at the downstream and upstream

portions, respectively. Site Number is found along Buck Run, a tributary that enters the Upper Two Lick just north of Clymer. Sites that were classified as *Serious* included numbers 3, 12, 13, and 14. Sites 12-14 are each located in the North Branch Two Lick Creek subbasin, with sites 12 and 13 very near the North Branch itself, and site 14 approximately a quarter of a mile upstream on an unnamed tributary. Site Number 3 is located in Buck Run subbasin, less than 300 meters east of Site 4 on the opposite side of the stream.

**Table 5 – BAMR Problem Classification by Sampling Location**

| ID | NAME               | DOWNSTREAM DIST.<br>(miles) | CONTAMINANT(S)        | PROBLEM            | SUBBASIN     |
|----|--------------------|-----------------------------|-----------------------|--------------------|--------------|
| 1  | Waste below Clymer | 1.37                        | Acidity, Iron         | very ser./critical | Main Stem    |
| 4  |                    | 1.73                        | All                   | very ser./critical | Buck Run     |
| 16 |                    | 1.55                        | All                   | very ser./critical | Main Stem    |
| 3  |                    | 1.73                        | Acidity               | serious            | Buck Run     |
| 12 |                    | 0.82                        | Acidity, Manganese    | serious            | North Branch |
| 13 |                    | 0.56                        | Iron                  | serious            | North Branch |
| 14 |                    | 0.72                        | Acidity, Alum., Sulf. | serious            | North Branch |
| 2  |                    | 2.01                        | No Major Contribution | moderate           | Dixon Run    |
| 5  |                    | 0.26                        | No Major Contribution | moderate           | Main Stem    |
| 6  |                    | 0.61                        | No Major Contribution | moderate           | Main Stem    |
| 7  |                    | 0.75                        | Acidity               | moderate           | Main Stem    |
| 8  |                    | 1.45                        | Could Not Determine   | moderate           | Main Stem    |
| 9  |                    | 1.01                        | Could Not Determine   | moderate           | North Branch |
| 10 |                    | 0.25                        | No Major Contribution | moderate           | North Branch |
| 11 |                    | 0.09                        | Acidity               | moderate           | North Branch |
| 15 |                    | 0.23                        | Could Not Determine   | moderate           | North Branch |
| 17 |                    | 0.71                        | Could Not Determine   | moderate           | North Branch |
| 18 |                    | 0.31                        | Could Not Determine   | moderate           | North Branch |
| 19 |                    | 0.23                        | Could Not Determine   | moderate           | North Branch |

#### **Development of Watershed Restoration Plan and Remediation Strategy for the Upper Two Lick Creek Watershed**

Based on the results and analysis discussed above, AMD problem sources were prioritized for remediation. The approach in developing a remediation plan for the watershed was to address the most significant water quality problems within subbasins as units. The results of the reconnaissance and sampling phases of this project indicate that the subbasins of the Upper Two Lick Creek drainage that

contain the vast majority of AMD contamination sources are: 1) North Branch Upper Two Lick Creek 2) Buck Run 3) Dixon Run, and 4) Main Stem Upper Two Lick Creek.

#### North Branch Upper Two Lick Creek

The North Branch subbasin contains 10 identified AMD contamination sources, 3 of which (Locations 12, 13, and 14) have been determined to be Serious AMD-related problems based on PADEP BAMR criteria. This is significant, as the North Branch is a headwaters subbasin for Upper Two Lick Creek, meaning that any remediation accomplished should theoretically improve conditions downstream.

#### Buck Run

Two AMD contamination sources are located within the Buck Run drainage. These two sources are significant, with Site Number 4 classified as Very Serious/Critical and Site Number 3 classified as Serious based on BAMR parameters. Certainly addressing these two sources would have definite positive impacts on the approximately 1 mile of stream downstream of where they enter Buck Run. However, when viewed in the entire watershed context, Buck Run flows into Upper Two Lick Creek at a fairly downstream location, and it might make sense to address this area later than impacted areas at more upstream locations.

#### Dixon Run

The Dixon Run subbasin contains one (comparatively) minor AMD source, and is located at a fairly downstream location in the Upper Two Lick Creek watershed. Dixon Run, although impacted by AMD downstream of Site Number 2, likely will not be a priority during the early phases of remediation planning in the watershed.

#### Main Stem Upper Two Lick Creek

There are six AMD contamination sources located within the Main Stem subbasin. Of these, two sites (1 and 16) are classified as Very Serious/Critical problems and are ranked as the first and second most significant AMD contribution sources in the study area, respectively, based on the contribution of AMD-related chemicals. It is very likely that Site 16 would be addressed, if feasible, before Site 1 as Site 16 is approximately seven miles upstream.

Based on the data collected and analysis conducted for this project, the following remediation prioritization is recommended.

### Phase I

It is recommended that the first areas to be targeted for remediation in the Upper Two Lick Watershed are Sites 14, 13, and 12 (in that order) located in the North Branch subbasin. These areas are at upstream locations in the watershed and they contribute significant amounts of AMD-related contaminants. Remediating these sources should have positive cumulative impacts on approximately 2.5 miles of the North Branch Upper Two Lick Creek downstream. If length of stream upstream of Site 14 is included (the areas upstream do not seem to be heavily impacted by AMD), a continuous corridor of better quality water along approximately 3.4 miles of stream will be created by remediating Sites 14, 13, and 12. Each of these sources are small tributaries that originate in abandoned deep and/or strip mines. Site 14 will likely require an alkaline producing system, however, land is not available in the immediate vicinity to construct such a system. A potential solution would be to pipe contaminated water downslope to a larger site, however, this possibility will have to be investigated with landowners. Site 13 presently flows into an small existing wetland that is overwhelmed by the contaminated inflow. Although there does not appear to be enough space to treat the AMD at this site, it may be possible to more effectively remediate this water by piping the outflow from the existing wetlands downslope to a series of constructed wetlands. Again, the feasibility of this treatment option is dependent on landowner cooperation. As site 12 is a very narrow flow, and little proximate land exists for a passive alkalinity producing system, this source may be amenable to in-stream alkaline-based treatment.

Once these sites 14, 13 and 12 are addressed, Site Number 9 will be the next target of remediation. Site 9 is a small tributary that originates in old abandoned country banks and strip workings where significant amounts of acid, aluminum, and sulfates flow into the North Branch. Although only classified as a Moderate AMD-related problem based on BAMR criteria, site 9 is the next significant source of AMD downstream of sites 14, 13 and 12, and should be addressed as part of a comprehensive remediation strategy. There is possibly some room for the construction of an alkaline producing system on the right side of road near site 9 to address the contamination problem. If Sites 14, 13, and 12 are remediated, followed by Site 9, approximately 4.25 stream miles of the North Branch should be positively impacted.

### Phase II

Once the significant sources on the North Branch are addressed, Site 16 found at an upstream location on the Main Stem Upper Two Lick Creek should be targeted. Site 16 is a major AMD contamination source, contributing thousands of pounds per day of acid and sulfates into Upper Two Lick Creek. It is hard to gauge the positive impact that remediating this site might have, as the large flow of water in Two Lick Creek dilutes its chemical impact downstream. However, this source is too large of an AMD contributor to ignore and it would be remiss not to address this site as we work to improve water quality in the watershed in an upstream-to-downstream manner. If Site 16 is remediated, approximately 1.55 miles of the Upper Two Lick Creek downstream should be positively impacted.

Phase II will also include the treatment of sites 7, 5, and 6 (in that order) on the main stem of Upper Two Lick Creek. Each of these sites have been classified as moderate problems based on the assessment methodology and BAMR criteria, however, they are significant contributors of AMD-related contaminants. Site 7 is a discharge from the abandoned Egypt deep mine, that has been treated in the past by the Richards project alkaline producing system. The Richards systems has experienced periodic malfunctions, allowing large volumes of highly acidic water to flow directly into the main stem of Two Lick Creek. Site 5 originates in an abandoned clay mine high on the slopes above Route 403, and its outflow contains large loads of acidity, iron, and aluminum. This site will require an alkaline producing treatment system, and it appears that sufficient area to build such systems is available in the vicinity of the contamination origin. Site 6, a spring impacted by the disturbed area of an abandoned strip mine, is not as significant as sites 7 and 5. This site will require minimal treatment, and perhaps none once the remediation of sites 7 and 5 are assessed.

### Phase III

Phase III of a watershed-wide approach to remediation would address the remaining significant sources of AMD at farther downstream locations. Based on this assessment, Sites 4 and 1 (in that order) would be the targets of tertiary mitigation efforts. Site 4 is a tributary to Buck Run that discharges from an area that has seen both previous deep and strip mining. This source has both high AMD chemical concentrations and high flows, making it a very significant contributor of AMD contamination. Loadings of contaminants are too high to be treated on the site as is, however, since remediation will not be until years

into the future based on this plan, there is time to work with local landowners to explore options. Site number 1 at Sample Run in the Buck Run ranked as the largest and most serious AMD contamination source in the Upper Two Lick Creek drainage. Its mitigation will be delayed until phase 3 only because of its downstream location relative to other problem areas. The sources of AMD contributing to Sample Run are diffuse, and will require further study to characterize in necessary detail to design treatment systems. An alkalinity producing treatment system with very high loading capabilities will be required. Adjacent land is available in the area for the construction of treatment systems.

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## Appendix A – AMD Source Sampling Site

### Photographs and Descriptions



1. **Sample Run** - Since the sources of AMD on this stream are diffuse and scattered, further detailed study will be necessary to fulfill treatment design needs. The contaminants in this stream indicate the usage of alkalinity producing treatment systems with high loading capabilities. Sufficient area for system location is available nearby.



2. **Un-named trib/Dixon Run** - This un-named tributary to Dixon Run discharges from an old abandoned deep mine and in wet weather flows significantly. Previously opened and captured by DEP/BAMR, this discharge could be treated by a small alkalinity producing system located across the railroad in the Dixon Run flood plain area.



3. **Un-named trib/Buck Run** - This un-named tributary to Buck Run discharges from an abandoned deep mine complex and carries sufficient acidity and metals to require Alkalinity producing system for treatment. Available area will depend upon land-owner cooperation.



4. **Un-named trib/Buck Run** - This un-named tributary to Buck Run discharges from a combined abandoned deep and surface mine area. Treatable flows may be of volume/loading too high for available treatment.



5. **Un-named trib to Two Lick/Clay mine** - This trib to Two Lick originates in an abandoned clay mine high on the slopes above Route 403. It is very acid and carries a significant load of iron and aluminum requiring an alkalinity producing treatment system. Sufficient area and previously built but abandoned sedimentation ponds are located in the vicinity on the stream side of Two Lick Creek.



6. **Un-named trib to Two Lick/natural spring** - This trib to Two Lick originates in a spring off the disturbed area of an abandoned surface mine area. Water quality appears satisfactory and flow is low except in high precipitation events.



7. **Discharge from abandoned deep mine (Egypt Mine)** presently being treated by Richards Project of 3 alkalinity producing systems. Un-treated this discharge is the second major AMD contaminant of main stem Two Lick Creek.



8. **Diamondville Borehole Discharge** - This discharge is the largest and most significant source of AMD loading (iron, aluminum, acidity) to the main stem Two Lick Creek. Various treatment systems have been considered however sufficient area for passive alkalinity systems is not available in the near vicinity. Possibilities exist downstream for location at a second discharge area (portal) from the same mine. Sufficient area for alkalinity systems is available at that site.



9. **Un-named trib to North Branch Two Lick** - This small tributary originates in old abandoned country bank and strip workings. The load of acidity and metals is not high but at times may contribute sufficiently to have a moderate effect upon the quality of the North Branch.



10. **Un-named Trib to North Branch Two Lick** - This small tributary originates in old abandoned surface mined areas and although low in flow contributes very small amounts of AMD from acidity and metals. It flows through a culvert under Route ?? into an area possibly available and large enough for treatment.



11. **Un-named Trib to North Branch Two Lick** - This small tributary originates in old mine workings (deep and surface) and flows through a culvert under Route ?? enroute to North Branch Two Lick Creek. There may be sufficient area downstream from Route ?? for passive alkalinity treatment systems.



12. **Small tributary originating from abandoned deep mine** - Water quality best treated by a passive alkalinity producing system. However, sufficient space in the immediate area may not be available – may be amenable to “in-stream” treatment.



13. This small tributary arises upslope from the highway and flows into a small AMD impacted wetland. The AMD loading may require more space for treatment than is available. Piping to downslope may be necessary.



14. Small tributary carrying AMD from abandoned deep and surface mining. Requires alkalinity producing system for treatment but sufficient area not available in immediate vicinity. May be piped down slope to suitable area.



15. Site 15 was/is a sewage system overflow from a pressured main line along Dixon Run. No action needed. However, immediately upstream are two deep mine discharges presently being monitored by DEP mining.



16. North Branch Two Lick Creek at confluence with South Branch in village of Wandin.



17. **Un-named tributary to North Branch in Starford** - Originates in abandoned deep, surface mines and refuse piles. Diffuse sources.



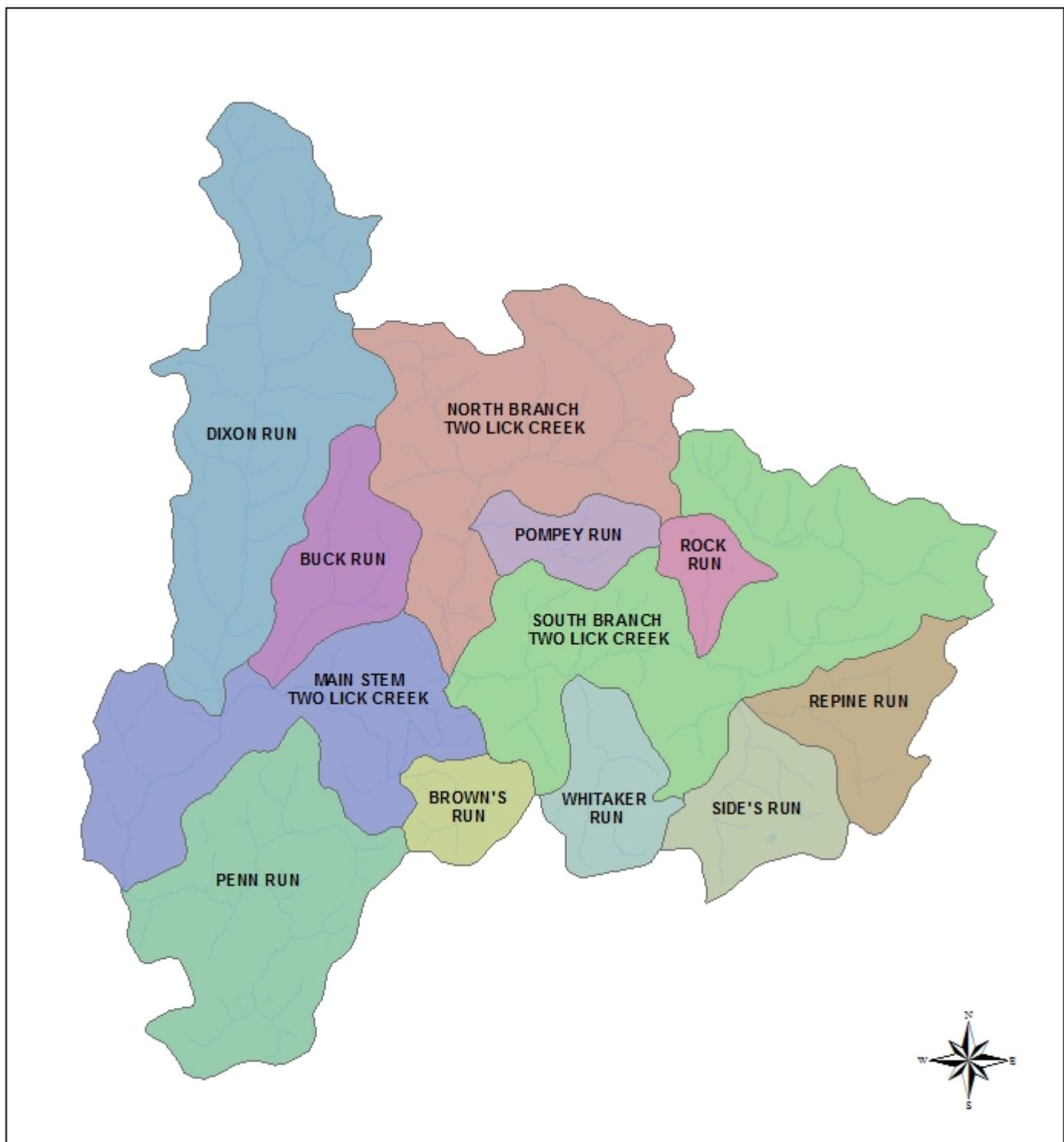
18. **Un-named tributary to North Branch upstream from Site 11** - No treatment necessary as dilution appears to remediate.



19. **Un-named trib to North Branch entering Two Lick at Commodore** - Requires alkalinity producing system for treatment. Availability of area needed unknown.

## Appendix B – Project Maps and Figures

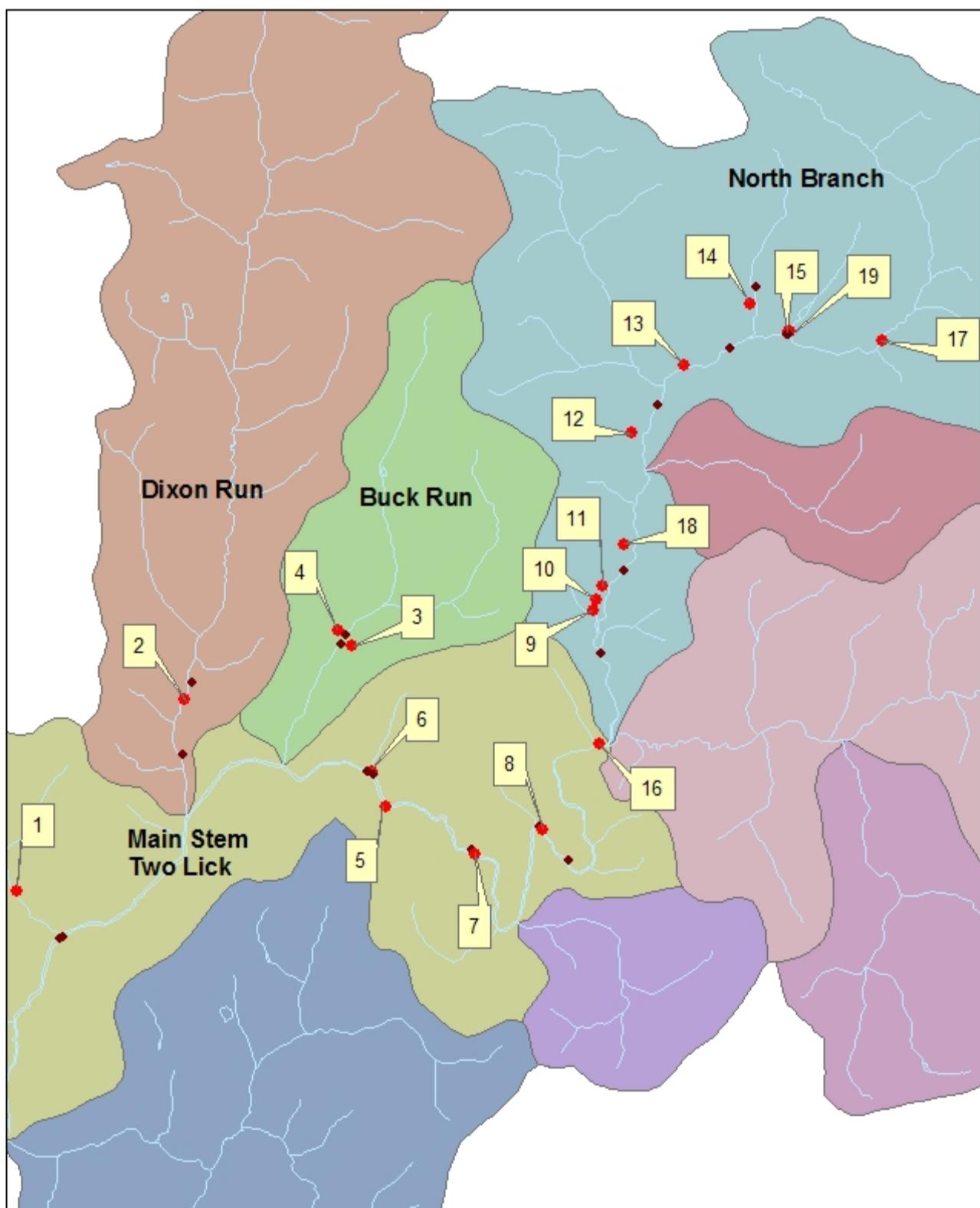
Figure 2 - Upper Two Lick Creek Watershed Subbasins



Miles  
0 0.5 1 2 3 4



**Figure 3 - Locations of AMD Sources in the  
Upper Two Lick Creek Watershed**



0 0.25 0.5 1 1.5 2 Miles

**Sampling Location Types**

- AMD Source Location
- ◆ Upstream/Downstream Control

**Figure 4 - Average Pounds Per Day of Acidity Contributed at AMD Source Locations in the Upper Two Lick Creek Watershed**

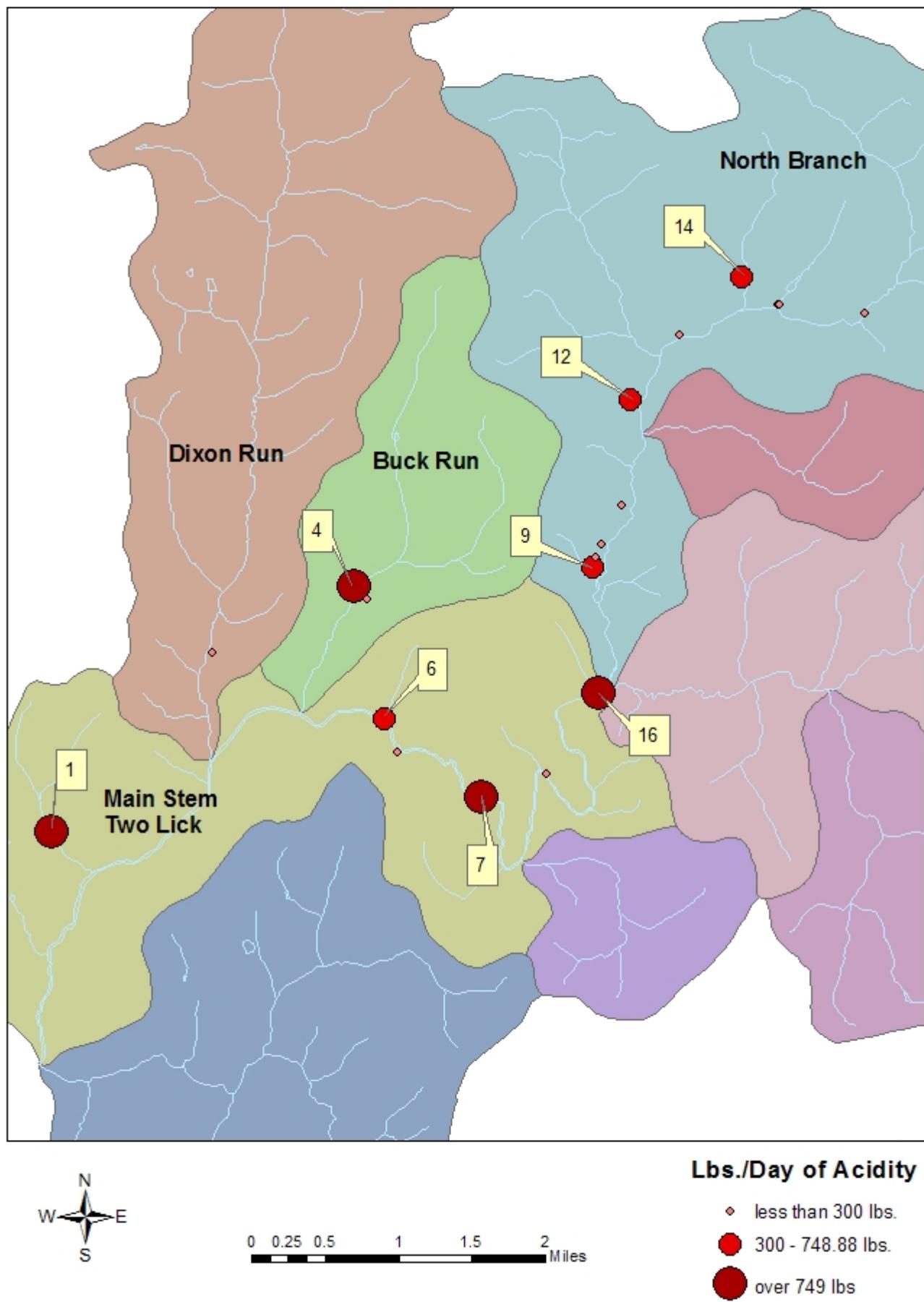


Figure 5 - Average Pounds Per Day of Aluminum Contributed at AMD Source Locations in the Upper Two Lick Creek Watershed

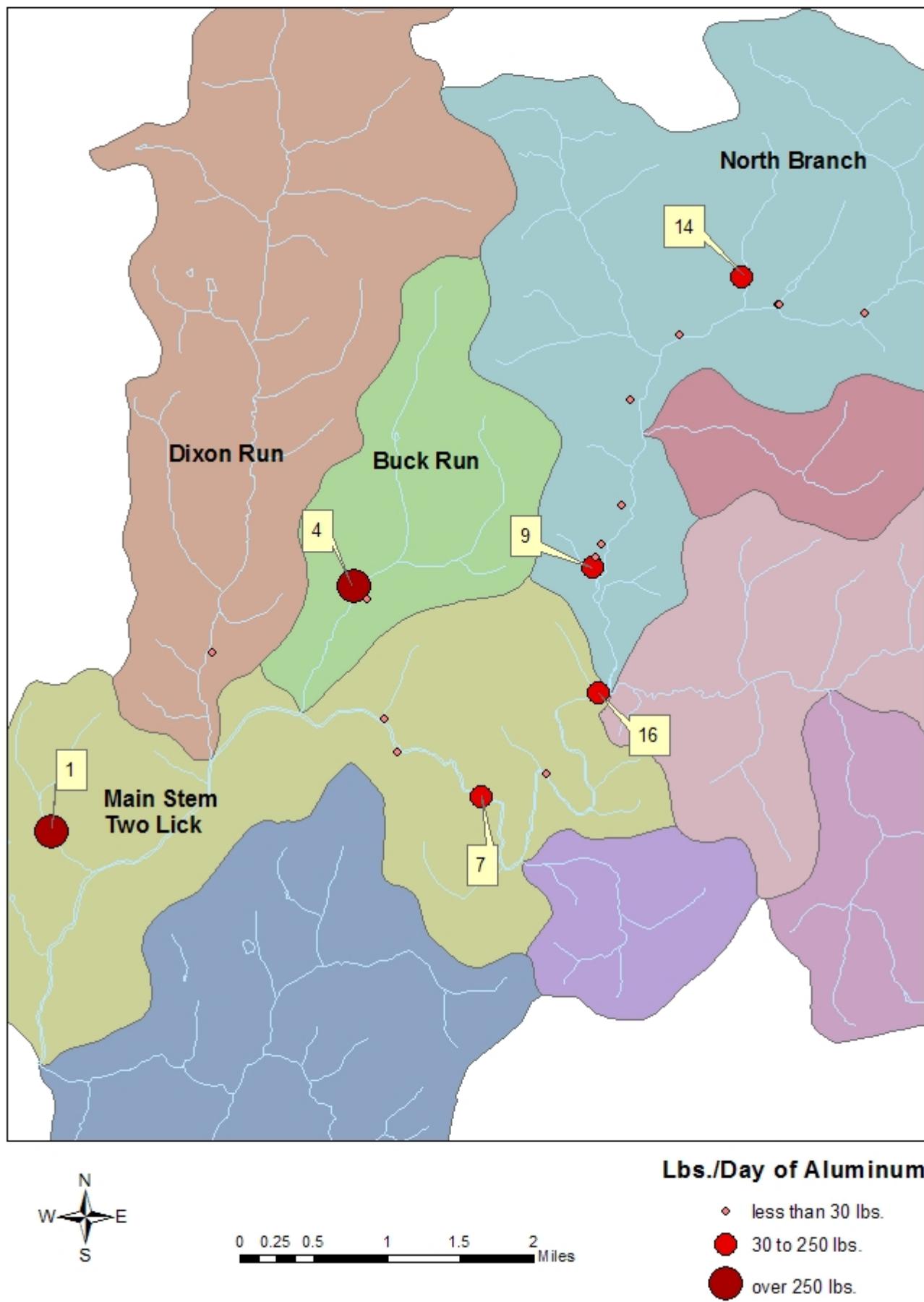


Figure 6 - Average Pounds Per Day of Iron Contributed at AMD Source Locations in the Upper Two Lick Creek Watershed

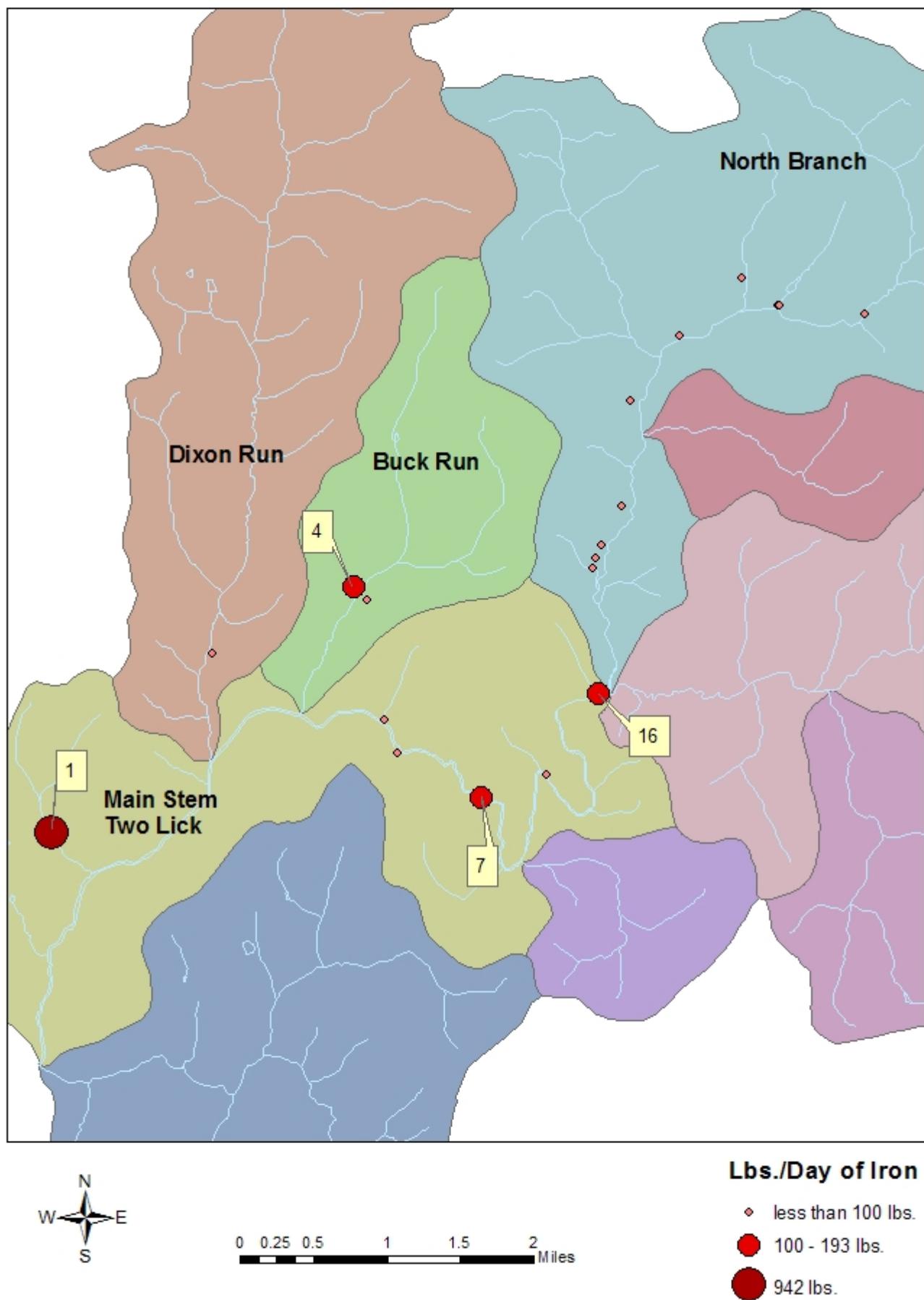


Figure 7 - Average Pounds Per Day of Manganese Contributed at AMD Source Locations in the Upper Two Lick Creek Watershed

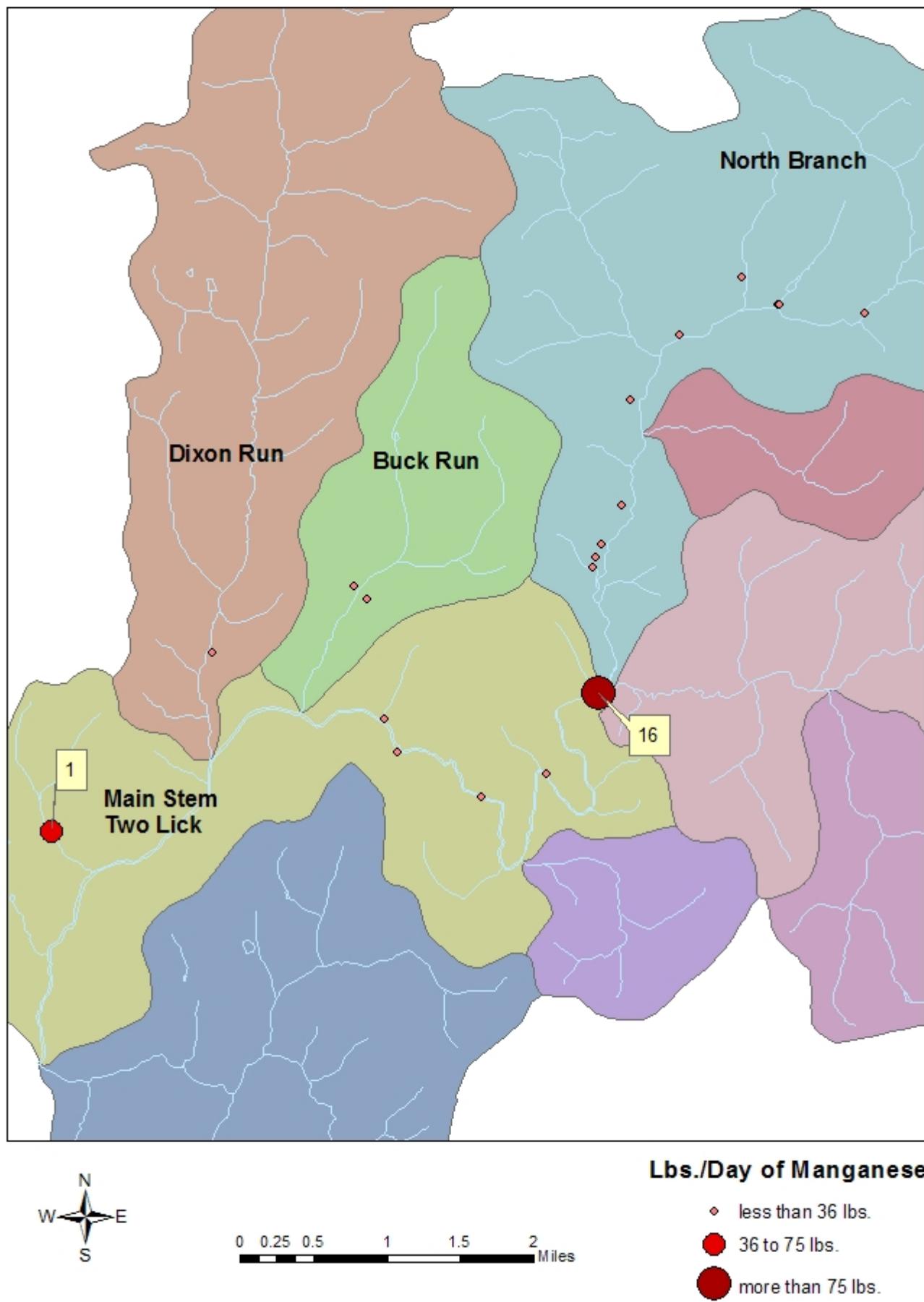


Figure 8 - Average Pounds Per Day of Sulfates Contributed at AMD Source Locations in the Upper Two Lick Creek Watershed

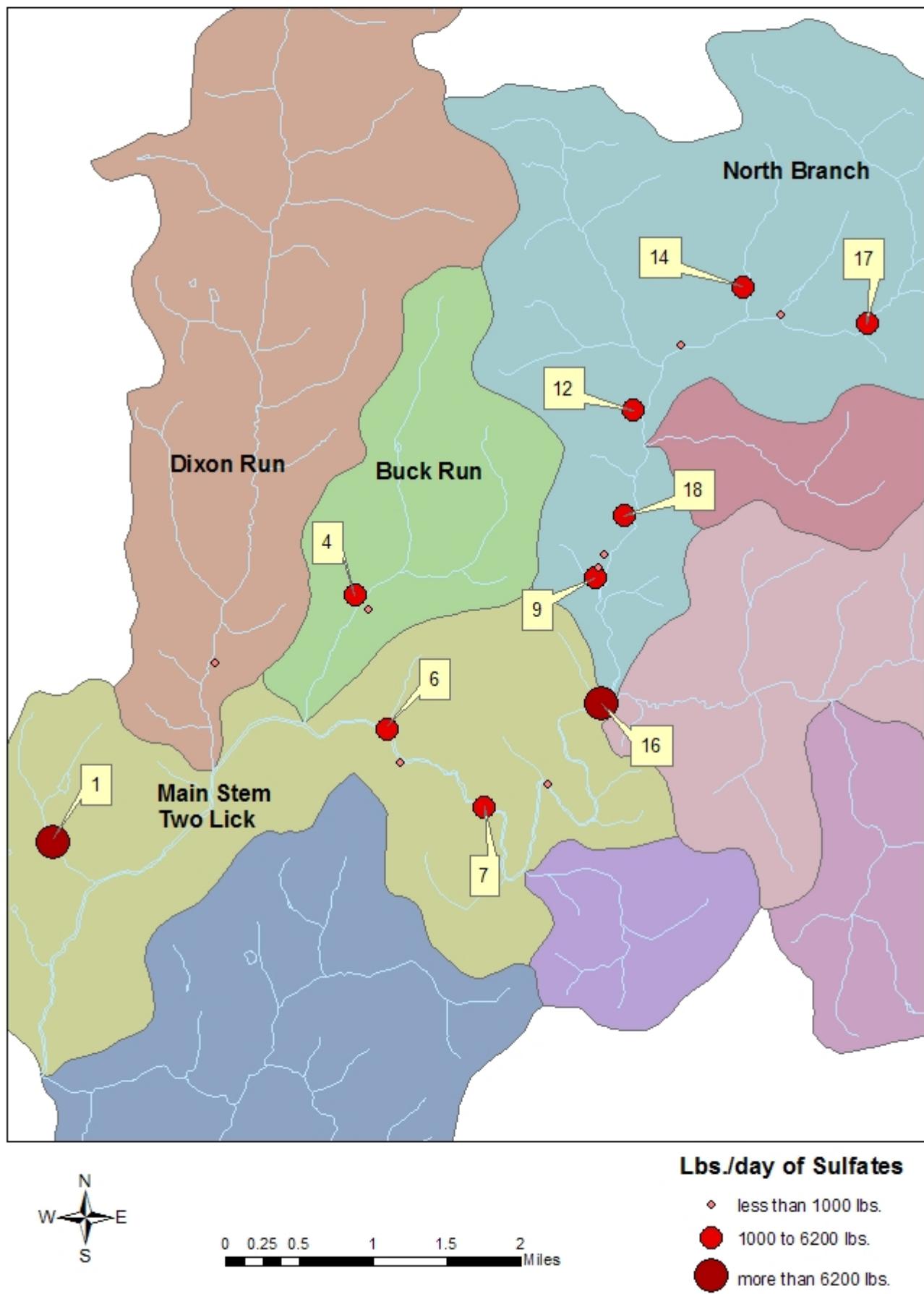
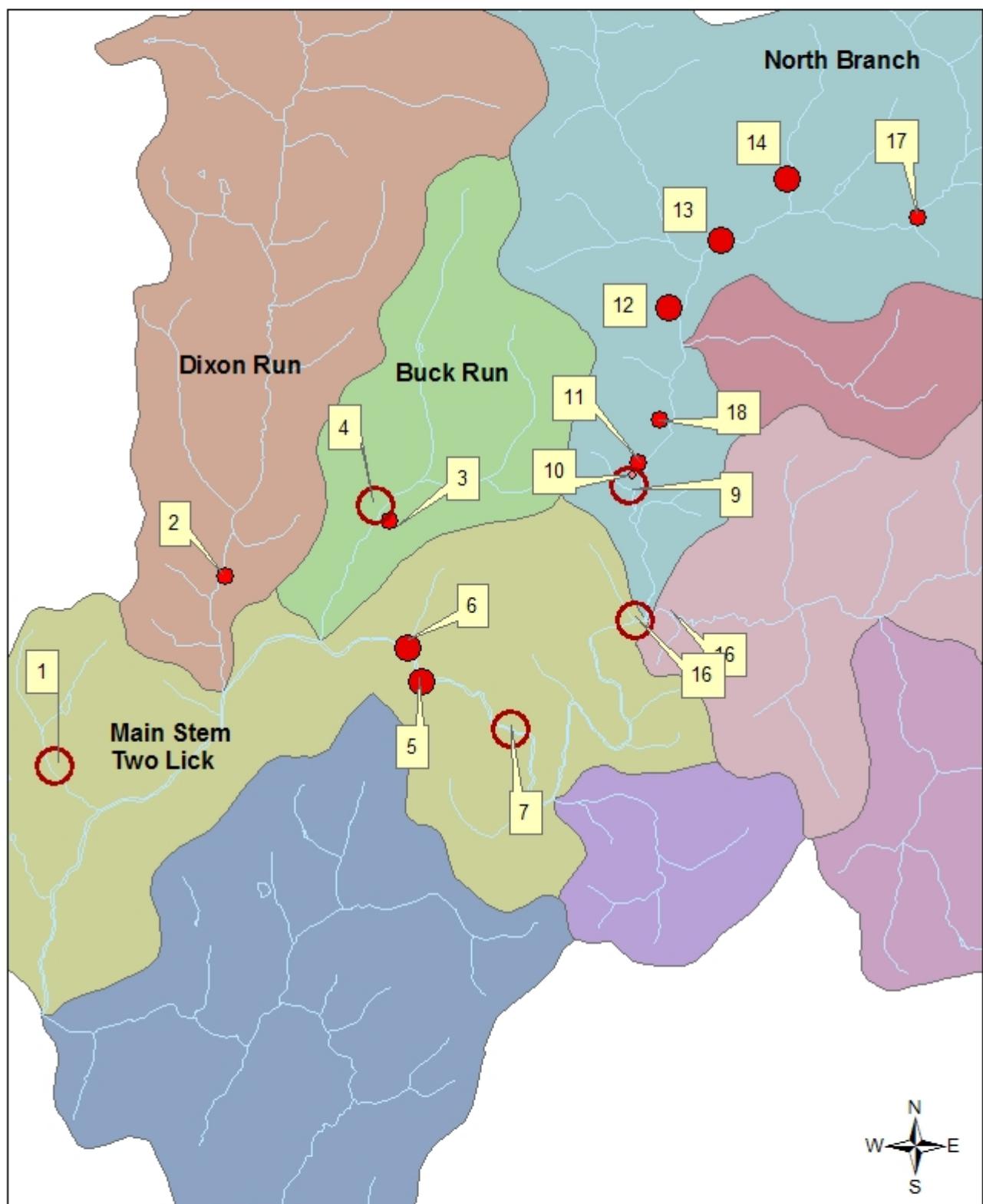
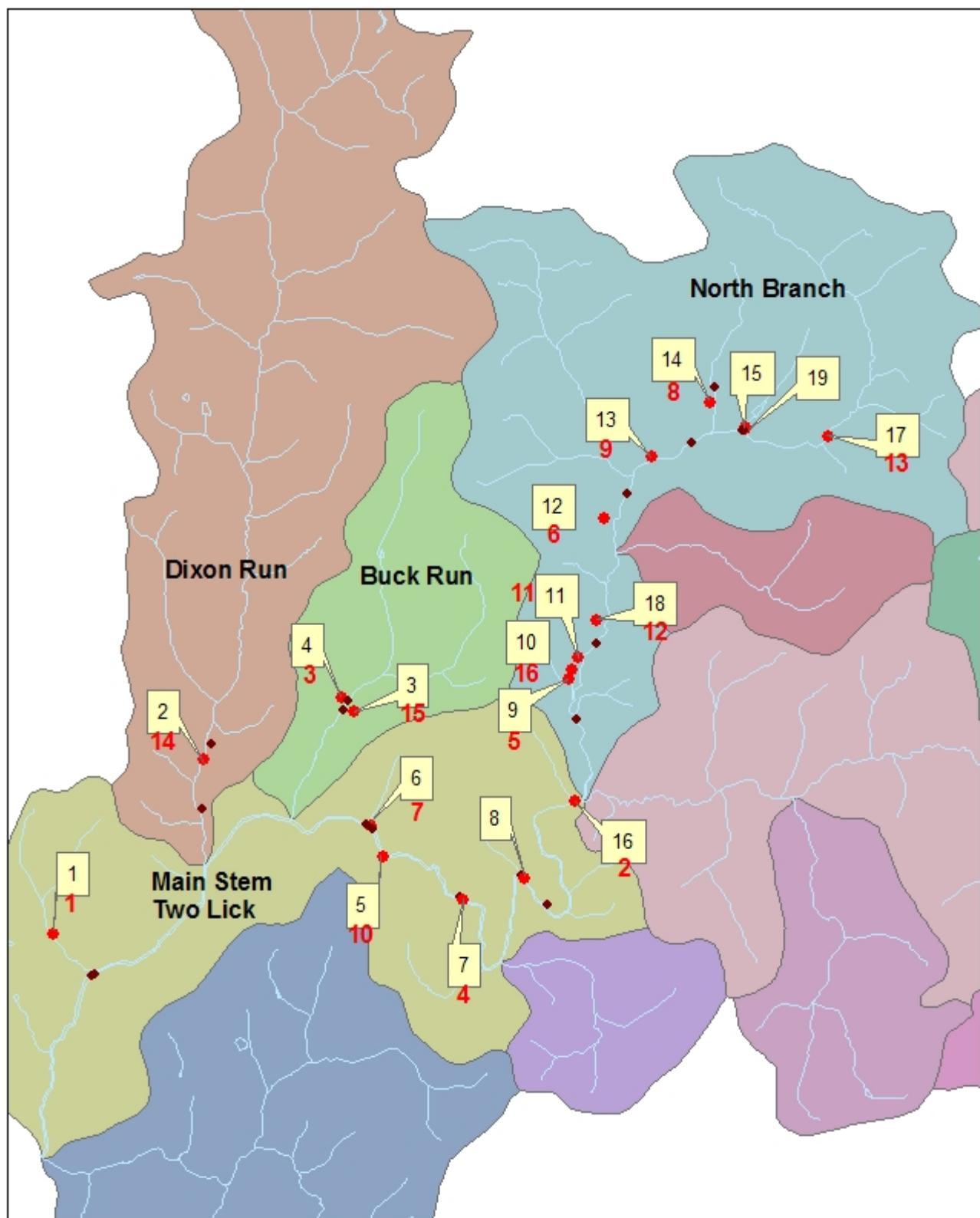


Figure 9 - Water Chemistry Prioritization Ranks of AMD Source Locations in the Upper Two Lick Creek Watershed



Note: Locations 8, 15 and 19 could not be included in the loading prioritization procedure because these sources did not have flow for much of the sampling period.

**Figure 10 - Locations of AMD Sources and Their AMD Chemistry Ranks**



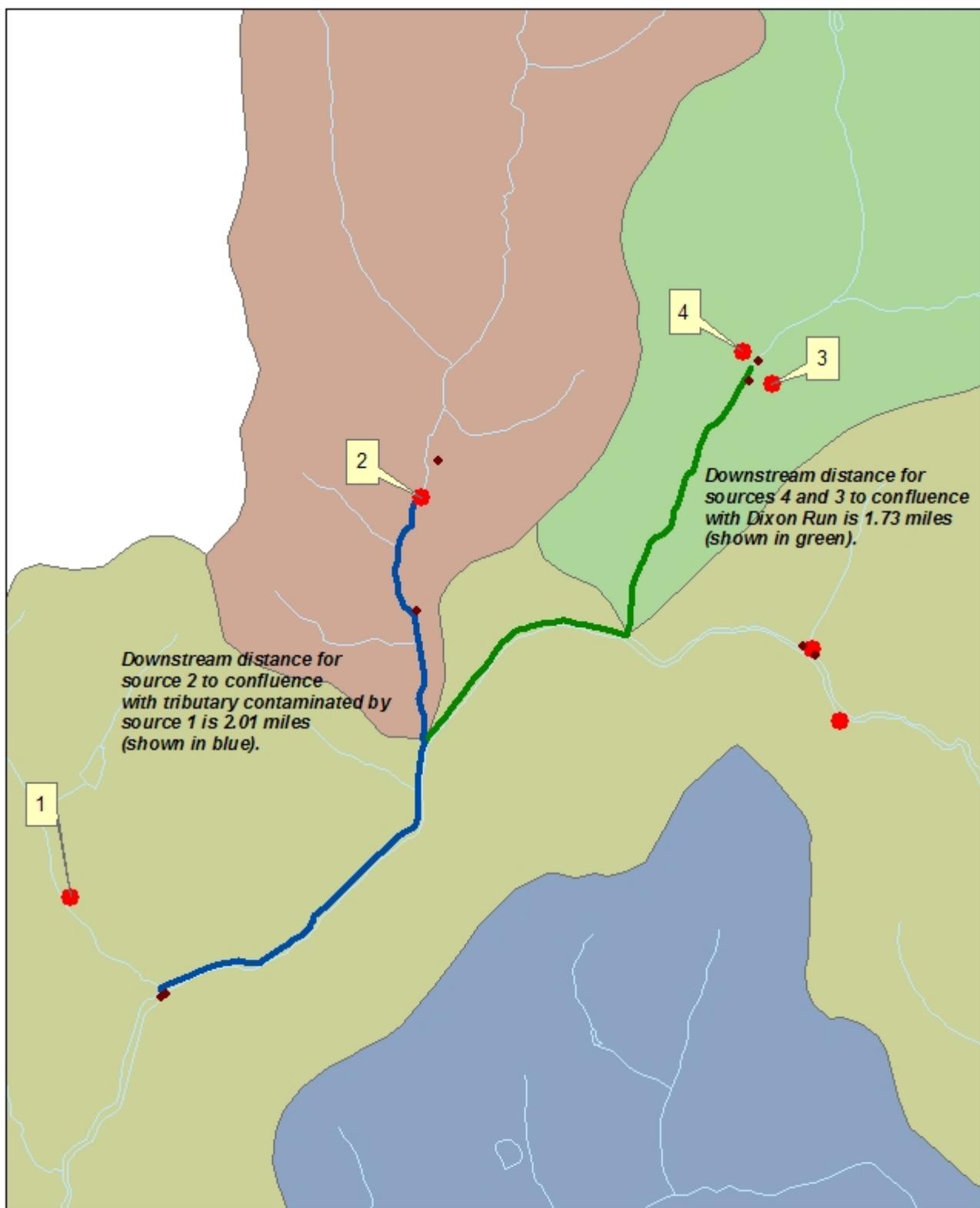
The numbers in call out boxes are the Site Numbers of sampling locations and the red numbers below are the chemistry ranks of each site.

**Sampling Location Types**

0 0.25 0.5 1 1.5 2 Miles

- AMD Source Location
- Upstream/Downstream Control

**Figure 11 - Example of Linear Downstream Distances Calculated for AMD Sources Using GIS**

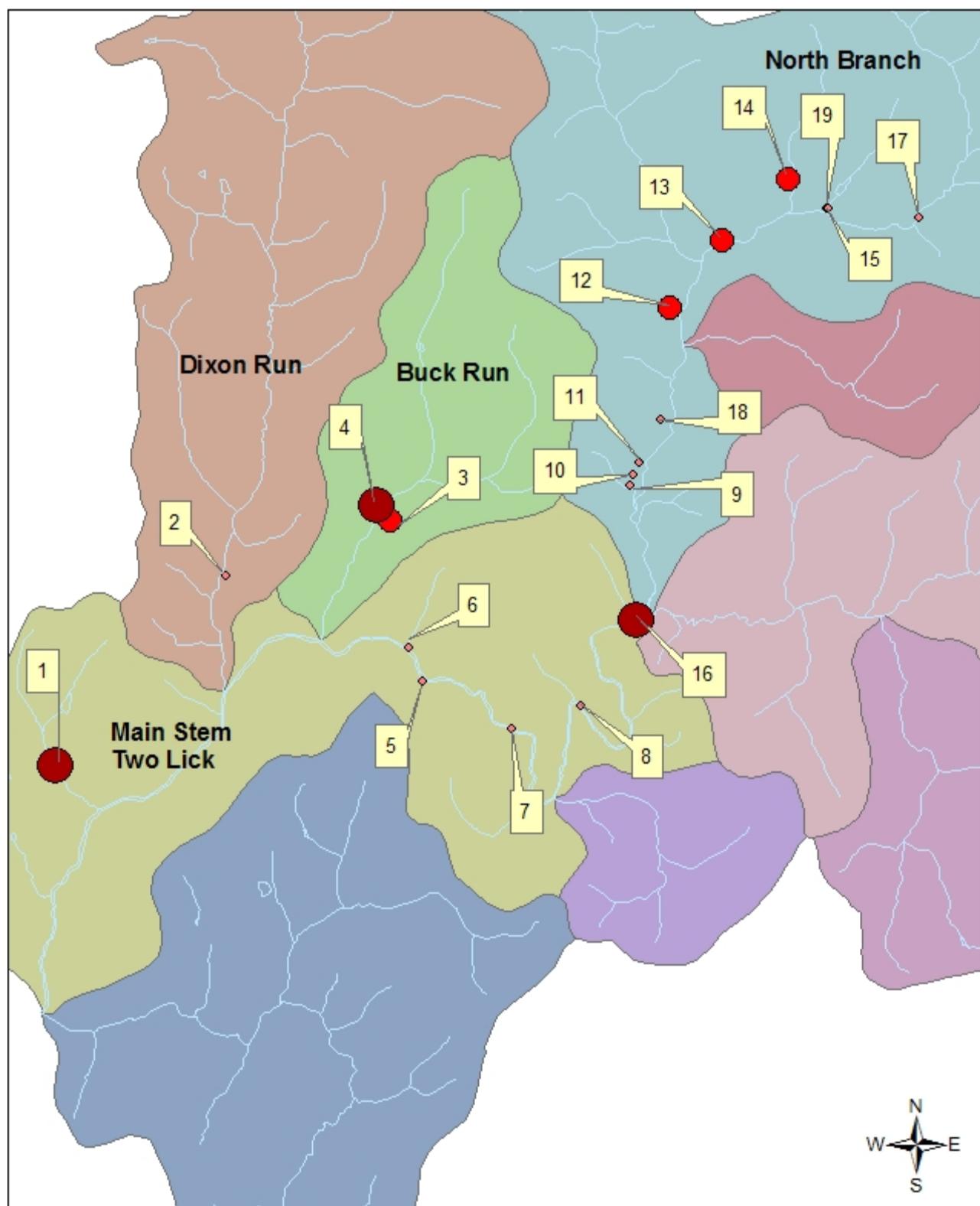


0 0.125 0.25 0.5 0.75 1 Miles

**Linear Downstream Distance**

- AMD Source 2 (blue line)
- AMD Sources 3 and 4 (green line)

**Figure 12 - AMD Problem Classifications of AMD Source Locations in the Upper Two Lick Creek Watershed Based on BAMR Criteria**



Note: Locations 8, 15 and 19 were classified as moderate problems based chemical concentration and downstream distance data (even though flow data was not available).

**AMD Problem Classification**

- Very Serious/Critical (Largest red dot)
- Serious (Medium red dot)
- Moderate (Smallest red dot)

0 0.25 0.5 1 1.5 2 Miles

Appendix C – Summary Statistics of AMD-related  
Chemical Parameters by Source Location

# Chemical Concentration Summary Statistics by Source Location

MONTRPOINT 1

|  | LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|--|-----|----|---------|-------|------|------|------|------|------|-----|
|--|-----|----|---------|-------|------|------|------|------|------|-----|

Summary for 'MONTRPOINT' = 1 (12 detail records)

|     |            |  |      |   |            |            |        |            |        |            |
|-----|------------|--|------|---|------------|------------|--------|------------|--------|------------|
| Avg | 3.01083333 |  | 2120 | 0 | 947.041667 | 128.393333 | 5.8625 | 1199.60833 | 117.45 | 2098.83333 |
| Min | 2.59       |  | 748  | 0 | 173.2      | 35.02      | 0.82   | 239.3      | 17.34  | 400        |
| Max | 4.22       |  | 3704 | 0 | 2382.3     | 289.44     | 17.19  | 3144.2     | 312.87 | 5394       |

MONTRPOINT 10

|  | LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|--|-----|----|---------|-------|------|------|------|------|------|-----|
|--|-----|----|---------|-------|------|------|------|------|------|-----|

Summary for 'MONTRPOINT' = 10 (10 detail records)

|     |            |  |              |   |            |            |            |            |            |            |
|-----|------------|--|--------------|---|------------|------------|------------|------------|------------|------------|
| Avg | 3.45142857 |  | 739.71428571 | 0 | 84.0428571 | 0.27285714 | 0.76857143 | 325.371429 | 7.45142857 | 602.571429 |
| Min | 3.37       |  | 654          | 0 | 72.8       | 0.2        | 0.62       | 274.7      | 6.46       | 446        |
| Max | 3.55       |  | 779          | 0 | 95.2       | 0.55       | 0.87       | 359.9      | 9.1        | 742        |

MONTRPOINT 11

|  | LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|--|-----|----|---------|-------|------|------|------|------|------|-----|
|--|-----|----|---------|-------|------|------|------|------|------|-----|

Summary for 'MONTRPOINT' = 11 (12 detail records)

|     |        |  |        |   |            |            |            |            |        |       |
|-----|--------|--|--------|---|------------|------------|------------|------------|--------|-------|
| Avg | 3.6575 |  | 709.75 | 0 | 74.9583333 | 0.77666667 | 1.24333333 | 330.308333 | 7.5475 | 604.5 |
| Min | 3.28   |  | 596    | 0 | 61.2       | 0.15       | 0.76       | 253.3      | 5.59   | 392   |
| Max | 4.02   |  | 864    | 0 | 102.3      | 2.86       | 1.91       | 425.8      | 12.46  | 824   |

MONTRPOINT 12

|  | LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|--|-----|----|---------|-------|------|------|------|------|------|-----|
|--|-----|----|---------|-------|------|------|------|------|------|-----|

Summary for 'MONTRPOINT' = 12 (12 detail records)

|     |            |  |         |   |        |            |            |         |      |       |
|-----|------------|--|---------|---|--------|------------|------------|---------|------|-------|
| Avg | 3.33583333 |  | 1067.75 | 0 | 79.025 | 2.13416667 | 3.45083333 | 482.475 | 4.17 | 848.5 |
| Min | 3.18       |  | 950     | 0 | 51.9   | 1.52       | 2.61       | 426.7   | 2.33 | 668   |
| Max | 3.53       |  | 1182    | 0 | 107.6  | 2.73       | 4.3        | 546.4   | 7.26 | 1042  |

MONTRPOINT 13

|  | LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|--|-----|----|---------|-------|------|------|------|------|------|-----|
|--|-----|----|---------|-------|------|------|------|------|------|-----|

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Summary for 'MONTRPOINT' = 13 (12 detail records)

|     |            |              |        |        |            |      |            |            |       |
|-----|------------|--------------|--------|--------|------------|------|------------|------------|-------|
| Avg | 6.57833333 | 396.83333333 | 31.625 | 14.675 | 9.24916667 | 0.96 | 144.483333 | 0.34083333 | 290.5 |
| Min | 6.11       | 339          | 19     | 2.1    | 7.43       | 0.7  | 123        | -0.1       | 232   |
| Max | 7.16       | 443          | 49.2   | 29.6   | 11.98      | 1.47 | 181.2      | 2.06       | 338   |

MONTRPOINT 14

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| LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|-----|----|---------|-------|------|------|------|------|------|-----|
|-----|----|---------|-------|------|------|------|------|------|-----|

Summary for 'MONTRPOINT' = 14 (12 detail records)

|     |      |              |   |        |            |        |            |            |       |
|-----|------|--------------|---|--------|------------|--------|------------|------------|-------|
| Avg | 3.83 | 724.16666667 | 0 | 76.825 | 0.02583333 | 0.6075 | 355.308333 | 9.11583333 | 636.5 |
| Min | 3.74 | 612          | 0 | 53.1   | -0.04      | 0.46   | 302.7      | 5.61       | 442   |
| Max | 4.01 | 831          | 0 | 94.8   | 0.16       | 0.76   | 428.1      | 11.8       | 808   |

MONTRPOINT 15

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| LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|-----|----|---------|-------|------|------|------|------|------|-----|
|-----|----|---------|-------|------|------|------|------|------|-----|

Summary for 'MONTRPOINT' = 15 (12 detail records)

|     |            |              |             |            |        |            |            |        |            |
|-----|------------|--------------|-------------|------------|--------|------------|------------|--------|------------|
| Avg | 6.79833333 | 485.83333333 | 49.43333333 | 9.35833333 | 0.1775 | 0.17666667 | 175.841667 | 0.5325 | 365.166667 |
| Min | 6.49       | 437          | 36.7        | 1.6        | 0.05   | 0.14       | 148.2      | -0.1   | 294        |
| Max | 7.5        | 536          | 62.7        | 13.3       | 0.33   | 0.23       | 198.1      | 2.49   | 440        |

MONTRPOINT 16

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| LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|-----|----|---------|-------|------|------|------|------|------|-----|
|-----|----|---------|-------|------|------|------|------|------|-----|

Summary for 'MONTRPOINT' = 16 (12 detail records)

|     |            |              |       |            |        |            |            |       |     |
|-----|------------|--------------|-------|------------|--------|------------|------------|-------|-----|
| Avg | 7.68166667 | 452.91666667 | 122.4 | 2.30833333 | 0.3625 | 0.18916667 | 93.9916667 | 0.315 | 294 |
| Min | 6.87       | 219          | 25.5  | -1         | 0.19   | 0.11       | 49.6       | -0.1  | 154 |
| Max | 8.33       | 773          | 274   | 6.3        | 0.59   | 0.46       | 141.1      | 0.99  | 534 |

MONTRPOINT 17

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| LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|-----|----|---------|-------|------|------|------|------|------|-----|
|-----|----|---------|-------|------|------|------|------|------|-----|

Summary for 'MONTRPOINT' = 17 (12 detail records)

|     |            |              |             |       |            |            |        |            |            |
|-----|------------|--------------|-------------|-------|------------|------------|--------|------------|------------|
| Avg | 7.00583333 | 197.66666667 | 38.53333333 | 3.025 | 0.20833333 | 0.03166667 | 42.225 | 0.34416667 | 135.333333 |
| Min | 6.69       | 150          | 21.6        | 1.2   | 0.04       | -0.02      | 23.2   | -0.1       | 88         |
| Max | 7.52       | 320          | 97.8        | 5.3   | 0.61       | 0.17       | 85.4   | 1.92       | 248        |

MONTRPOINT 18

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| LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|-----|----|---------|-------|------|------|------|------|------|-----|
|-----|----|---------|-------|------|------|------|------|------|-----|

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Summary for 'MONTRPOINT' = 18 (9 detail records)

|     |            |              |            |            |            |            |            |            |     |
|-----|------------|--------------|------------|------------|------------|------------|------------|------------|-----|
| Avg | 4.31555556 | 789.66666667 | -0.3333333 | 33.1555556 | 0.54222222 | 0.91333333 | 391.922222 | 3.05555556 | 658 |
| Min | 3.91       | 670          | -1         | 15.5       | -0.04      | 0.58       | 329.3      | 1.7        | 492 |
| Max | 4.65       | 874          | 0          | 67.1       | 4.14       | 1.2        | 443.5      | 5.49       | 796 |

**MONTRPOINT** 19

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| LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|-----|----|---------|-------|------|------|------|------|------|-----|
|-----|----|---------|-------|------|------|------|------|------|-----|

Summary for 'MONTRPOINT' = 19 (9 detail records)

|     |      |              |            |            |            |            |            |            |            |
|-----|------|--------------|------------|------------|------------|------------|------------|------------|------------|
| Avg | 7.1  | 465.77777778 | 92.9111111 | 8.34444444 | 0.47777778 | 0.09222222 | 132.566667 | 0.23444444 | 319.777778 |
| Min | 6.8  | 433          | 81.8       | 1.6        | 0.29       | 0.05       | 111.3      | -0.1       | 268        |
| Max | 7.66 | 493          | 104.6      | 11.3       | 0.85       | 0.17       | 144.9      | 2.04       | 356        |

**MONTRPOINT** 2

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| LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|-----|----|---------|-------|------|------|------|------|------|-----|
|-----|----|---------|-------|------|------|------|------|------|-----|

Summary for 'MONTRPOINT' = 2 (12 detail records)

|     |            |              |       |            |            |        |            |            |             |
|-----|------------|--------------|-------|------------|------------|--------|------------|------------|-------------|
| Avg | 3.37666667 | 1593.0833333 | 0.475 | 393.291667 | 26.7508333 | 3.5675 | 874.691667 | 47.5833333 | 1666.666667 |
| Min | 2.87       | 772          | 0     | 8.4        | 6.27       | 1.94   | 360.1      | 4.34       | 746         |
| Max | 6.02       | 2346         | 5.7   | 758.5      | 51.56      | 6.27   | 1481.2     | 96.44      | 3348        |

**MONTRPOINT** 3

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| LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|-----|----|---------|-------|------|------|------|------|------|-----|
|-----|----|---------|-------|------|------|------|------|------|-----|

Summary for 'MONTRPOINT' = 3 (12 detail records)

|     |            |              |   |            |      |            |       |            |            |
|-----|------------|--------------|---|------------|------|------------|-------|------------|------------|
| Avg | 3.39454545 | 726.45454545 | 0 | 74.2272727 | 0.45 | 0.63727273 | 302.8 | 5.65545455 | 550.727273 |
| Min | 3.24       | 643          | 0 | 63.1       | 0.28 | 0.5        | 254.2 | 4.19       | 416        |
| Max | 3.56       | 846          | 0 | 91.7       | 0.73 | 0.81       | 375.5 | 8.16       | 738        |

**MONTRPOINT** 4

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| LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|-----|----|---------|-------|------|------|------|------|------|-----|
|-----|----|---------|-------|------|------|------|------|------|-----|

Summary for 'MONTRPOINT' = 4 (12 detail records)

|     |      |              |   |            |        |            |        |            |            |
|-----|------|--------------|---|------------|--------|------------|--------|------------|------------|
| Avg | 2.76 | 1866.2727273 | 0 | 762.772727 | 73.04  | 4.11363636 | 973.6  | 82.2363636 | 1908.72727 |
| Min | 2.58 | 985          | 0 | 243.1      | 9.64   | 1.79       | 359.6  | 24.19      | 736        |
| Max | 3.07 | 2688         | 0 | 1553.4     | 202.16 | 6.96       | 1989.5 | 164.47     | 3638       |

**MONTRPOINT** 5

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| LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|-----|----|---------|-------|------|------|------|------|------|-----|
|-----|----|---------|-------|------|------|------|------|------|-----|

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Summary for 'MONTRPOINT' = 5 (12 detail records)

|     |       |              |   |            |            |            |            |            |        |
|-----|-------|--------------|---|------------|------------|------------|------------|------------|--------|
| Avg | 2.555 | 2502.1666667 | 0 | 789.541667 | 84.9408333 | 2.46083333 | 1062.50833 | 53.8533333 | 2143.5 |
| Min | 2.29  | 1667         | 0 | 428.9      | 32.11      | 1.46       | 637.6      | 32.23      | 1046   |
| Max | 2.76  | 3644         | 0 | 1202.7     | 126.16     | 3.45       | 1689.3     | 78.07      | 3192   |

**MONTRPOINT** 6

---

| LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|-----|----|---------|-------|------|------|------|------|------|-----|
|-----|----|---------|-------|------|------|------|------|------|-----|

Summary for 'MONTRPOINT' = 6 (12 detail records)

|     |            |     |   |            |            |      |            |            |            |
|-----|------------|-----|---|------------|------------|------|------------|------------|------------|
| Avg | 4.00181818 | 633 | 0 | 51.8636364 | 0.89090909 | 3.53 | 300.118182 | 4.06636364 | 545.818182 |
| Min | 3.68       | 489 | 0 | 34.1       | 0.35       | 2.04 | 221.5      | 2.69       | 346        |
| Max | 4.19       | 884 | 0 | 72.1       | 1.98       | 6.08 | 434.7      | 5.44       | 820        |

**MONTRPOINT** 7

---

| LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|-----|----|---------|-------|------|------|------|------|------|-----|
|-----|----|---------|-------|------|------|------|------|------|-----|

Summary for 'MONTRPOINT' = 7 (12 detail records)

|     |             |              |            |            |         |        |         |             |             |
|-----|-------------|--------------|------------|------------|---------|--------|---------|-------------|-------------|
| Avg | 3.560833333 | 900.83333333 | -0.0833333 | 115.408333 | 15.2275 | 1.5925 | 370.175 | 9.863333333 | 664.1666667 |
| Min | 3.08        | 774          | -1         | 72         | 8.74    | 1.35   | 339.6   | 5.11        | 548         |
| Max | 4.57        | 1139         | 0          | 168.3      | 24.29   | 1.92   | 419     | 14.2        | 846         |

**MONTRPOINT** 8

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| LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|-----|----|---------|-------|------|------|------|------|------|-----|
|-----|----|---------|-------|------|------|------|------|------|-----|

Summary for 'MONTRPOINT' = 8 (12 detail records)

|     |            |              |   |            |            |            |       |            |        |
|-----|------------|--------------|---|------------|------------|------------|-------|------------|--------|
| Avg | 2.86166667 | 1696.9166667 | 0 | 444.516667 | 57.2883333 | 1.76083333 | 752.8 | 35.1241667 | 1453.5 |
| Min | 2.72       | 1590         | 0 | 390.1      | 32.57      | 1.5        | 666   | 28.95      | 1262   |
| Max | 3.03       | 1795         | 0 | 524.3      | 90.03      | 2.02       | 852.1 | 40.11      | 1682   |

**MONTRPOINT** 9

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| LAB | PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|-----|----|---------|-------|------|------|------|------|------|-----|
|-----|----|---------|-------|------|------|------|------|------|-----|

Summary for 'MONTRPOINT' = 9 (12 detail records)

|     |            |              |   |        |       |      |            |            |            |
|-----|------------|--------------|---|--------|-------|------|------------|------------|------------|
| Avg | 3.89166667 | 434.83333333 | 0 | 42.325 | 0.685 | 0.7  | 182.958333 | 2.97583333 | 326.333333 |
| Min | 3.65       | 389          | 0 | 34.3   | 0.27  | 0.46 | 137.8      | 2.29       | 242        |
| Max | 4.18       | 502          | 0 | 51.6   | 2.97  | 1.22 | 231.2      | 3.83       | 414        |

Appendix D – Summary Statistics of AMD-related  
Chemical Loadings by Source Location

# AMD Chemical Loading Summary Statistics by Location

**MP**

1

|  | <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

Summary for 'MP' = 1 (9 detail records)

|            |             |             |             |               |               |              |             |             |             |
|------------|-------------|-------------|-------------|---------------|---------------|--------------|-------------|-------------|-------------|
| <b>Sum</b> | 0           | 55389.01918 | 8477.974359 | 328.299148318 | 6647.0140699  | 74344.11469  | 6405.619675 | 127689.7856 |             |
| <b>Avg</b> | 1132.693265 | 0           | 6154.335464 | 941.9971510   | 36.4776831464 | 738.55711888 | 8260.457188 | 711.7355195 | 14187.75396 |
| <b>Min</b> | 9.140625    | 0           | 122.4777895 | 11.61616703   | 0.96883776117 | 16.722886707 | 174.2370132 | 8.128570785 | 371.7173451 |
| <b>Max</b> | 3174.165306 | 0           | 17209.09731 | 2528.721638   | 90.980763819  | 2037.3396829 | 19495.06052 | 1589.238674 | 35276.50371 |

**MP**

10

|  | <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

Summary for 'MP' = 10 (9 detail records)

|            |             |             |             |               |               |              |             |             |             |
|------------|-------------|-------------|-------------|---------------|---------------|--------------|-------------|-------------|-------------|
| <b>Sum</b> | 0           | 58.33193084 | 0.174491066 | 0.57322478386 | 5.0112103746  | 217.904732   | 0.576829971 | 363.9797118 |             |
| <b>Avg</b> | 6.666666667 | 0           | 6.481325648 | 0.019387896   | 0.06369164265 | 0.5568011527 | 24.21163689 | 0.072103746 | 40.44219020 |
| <b>Min</b> | 0           | 0           | 0           | 0             | 0             | 0            | 0           | -0.28841499 | 0           |
| <b>Max</b> | 30          | 0           | 28.69729107 | 0.093734870   | 0.31365129683 | 2.3505821326 | 99.03449568 | 0.576829971 | 160.7913545 |

**MP**

11

|  | <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

Summary for 'MP' = 11 (9 detail records)

|            |             |             |             |               |               |              |             |             |             |
|------------|-------------|-------------|-------------|---------------|---------------|--------------|-------------|-------------|-------------|
| <b>Sum</b> | 0           | 1365.304983 | 11.72819108 | 23.8174200237 | 135.14834253  | 6172.874265  | 90.74999463 | 10541.83647 |             |
| <b>Avg</b> | 172.6168973 | 0           | 151.7005536 | 1.303132342   | 2.64638000264 | 15.016482503 | 685.8749184 | 22.68749866 | 1171.315163 |
| <b>Min</b> | 64.5        | 0           | 55.80829971 | 0.198366132   | 1.00505506776 | 6.2861848703 | 267.2597464 | -2.64488176 | 518.3968244 |
| <b>Max</b> | 309.68694   | 0           | 276.8868984 | 3.294780692   | 6.50664207493 | 24.503737176 | 1251.836403 | 74.43196195 | 2262.731643 |

**MP**

12

|  | <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

Summary for 'MP' = 12 (9 detail records)

|            |             |             |             |               |               |              |             |             |             |
|------------|-------------|-------------|-------------|---------------|---------------|--------------|-------------|-------------|-------------|
| <b>Sum</b> | 0           | 3183.820372 | 85.69191811 | 119.213031247 | 178.62466725  | 18471.09973  | 51.24020546 | 32074.84824 |             |
| <b>Avg</b> | 337.5705199 | 0           | 353.7578192 | 9.521324234   | 13.2458923607 | 19.847185250 | 2052.344414 | 10.24804109 | 3563.872027 |
| <b>Min</b> | 168.063633  | 0           | 131.6824576 | 3.211274657   | 7.93730150999 | 4.7058301573 | 887.0388863 | -6.180667   | 1712.679817 |
| <b>Max</b> | 612         | 0           | 650.8805187 | 18.53354697   | 23.0198420749 | 37.297465418 | 3815.557210 | 20.54956772 | 7663.474582 |

**MP**

13

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|  | <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

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Summary for 'MP' = 13 (9 detail records)

|            |             |             |             |               |               |              |             |             |             |
|------------|-------------|-------------|-------------|---------------|---------------|--------------|-------------|-------------|-------------|
| <b>Sum</b> | 2139.609956 | 1053.448226 | 589.7428829 | 60.6575065739 | 25.931213741  | 9172.26811   | 1987.694652 | 17987.46525 |             |
| <b>Avg</b> | 569.4458963 | 237.7344395 | 117.0498028 | 65.52698699   | 6.73972295266 | 6.4828034351 | 1019.140901 | 220.8549613 | 1998.607250 |
| <b>Min</b> | 236.331585  | 75.54574084 | 5.964137435 | 25.27658246   | 2.86846609955 | 1.8294523055 | 383.9768482 | 73.84170157 | 959.9421204 |
| <b>Max</b> | 1039.5      | 529.4650202 | 259.8330605 | 133.7890422   | 12.7418135447 | 13.994661203 | 1828.825003 | 738.9641651 | 3637.381643 |

**MP**

14

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|  | <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

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Summary for 'MP' = 14 (9 detail records)

|            |            |             |             |               |               |              |             |             |             |
|------------|------------|-------------|-------------|---------------|---------------|--------------|-------------|-------------|-------------|
| <b>Sum</b> | 0          | 3685.128553 | 1.734264108 | 29.7293810141 | 432.46805929  | 17756.67807  | 212.349957  | 29574.56005 |             |
| <b>Avg</b> | 481.504842 | 0           | 409.4587281 | 0.433566027   | 3.30326455712 | 48.052006587 | 1972.96423  | 35.3916595  | 3286.062228 |
| <b>Min</b> | 135        | 0           | 146.4967867 | 0.129786744   | 1.10318731988 | 19.062427954 | 626.7077378 | -14.3726073 | 1281.644092 |
| <b>Max</b> | 859.58181  | 0           | 686.9346796 | 0.862356440   | 5.37940451438 | 91.743298809 | 3380.958205 | 103.2984481 | 5829.318346 |

**MP**

15

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|  | <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

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Summary for 'MP' = 15 (9 detail records)

|            |   |   |   |   |   |   |   |   |
|------------|---|---|---|---|---|---|---|---|
| <b>Sum</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <b>Avg</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <b>Min</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <b>Max</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**MP**

16

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|  | <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

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Summary for 'MP' = 16 (9 detail records)

|            |             |             |             |               |               |              |             |             |             |
|------------|-------------|-------------|-------------|---------------|---------------|--------------|-------------|-------------|-------------|
| <b>Sum</b> | 339129.2079 | 18580.95884 | 1549.254683 | 784.942496872 | 1194.7342546  | 342079.1850  | 39421.7394  | 979816.4233 |             |
| <b>Avg</b> | 44391.98548 | 37681.0231  | 2654.422692 | 172.1394093   | 87.2158329858 | 199.12237576 | 38008.79834 | 6570.289899 | 108868.4915 |
| <b>Min</b> | 3662.642045 | 12060.11974 | 212.9313761 | 13.64466101   | 5.28180426382 | 41.3741334   | 6210.521514 | 1548.193411 | 23504.02897 |
| <b>Max</b> | 102135.0023 | 77661.23512 | 6910.533633 | 405.8567372   | 161.045880692 | 745.89886837 | 82158.56653 | 24132.02221 | 214133.648  |

**MP**

17

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|  | <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

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Summary for 'MP' = 17 (9 detail records)

|            |             |             |             |               |               |              |             |             |
|------------|-------------|-------------|-------------|---------------|---------------|--------------|-------------|-------------|
| <b>Sum</b> | 8375.823279 | 941.7110422 | 35.95936829 | 9.83797197392 | 29.480106681  | 13027.48574  | 1953.630650 | 38045.97086 |
| <b>Avg</b> | 2838.53625  | 930.647031  | 104.6345602 | 3.995485365   | 1.63966199565 | 7.3700266703 | 1447.498415 | 325.6051083 |
| <b>Min</b> | 18.75       | 22.03670749 | 1.171685879 | 0.089228386   | 0.02230709654 | 0.0669212896 | 5.227521614 | -84.4094065 |
| <b>Max</b> | 8496        | 3062.967147 | 377.7659481 | 16.33582478   | 8.16791239193 | 24.760092586 | 4165.63532  | 1031.670524 |

**MP** 18

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|  | <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

Summary for 'MP' = 18 (9 detail records)

|            |             |             |             |               |               |              |             |             |
|------------|-------------|-------------|-------------|---------------|---------------|--------------|-------------|-------------|
| <b>Sum</b> | 5.255705995 | 1096.706409 | 13.26133969 | 29.2680863255 | 97.412977453  | 11323.02118  | 132.6644556 | 18355.76049 |
| <b>Avg</b> | 267.0172202 | 0.583967333 | 121.8562677 | 1.657667461   | 3.25200959172 | 10.823664161 | 1258.113464 | 26.53289111 |
| <b>Min</b> | 91.5        | 0           | 26.73970849 | 0.078863473   | 0.79169913545 | 2.9327422218 | 464.2435764 | -6.70088092 |
| <b>Max</b> | 538.736064  | 3.237074044 | 434.4153368 | 10.41673811   | 7.76897770679 | 35.543073009 | 2798.126804 | 77.68977707 |

**MP** 2

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|  | <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

Summary for 'MP' = 2 (9 detail records)

|            |      |             |             |               |               |              |             |             |
|------------|------|-------------|-------------|---------------|---------------|--------------|-------------|-------------|
| <b>Sum</b> | 0    | 981.2570006 | 63.25373256 | 7.70832311239 | 114.32496035  | 2027.391510  | 16.78575216 | 3892.477487 |
| <b>Avg</b> | 24   | 0           | 109.0285556 | 7.028192507   | 0.85648034582 | 12.702773372 | 225.2657233 | 2.797625360 |
| <b>Min</b> | 10.8 | 0           | 45.75703746 | 2.631786744   | 0.37061325648 | 5.0890824207 | 98.98402305 | 0.778720461 |
| <b>Max</b> | 42   | 0           | 151.3097118 | 9.476595389   | 1.21999538905 | 18.457838040 | 301.0619827 | 6.056714697 |

**MP** 3

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|  | <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

Summary for 'MP' = 3 (9 detail records)

|            |             |             |             |               |               |              |             |             |
|------------|-------------|-------------|-------------|---------------|---------------|--------------|-------------|-------------|
| <b>Sum</b> | 0           | 1047.700056 | 6.478752432 | 8.84320253514 | 78.189270846  | 4213.414040  | 14.24115471 | 7343.820883 |
| <b>Avg</b> | 125.8965753 | 0           | 116.4111173 | 0.719861381   | 0.98257805946 | 8.6876967606 | 468.1571156 | 2.848230942 |
| <b>Min</b> | 0           | 0           | 0           | 0             | 0             | 0            | 0           | -3.91986811 |
| <b>Max</b> | 250.47495   | 0           | 276.0197858 | 2.167221873   | 2.37792399938 | 20.799309919 | 1070.968809 | 12.85024907 |

**MP** 4

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|  | <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

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Summary for 'MP' = 4 (9 detail records)

|            |             |             |             |               |               |              |             |             |
|------------|-------------|-------------|-------------|---------------|---------------|--------------|-------------|-------------|
| <b>Sum</b> | 0           | 21130.85586 | 1665.240028 | 118.492889904 | 2376.7242675  | 27135.45439  | 131.6093034 | 52632.6216  |
| <b>Avg</b> | 304.5025368 | 0           | 2347.872873 | 185.0266697   | 13.165876656  | 264.08047416 | 3015.050488 | 21.93488389 |
| <b>Min</b> | 0           | 0           | 0           | 0             | 0             | 0            | 0           | -7.77914485 |
| <b>Max</b> | 471.048672  | 0           | 5585.57673  | 434.6105430   | 27.2145978195 | 738.03136143 | 7152.062149 | 76.81539707 |

**MP** 5

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| <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

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Summary for 'MP' = 5 (9 detail records)

|            |       |             |             |               |               |              |             |             |
|------------|-------|-------------|-------------|---------------|---------------|--------------|-------------|-------------|
| <b>Sum</b> | 0     | 2574.405212 | 306.7668455 | 8.36422205187 | 182.00310137  | 3430.637777  | 33.26866859 | 6724.085343 |
| <b>Avg</b> | 32.02 | 0           | 286.0450236 | 34.08520506   | 0.92935800576 | 20.222566818 | 381.1819753 | 5.544778098 |
| <b>Min</b> | 19.98 | 0           | 185.551781  | 22.66076542   | 0.63162881844 | 13.943422478 | 275.8400922 | -0.86524496 |
| <b>Max</b> | 40.2  | 0           | 422.5632847 | 45.48304323   | 1.45894720461 | 32.236936081 | 593.0475458 | 28.1204611  |

**MP** 6

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| <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

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Summary for 'MP' = 6 (9 detail records)

|            |          |             |             |               |               |              |             |             |
|------------|----------|-------------|-------------|---------------|---------------|--------------|-------------|-------------|
| <b>Sum</b> | 0        | 2636.141934 | 33.58131202 | 163.920944899 | 221.36199268  | 14855.64409  | 382.494713  | 25937.6796  |
| <b>Avg</b> | 512.7005 | 0           | 292.9046593 | 3.731256891   | 18.2134383221 | 24.595776964 | 1650.627121 | 47.81183912 |
| <b>Min</b> | 0        | 0           | 0           | 0             | 0             | 0            | -19.4112046 | 0           |
| <b>Max</b> | 1152     | 0           | 610.5168415 | 10.52137867   | 46.6540080692 | 50.581195233 | 3782.158755 | 219.301396  |

**MP** 7

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| <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

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Summary for 'MP' = 7 (9 detail records)

|            |             |             |             |               |               |              |             |             |
|------------|-------------|-------------|-------------|---------------|---------------|--------------|-------------|-------------|
| <b>Sum</b> | 13.12513509 | 6292.154568 | 1044.929351 | 107.049707185 | 544.49092857  | 23566.27613  | 5434.164545 | 38870.51079 |
| <b>Avg</b> | 600.0468453 | 1.458348343 | 699.1282853 | 116.1032613   | 11.8944119094 | 60.498992063 | 2618.475126 | 679.2705682 |
| <b>Min</b> | 24          | 0           | 27.48594813 | 4.277194236   | 0.44704322767 | 2.3866340058 | 100.714513  | 2.163112392 |
| <b>Max</b> | 2184.375    | 13.12513509 | 1890.019452 | 402.1541390   | 40.9504214697 | 134.13888058 | 8914.591751 | 4455.079382 |

**MP** 8

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| <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

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Summary for 'MP' = 8 (9 detail records)

|            |   |   |   |   |   |   |   |   |
|------------|---|---|---|---|---|---|---|---|
| <b>Sum</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <b>Avg</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <b>Min</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <b>Max</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**MP** 9

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|  | <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|--|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|

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Summary for 'MP' = 9 (9 detail records)

|                    |             |             |             |               |               |              |             |             |             |
|--------------------|-------------|-------------|-------------|---------------|---------------|--------------|-------------|-------------|-------------|
| <b>Sum</b>         | 0           | 4998.752629 | 48.66449592 | 80.963989382  | 315.21342909  | 19694.10624  | 213.0139777 | 34424.75975 |             |
| <b>Avg</b>         | 979.1680381 | 0           | 555.4169588 | 5.407166213   | 8.99599882022 | 35.023714343 | 2188.234027 | 53.25349442 | 3824.973305 |
| <b>Min</b>         | 25.3125     | 0           | 11.68080692 | 0.876060519   | 0.27072703530 | 0.9368980548 | 70.32819164 | -11.0916822 | 125.9336996 |
| <b>Max</b>         | 3116.01312  | 0           | 1840.504387 | 16.47625612   | 35.5737347979 | 110.84026842 | 7361.890801 | 155.9493986 | 13630.35733 |
| <b>Grand Total</b> | 349663.0219 | 125015.6968 | 13934.43602 | 1881.68154620 | 12578.132852  | 587487.5557  | 56481.84393 | 1424276.585 |             |

## Appendix E – AMD Loading Data by Source Location

# AMD Loading Data by Source Location

| MP | 1 | Date       | galmin      | Alklbsday | Acidlbsday  | Ironlbsday  | Manglbsday   | Alumlbsday   | Sulflbsday  | TSSlbsday   | TDSlbsday   |
|----|---|------------|-------------|-----------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
|    |   | 9/9/2002   | 39.1015625  | 0         | 1119.43052  | 103.9172478 | 8.0774926040 | 147.01600413 | 1434.448032 | 49.80885492 | 2534.612862 |
|    |   | 9/30/2002  | 9.140625    | 0         | 122.4777895 | 11.61616703 | 0.9688377612 | 16.722886707 | 174.2370132 | 8.128570785 | 371.7173451 |
|    |   | 10/30/2002 | 2133        | 0         | 9209.894447 | 1025.571603 | 75.360672622 | 1247.0397017 | 15674.50725 | 1589.238674 | 24146.1747  |
|    |   | 11/26/2002 | 1165.55866  | 0         | 6319.894182 | 954.1471446 | 39.359270058 | 745.02475958 | 8264.046027 | 1260.617190 | 14791.24170 |
|    |   | 12/23/2002 | 3174.165306 | 0         | 6606.691202 | 1335.833290 | 31.278792067 | 661.43201762 | 9128.067002 | 76.28973675 | 15257.94735 |
|    |   | 1/30/2003  | 1190.380716 | 0         | 17209.09731 | 2528.721638 | 90.980763819 | 2037.3396829 | 19495.06052 | 1029.970911 | 35276.50371 |
|    |   | 3/4/2003   | 1099.021482 | 0         | 2932.011950 | 482.0650279 | 20.075036777 | 385.7840949  | 4275.190398 | 871.6792285 | 7105.506438 |
|    |   | 3/30/2003  | 1004.798808 | 0         | 5451.844322 | 879.2985682 | 29.945900152 | 649.27058515 | 8008.113299 | 772.7974233 | 11761.01079 |
|    |   | 4/30/2003  | 379.072224  | 0         | 6417.677458 | 1156.803672 | 32.252382457 | 757.38433718 | 7890.445149 | 747.0890852 | 16445.07072 |

Summary for 'MP' = 1 (9 detail records)

|     |  |             |             |             |              |              |              |             |             |             |
|-----|--|-------------|-------------|-------------|--------------|--------------|--------------|-------------|-------------|-------------|
| Sum |  | 0           | 55389.01918 | 8477.974359 | 328.29914832 | 6647.0140699 | 74344.11469  | 6405.619675 | 127689.7856 |             |
| Avg |  | 1132.693265 | 0           | 6154.335464 | 941.9971510  | 36.477683146 | 738.55711888 | 8260.457188 | 711.7355195 | 14187.75396 |
| Min |  | 9.140625    | 0           | 122.4777895 | 11.61616703  | 0.9688377612 | 16.722886707 | 174.2370132 | 8.128570785 | 371.7173451 |
| Max |  | 3174.165306 | 0           | 17209.09731 | 2528.721638  | 90.980763819 | 2037.3396829 | 19495.06052 | 1589.238674 | 35276.50371 |

| MP | 10 | Date       | galmin | Alklbsday | Acidlbsday  | Ironlbsday  | Manglbsday   | Alumlbsday   | Sulflbsday  | TSSlbsday | TDSlbsday   |
|----|----|------------|--------|-----------|-------------|-------------|--------------|--------------|-------------|-----------|-------------|
|    |    | 9/9/2002   | 0      | 0         | 0           | 0           | 0            | 0            | 0           | 0         | 0           |
|    |    | 9/30/2002  | 0      | 0         | 0           | 0           | 0            | 0            | 0           | 0         | 0           |
|    |    | 10/30/2002 | 0      | 0         | 0           | 0           | 0            | 0            | 0           | 0         | 0           |
|    |    | 11/26/2002 | 0      | 0         | 0           | 0           | 0            | 0            | 0           | 0         | 0           |
|    |    | 12/23/2002 | 30     | 0         | 28.69729107 | 0.093734870 | 0.3136512968 | 2.3505821326 | 99.03449568 |           | 160.7913545 |

|           |    |   |             |             |              |              |             |             |             |   |
|-----------|----|---|-------------|-------------|--------------|--------------|-------------|-------------|-------------|---|
| 1/30/2003 | 0  | 0 | 0           | 0           | 0            | 0            | 0           | 0           | 0           | 0 |
| 3/4/2003  | 12 | 0 | 12.82004611 | 0.031725648 | 0.1153659942 | 1.1536599424 | 51.90027666 | -0.28841499 | 87.10132565 |   |
| 3/30/2003 | 12 | 0 | 10.49830548 | 0.030283573 | 0.0894086455 | 0.9907054755 | 42.59889337 | 0.288414986 | 68.93118156 |   |
| 4/30/2003 | 6  | 0 | 6.316288184 | 0.018746974 | 0.0547988473 | 0.5162628242 | 24.37106628 | 0.576829971 | 47.15585014 |   |

Summary for 'MP' = 10 (9 detail records)

|            |             |   |             |             |              |              |             |             |             |
|------------|-------------|---|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
| <b>Sum</b> |             | 0 | 58.33193084 | 0.174491066 | 0.5732247839 | 5.0112103746 | 217.904732  | 0.576829971 | 363.9797118 |
| <b>Avg</b> | 6.666666667 | 0 | 6.481325648 | 0.019387896 | 0.0636916427 | 0.5568011527 | 24.21163689 | 0.072103746 | 40.44219020 |
| <b>Min</b> | 0           | 0 | 0           | 0           | 0            | 0            | 0           | -0.28841499 | 0           |
| <b>Max</b> | 30          | 0 | 28.69729107 | 0.093734870 | 0.3136512968 | 2.3505821326 | 99.03449568 | 0.576829971 | 160.7913545 |

| MP | 11 | Date       | galmin      | Alklbsday | Acidlbsday  | Ironlbsday  | Manglbsday   | Alumlbsday   | Sulflbsday  | TSSlbsday   | TDSlbsday   |
|----|----|------------|-------------|-----------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
|    |    | 9/9/2002   | 111         | 0         | 136.4599452 | 3.294780692 | 2.1342708934 | 16.620634582 | 567.9828415 | 21.34270893 | 1099.149510 |
|    |    | 9/30/2002  | 64.5        | 0         | 55.80829971 | 2.216829683 | 1.4804701729 | 6.2861848703 | 267.2597464 |             | 598.3889914 |
|    |    | 10/30/2002 | 288         | 0         | 211.8119654 | 2.630344669 | 6.5066420749 | 24.503737176 | 1251.836403 |             | 1924.304784 |
|    |    | 11/26/2002 | 180.088072  | 0         | 200.8350483 | 0.952235143 | 3.1596893370 | 18.070826003 | 833.8550011 |             | 1302.830809 |
|    |    | 12/23/2002 | 228.444825  | 0         | 186.4050521 | 0.411793193 | 2.964910991  | 15.346159666 | 695.3814389 |             | 1191.454972 |
|    |    | 1/30/2003  | 162.771968  | 0         | 129.883587  | 0.371654842 | 2.0538820227 | 13.88815463  | 663.5016972 |             | 1021.072777 |
|    |    | 3/4/2003   | 99.0154305  | 0         | 86.14856078 | 0.23797945  | 1.2374931383 | 8.0794023164 | 365.417445  | -2.3797945  | 623.5061581 |
|    |    | 3/30/2003  | 110.0448405 | 0         | 81.06562586 | 0.198366132 | 1.0050550678 | 8.0139917245 | 361.2908480 | -2.64488176 | 518.3968244 |
|    |    | 4/30/2003  | 309.68694   | 0         | 276.8868984 | 1.414207277 | 3.2750063257 | 24.339251557 | 1166.348844 | 74.43196195 | 2262.731643 |

Summary for 'MP' = 11 (9 detail records)

|            |             |   |             |             |              |              |             |             |             |
|------------|-------------|---|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
| <b>Sum</b> |             | 0 | 1365.304983 | 11.72819108 | 23.817420024 | 135.14834253 | 6172.874265 | 90.74999463 | 10541.83647 |
| <b>Avg</b> | 172.6168973 | 0 | 151.7005536 | 1.303132342 | 2.6463800026 | 15.016482503 | 685.8749184 | 22.68749866 | 1171.315163 |
| <b>Min</b> | 64.5        | 0 | 55.80829971 | 0.198366132 | 1.0050550678 | 6.2861848703 | 267.2597464 | -2.64488176 | 518.3968244 |
| <b>Max</b> | 309.68694   | 0 | 276.8868984 | 1.294780692 | 3.5066420749 | 24.503737176 | 1251.836403 | 74.43196195 | 2262.731643 |

| MP | 12 | Date | galmin | Alklbsday | Acidlbsday | Ironlbsday | Manglbsday | Alumlbsday | Sulflbsday | TSSlbsday | TDSlbsday |
|----|----|------|--------|-----------|------------|------------|------------|------------|------------|-----------|-----------|
|    |    |      |        |           |            |            |            |            |            |           |           |

|            |            |   |             |             |              |              |             |             |             |
|------------|------------|---|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
| 9/9/2002   | 427.5      | 0 | 521.9590202 | 13.61408862 | 15.360801873 | 37.297465418 | 2758.779467 | 20.54956772 | 4818.873631 |
| 9/30/2002  | 612        | 0 | 650.8805187 | 18.53354697 | 23.019842075 | 36.03745245  | 3815.557210 | 14.70916427 | 7663.474582 |
| 10/30/2002 | 536.25     | 0 | 587.7176369 | 17.59286347 | 19.526145173 | 36.603466859 | 3521.150403 |             | 6083.393084 |
| 11/26/2002 | 271.975386 | 0 | 351.6806337 | 8.301754736 | 8.5305432525 | 17.845504275 | 1698.264473 |             | 2660.483604 |
| 12/23/2002 | 273.759624 | 0 | 311.8776931 | 7.698246856 | 11.514471793 | 13.290990299 | 1439.966944 |             | 2454.227417 |
| 1/30/2003  | 241.589466 | 0 | 197.7113884 | 6.938769726 | 11.003321030 | 11.351711142 | 1497.787156 |             | 2247.116221 |
| 3/4/2003   | 257.157248 | 0 | 245.0634465 | 4.697306919 | 11.001587257 | 11.434233946 | 1571.434584 | -6.180667   | 2429.002130 |
| 3/30/2003  | 249.839322 | 0 | 185.2475773 | 5.104066149 | 11.319017283 | 10.058012705 | 1281.120603 | 6.004783705 | 2005.597757 |
| 4/30/2003  | 168.063633 | 0 | 131.6824576 | 3.211274657 | 7.93730151   | 4.7058301573 | 887.0388863 | 16.15735676 | 1712.679817 |

Summary for 'MP' = 12 (9 detail records)

|            |  |             |             |             |              |              |              |             |             |
|------------|--|-------------|-------------|-------------|--------------|--------------|--------------|-------------|-------------|
| <b>Sum</b> |  | 0           | 3183.820372 | 85.69191811 | 119.21303125 | 178.62466725 | 18471.09973  | 51.24020546 | 32074.84824 |
| <b>Avg</b> |  | 337.5705199 | 0           | 353.7578192 | 9.521324234  | 13.245892361 | 19.847185250 | 2052.344414 | 10.24804109 |
| <b>Min</b> |  | 168.063633  | 0           | 131.6824576 | 3.211274657  | 7.93730151   | 4.7058301573 | 887.0388863 | -6.180667   |
| <b>Max</b> |  | 612         | 0           | 650.8805187 | 18.53354697  | 23.019842075 | 37.297465418 | 3815.557210 | 20.54956772 |

| MP | 13 | Date       | galmin     | Alklbsday   | Acidlbsday  | Ironlbsday  | Manglbsday   | Alumlbsday   | Sulflbsday  | TSSlbsday   | TDSlbsday   |
|----|----|------------|------------|-------------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
|    |    | 9/9/2002   | 565.3125   | 155.5717192 | 201.0883357 | 81.38642777 | 6.4538486131 | 13.994661203 | 956.5282997 | 108.6963977 | 1779.903512 |
|    |    | 9/30/2002  | 1039.5     | 374.7592219 | 259.8330605 | 133.7890422 | 12.741813545 |              | 1828.825003 | 199.8715850 | 3347.849049 |
|    |    | 10/30/2002 | 895.5      | 529.4650202 | 184.021379  | 89.64316297 | 7.5330389049 | 1.8294523055 | 1597.004248 | 344.3674928 | 3637.381643 |
|    |    | 11/26/2002 | 569.367984 | 256.5847795 | 67.7383818  | 73.55430347 | 8.0738677293 | 5.8159216694 | 841.5980769 | 738.9641651 | 2011.624672 |
|    |    | 12/23/2002 | 410.697    | 136.2188447 | 67.12232929 | 45.99853743 | 4.2938548885 |              | 698.3683526 | 78.96744622 | 1322.704724 |
|    |    | 1/30/2003  | 556.762944 | 252.2424947 | 82.29662294 | 60.61848812 | 9.8354500589 |              | 1212.369762 | 133.8156471 | 2114.287224 |
|    |    | 3/4/2003   | 410.697    | 172.7412886 | 115.9834366 | 36.67050784 | 4.1951455807 |              | 769.9326007 | 118.4511693 | 1362.188447 |
|    |    | 3/30/2003  | 440.844054 | 186.4808462 | 69.40054218 | 42.8058306  | 4.6620211543 | 4.2911785625 | 883.6649188 | 190.7190472 | 1451.583859 |
|    |    | 4/30/2003  | 236.331585 | 75.54574084 | 5.964137435 | 25.27658246 | 2.8684660996 |              | 383.9768482 | 73.84170157 | 959.9421204 |

Summary for 'MP' = 13 (9 detail records)

|            |  |             |             |             |              |              |              |             |             |             |
|------------|--|-------------|-------------|-------------|--------------|--------------|--------------|-------------|-------------|-------------|
| <b>Sum</b> |  | 2139.609956 | 1053.448226 | 589.7428829 | 60.657506574 | 25.931213741 | 9172.26811   | 1987.694652 | 17987.46525 |             |
| <b>Avg</b> |  | 569.4458963 | 237.7344395 | 117.0498028 | 65.52698699  | 6.7397229527 | 6.4828034351 | 1019.140901 | 220.8549613 | 1998.607250 |
| <b>Min</b> |  | 236.331585  | 75.54574084 | 5.964137435 | 25.27658246  | 2.8684660996 | 1.8294523055 | 383.9768482 | 73.84170157 | 959.9421204 |
| <b>Max</b> |  | 1039.5      | 529.4650202 | 259.8330605 | 133.7890422  | 12.741813545 | 13.994661203 | 1828.825003 | 738.9641651 | 3637.381643 |

**MP** 14

| Date       | galmin     | Alklbsday | Acidlbsday  | Ironlbsday  | Manglbsday   | Alumlbsday   | Sulflbsday  | TSSlbsday   | TDSlbsday   |
|------------|------------|-----------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
| 9/9/2002   | 135        | 0         | 146.4967867 | 0.129786744 | 1.1031873199 | 19.062427954 | 626.7077378 |             | 1281.644092 |
| 9/30/2002  | 193.5      | 0         | 180.4468357 |             | 1.7672628242 | 23.416232421 | 945.9506801 | 4.650691643 | 1878.879424 |
| 10/30/2002 | 263.25     | 0         | 264.7892918 | 0.25308415  | 2.3726639049 | 33.596920893 | 1354.316557 |             | 2461.243357 |
| 11/26/2002 | 435.219264 | 0         | 495.8188431 |             | 3.6611096012 | 52.876882954 | 1958.693637 | 10.46031315 | 3263.617702 |
| 12/23/2002 | 597.996972 | 0         | 557.6571647 |             | 3.6650148713 | 43.980178456 | 2187.510837 |             | 3837.486159 |
| 1/30/2003  | 437.11002  | 0         | 278.9278398 |             | 2.4163240356 | 29.468647478 | 1590.046273 | 10.50575668 | 2321.772226 |
| 3/4/2003   | 597.996972 | 0         | 511.6648213 | 0.862356440 | 4.0961930915 | 52.172564639 | 2599.286037 | -14.3726073 | 3866.231374 |
| 3/30/2003  | 859.58181  | 0         | 686.9346796 |             | 5.2682208511 | 86.150905682 | 3380.958205 | 103.2984481 | 4834.367369 |
| 4/30/2003  | 813.88854  | 0         | 562.3922901 | 0.489036774 | 5.3794045144 | 91.743298809 | 3113.208104 | 97.80735481 | 5829.318346 |

Summary for 'MP' = 14 (9 detail records)

|            |  |            |             |             |              |              |              |             |             |             |
|------------|--|------------|-------------|-------------|--------------|--------------|--------------|-------------|-------------|-------------|
| <b>Sum</b> |  | 0          | 3685.128553 | 1.734264108 | 29.729381014 | 432.46805929 | 17756.67807  | 212.349957  | 29574.56005 |             |
| <b>Avg</b> |  | 481.504842 | 0           | 409.4587281 | 0.433566027  | 3.3032645571 | 48.052006587 | 1972.96423  | 35.3916595  | 3286.062228 |
| <b>Min</b> |  | 135        | 0           | 146.4967867 | 0.129786744  | 1.1031873199 | 19.062427954 | 626.7077378 | -14.3726073 | 1281.644092 |
| <b>Max</b> |  | 859.58181  | 0           | 686.9346796 | 0.862356440  | 5.3794045144 | 91.743298809 | 3380.958205 | 103.2984481 | 5829.318346 |

**MP** 15

| Date       | galmin | Alklbsday | Acidlbsday | Ironlbsday | Manglbsday | Alumlbsday | Sulflbsday | TSSlbsday | TDSlbsday |
|------------|--------|-----------|------------|------------|------------|------------|------------|-----------|-----------|
| 9/9/2002   | 0      | 0         | 0          | 0          | 0          | 0          | 0          | 0         | 0         |
| 9/30/2002  | 0      | 0         | 0          | 0          | 0          | 0          | 0          | 0         | 0         |
| 10/30/2002 | 0      | 0         | 0          | 0          | 0          |            | 0          | 0         | 0         |
| 11/26/2002 | 0      | 0         | 0          | 0          | 0          | 0          | 0          | 0         | 0         |

|            |   |   |   |   |   |   |   |   |   |
|------------|---|---|---|---|---|---|---|---|---|
| 12/23/2002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1/30/2003  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3/4/2003   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3/30/2003  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4/30/2003  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Summary for 'MP' = 15 (9 detail records)

|            |   |   |   |   |   |   |   |   |   |
|------------|---|---|---|---|---|---|---|---|---|
| <b>Sum</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <b>Avg</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <b>Min</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <b>Max</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| MP         | 16          |             |             |             |              |              |             |             |             |           |
|------------|-------------|-------------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|-----------|
|            | Date        | galmin      | Alklbsday   | Acidlbsday  | Ironlbsday   | Manglbsday   | Alumlbsday  | Sulflbsday  | TSSlbsday   | TDSlbsday |
| 9/9/2002   | 3662.642045 | 12060.11974 |             | 13.64466101 | 5.2818042638 | 41.3741334   | 6210.521514 |             | 23504.02897 |           |
| 9/30/2002  | 11812.5     | 28490.21812 | 212.9313761 | 39.74719020 | 31.229935159 |              | 16651.23361 |             | 60472.51081 |           |
| 10/30/2002 | 29133       | 30248.61759 | 1645.468781 | 185.5528625 | 161.04588069 | 80.522940346 | 31999.11629 | 2100.598444 | 86124.5362  |           |
| 11/26/2002 | 19964.868   | 19433.81402 | 887.7174305 | 76.77556155 | 43.186253374 | 47.984725971 | 17658.37916 |             | 54222.74035 |           |
| 12/23/2002 | 102135.0023 | 31298.34428 | 4786.805596 | 233.2033495 | 135.01246552 |              | 60878.34809 | 4909.544201 | 189017.4517 |           |
| 1/30/2003  | 19964.868   | 34572.99506 | 287.9083558 | 141.5549416 | 52.783198568 | 50.38396227  | 25024.03459 | 1919.389039 | 72456.93622 |           |
| 3/4/2003   | 100105.5908 | 71097.18311 | 3849.593671 | 372.9293869 | 156.38974289 | 228.56962422 | 74224.97797 | 4811.992089 | 214133.648  |           |
| 3/30/2003  | 91277.65105 | 77661.23512 | 6910.533633 | 405.8567372 | 153.56741408 | 745.89886837 | 82158.56653 | 24132.02221 | 195249.9979 |           |
| 4/30/2003  | 21471.74715 | 34266.68083 |             | 79.98999291 | 46.445802337 |              | 27274.00726 | 1548.193411 | 84634.57315 |           |

Summary for 'MP' = 16 (9 detail records)

|            |             |             |             |              |              |              |             |             |             |
|------------|-------------|-------------|-------------|--------------|--------------|--------------|-------------|-------------|-------------|
| <b>Sum</b> | 339129.2079 | 18580.95884 | 1549.254683 | 784.94249687 | 1194.7342546 | 342079.1850  | 39421.7394  | 979816.4233 |             |
| <b>Avg</b> | 44391.98548 | 37681.0231  | 2654.422692 | 172.1394093  | 87.215832986 | 199.12237576 | 38008.79834 | 6570.289899 | 108868.4915 |
| <b>Min</b> | 3662.642045 | 12060.11974 | 212.9313761 | 13.64466101  | 5.2818042638 | 41.3741334   | 6210.521514 | 1548.193411 | 23504.02897 |
| <b>Max</b> | 102135.0023 | 77661.23512 | 6910.533633 | 405.8567372  | 161.04588069 | 745.89886837 | 82158.56653 | 24132.02221 | 214133.648  |

| <b>MP</b> | 17 | <b>Date</b> | <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|-----------|----|-------------|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|           |    | 9/9/2002    | 18.75         | 22.03670749      | 1.171685879       | 0.137447767       | 0.0383051153      | 0.4326224784      | 5.227521614       | 7.21037464       | 28.84149856      |
|           |    | 9/30/2002   | 37.125        | 28.06232745      | 1.293811599       | 0.089228386       | 0.0223070965      | 0.0669212896      | 14.54422695       |                  | 69.59814121      |
|           |    | 10/30/2002  | 8496          | 3062.967147      | 377.7659481       | 16.33582478       | 8.1679123919      |                   | 4165.63532        | 612.5934294      | 13477.05545      |
|           |    | 11/26/2002  | 1070.179704   | 299.6534012      | 47.58444569       | 0.64303305        | 0.3858198299      |                   | 529.8592330       |                  | 1620.443286      |
|           |    | 12/23/2002  | 3564.309006   | 1113.666808      | 227.0166955       | 1.713333551       |                   |                   | 1571.983533       |                  | 4797.333943      |
|           |    | 1/30/2003   | 1070.179704   | 398.6804909      | 32.15165249       | 0.77163966        | 0.3858198299      |                   | 706.0502887       | 51.44264398      | 1491.836676      |
|           |    | 3/4/2003    | 3511.99809    | 911.6215907      | 54.86611425       | 3.376376262       |                   | 4.2204703272      | 1857.006944       | -84.4094065      | 5486.611425      |
|           |    | 3/30/2003   | 4292.44211    | 1139.995929      | 149.5922260       | 6.190023147       |                   | 24.760092586      | 2032.390933       | 1031.670524      | 4539.350307      |
|           |    | 4/30/2003   | 3485.842632   | 1399.138876      | 50.26846262       | 6.702461683       | 0.8378077104      |                   | 2144.787739       | 335.1230842      | 6534.900141      |

Summary for 'MP' = 17 (9 detail records)

|            |             |             |             |              |              |              |             |             |
|------------|-------------|-------------|-------------|--------------|--------------|--------------|-------------|-------------|
| <b>Sum</b> | 8375.823279 | 941.7110422 | 35.95936829 | 9.8379719739 | 29.480106681 | 13027.48574  | 1953.630650 | 38045.97086 |
| <b>Avg</b> | 2838.53625  | 930.647031  | 104.6345602 | 3.995485365  | 1.6396619957 | 7.3700266703 | 1447.498415 | 325.6051083 |
| <b>Min</b> | 18.75       | 22.03670749 | 1.171685879 | 0.089228386  | 0.0223070965 | 0.0669212896 | -84.4094065 | 28.84149856 |
| <b>Max</b> | 8496        | 3062.967147 | 377.7659481 | 16.33582478  | 8.1679123919 | 24.760092586 | 4165.63532  | 1031.670524 |

| <b>MP</b> | 18 | <b>Date</b> | <b>galmin</b> | <b>Alklbsday</b> | <b>Acidlbsday</b> | <b>Ironlbsday</b> | <b>Manglbsday</b> | <b>Alumlbsday</b> | <b>Sulflbsday</b> | <b>TSSlbsday</b> | <b>TDSlbsday</b> |
|-----------|----|-------------|---------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|           |    | 9/9/2002    | 91.5          | 0                | 33.86712968       |                   | 0.7916991354      | 4.1674162824      | 464.2435764       |                  | 875.2673775      |
|           |    | 9/30/2002   | 131.25        | 0                | 43.69036383       | 0.078863473       | 1.0094524496      | 3.4699927954      | 699.5190022       |                  | 1223.961095      |
|           |    | 10/30/2002  | 209.375       | 0                | 80.76746218       | 10.41673811       | 1.4593497839      | 7.2715877161      | 1049.977008       | 20.12896254      | 1871.993516      |
|           |    | 11/26/2002  | 538.736064    | 0                | 434.4153368       | 0.647414809       | 7.7042362259      | 35.543073009      | 2798.126804       |                  | 4234.092850      |
|           |    | 12/23/2002  | 278.80164     | 0                | 156.4655694       | 0.636583687       | 3.0824052210      | 12.731673739      | 1216.209886       |                  | 2171.085417      |
|           |    | 1/30/2003   | 538.736064    | 3.237074044      | 168.9752651       | 0.582673328       | 7.7689777068      | 16.185370222      | 2443.990904       | 77.68977707      | 3793.850780      |
|           |    | 3/4/2003    | 278.80164     | 0                | 98.83799350       | 0.536070473       | 3.8195021217      | 10.486878632      | 1255.410039       | -6.70088092      | 1923.152823      |
|           |    | 3/30/2003   | 192.399552    | 1.156060709      | 52.94758046       | 0.138727285       | 1.8728183481      | 4.6242428348      | 761.3815828       | 27.74545701      | 1137.563737      |

|           |            |             |             |             |              |              |             |             |             |
|-----------|------------|-------------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
| 4/30/2003 | 143.555022 | 0.862571242 | 26.73970849 | 0.224268523 | 1.7596453331 | 2.9327422218 | 634.1623769 | 13.80113987 | 1124.792899 |
|-----------|------------|-------------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|

Summary for 'MP' = 18 (9 detail records)

|            |             |             |             |              |              |              |             |             |             |
|------------|-------------|-------------|-------------|--------------|--------------|--------------|-------------|-------------|-------------|
| <b>Sum</b> | 5.255705995 | 1096.706409 | 13.26133969 | 29.268086325 | 97.412977453 | 11323.02118  | 132.6644556 | 18355.76049 |             |
| <b>Avg</b> | 267.0172202 | 0.583967333 | 121.8562677 | 1.657667461  | 3.2520095917 | 10.823664161 | 1258.113464 | 26.53289111 | 2039.528944 |
| <b>Min</b> | 91.5        | 0           | 26.73970849 | 0.078863473  | 0.7916991354 | 2.9327422218 | 464.2435764 | -6.70088092 | 875.2673775 |
| <b>Max</b> | 538.736064  | 3.237074044 | 434.4153368 | 10.41673811  | 7.7689777068 | 35.543073009 | 2798.126804 | 77.68977707 | 4234.092850 |

| MP | 2 | Date       | galmin | Alklbsday | Acidlbsday  | Ironlbsday  | Manglbsday   | Alumlbsday   | Sulflbsday  | TSSlbsday   | TDSlbsday   |
|----|---|------------|--------|-----------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
|    |   | 9/9/2002   | 18     | 0         | 151.3097118 | 9.476595389 | 1.2199953890 | 18.457838040 | 301.0619827 | 2.595734870 | 639.4160231 |
|    |   | 9/30/2002  | 13.2   | 0         | 116.8614259 | 8.178872161 | 0.9945990778 | 14.162329452 | 227.5839389 |             | 531.0873545 |
|    |   | 10/30/2002 | 10.8   | 0         | 97.71643919 | 6.542549741 | 0.7255078963 | 11.61850928  | 192.2401245 | 0.778720461 | 333.0327839 |
|    |   | 11/26/2002 | 12     | 0         | 109.3813833 | 6.989737176 | 0.7441106628 | 13.907370605 | 210.1103170 |             | 334.2729683 |
|    |   | 12/23/2002 | 36     | 0         | 135.800196  | 6.90898098  | 0.9171596542 | 14.981716427 | 280.7287262 | 1.730489914 | 500.1115850 |
|    |   | 1/30/2003  | 12     | 0         | 45.75703746 | 2.631786744 | 0.3706132565 | 5.0890824207 | 98.98402305 |             | 157.7629971 |
|    |   | 3/4/2003   | 36     | 0         | 96.25850144 | 5.840403458 | 0.8392876081 | 11.719742939 | 223.1899366 | 2.595734870 | 349.5589625 |
|    |   | 3/30/2003  | 36     | 0         | 105.776196  | 7.549262248 | 0.8522662824 | 10.992937176 | 236.9905937 | 6.056714697 | 427.4310086 |
|    |   | 4/30/2003  | 42     | 0         | 122.3961095 | 9.135544669 | 1.0447832853 | 13.395434006 | 256.5018674 | 3.028357349 | 619.8038040 |

Summary for 'MP' = 2 (9 detail records)

|            |      |             |             |              |              |              |             |             |
|------------|------|-------------|-------------|--------------|--------------|--------------|-------------|-------------|
| <b>Sum</b> | 0    | 981.2570006 | 63.25373256 | 7.7083231124 | 114.32496035 | 2027.391510  | 16.78575216 | 3892.477487 |
| <b>Avg</b> | 24   | 0           | 109.0285556 | 7.028192507  | 0.8564803458 | 12.702773372 | 225.2657233 | 432.4974986 |
| <b>Min</b> | 10.8 | 0           | 45.75703746 | 2.631786744  | 0.3706132565 | 5.0890824207 | 98.98402305 | 0.778720461 |
| <b>Max</b> | 42   | 0           | 151.3097118 | 9.476595389  | 1.2199953890 | 18.457838040 | 301.0619827 | 6.056714697 |

| MP | 3 | Date       | galmin    | Alklbsday | Acidlbsday  | Ironlbsday  | Manglbsday   | Alumlbsday   | Sulflbsday  | TSSlbsday   | TDSlbsday   |
|----|---|------------|-----------|-----------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
|    |   | 9/9/2002   | 250.47495 | 0         | 276.0197858 | 2.167221873 | 2.377923994  | 20.799309919 | 1070.968809 |             | 2058.860779 |
|    |   | 9/30/2002  | 61.875    | 0         | 61.49322947 | 0.542806016 | 0.5948559078 | 4.6696188761 | 265.6031628 |             | 548.7545749 |
|    |   | 10/30/2002 | 99        | 0         | 104.5756686 | 0.642444380 | 0.9636665706 | 9.708048415  | 446.7367867 | 2.379423631 | 754.2772911 |

|            |            |   |             |             |              |              |             |             |             |
|------------|------------|---|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
| 11/26/2002 | 136.784856 | 0 | 119.6674336 | 0.46025936  | 0.9205187197 | 8.2353549743 | 465.1907101 |             | 710.1144409 |
| 12/23/2002 | 121.658808 | 0 | 98.83182912 | 0.423982699 | 0.7310046533 | 6.1258189943 | 371.6427657 |             | 640.3600763 |
| 1/30/2003  | 0          | 0 | 0           | 0           | 0            | 0            | 0           | 0           | 0           |
| 3/4/2003   | 178.218882 | 0 | 144.5653020 | 0.749597862 | 1.2636078253 | 11.522390000 | 609.9584892 | 12.85024907 | 933.7847658 |
| 3/30/2003  | 163.092834 | 0 | 143.467173  | 0.803572963 | 1.0975630719 | 10.034862372 | 551.5254436 | -3.91986811 | 815.3325677 |
| 4/30/2003  | 121.963848 | 0 | 99.07963412 | 0.688867279 | 0.8940617872 | 7.0938672951 | 431.787873  | 2.931350122 | 882.3363867 |

Summary for 'MP' = 3 (9 detail records)

|            |  |             |             |             |              |              |              |             |             |
|------------|--|-------------|-------------|-------------|--------------|--------------|--------------|-------------|-------------|
| <b>Sum</b> |  | 0           | 1047.700056 | 6.478752432 | 8.8432025351 | 78.189270846 | 4213.414040  | 14.24115471 | 7343.820883 |
| <b>Avg</b> |  | 125.8965753 | 0           | 116.4111173 | 0.719861381  | 0.9825780595 | 8.6876967606 | 468.1571156 | 2.848230942 |
| <b>Min</b> |  | 0           | 0           | 0           | 0            | 0            | 0            | -3.91986811 | 0           |
| <b>Max</b> |  | 250.47495   | 0           | 276.0197858 | 2.167221873  | 2.3779239994 | 20.799309919 | 1070.968809 | 12.85024907 |

| MP | 4 | Date       | galmin     | Alklbsday | Acidlbsday  | Ironlbsday  | Manglbsday   | Alumlbsday   | Sulflbsday  | TSSlbsday   | TDSlbsday   |
|----|---|------------|------------|-----------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
|    |   |            |            |           |             |             |              |              |             |             |             |
|    |   | 9/9/2002   | 0          | 0         | 0           | 0           | 0            | 0            | 0           | 0           | 0           |
|    |   | 9/30/2002  | 264.84375  | 0         | 2025.154829 | 203.247505  | 14.926883781 | 174.88960847 | 2433.177537 |             | 6008.945965 |
|    |   | 10/30/2002 | 156.25     | 0         | 1089.630313 | 74.01900216 | 9.482393732  | 116.79304755 | 1595.295389 |             | 3199.603746 |
|    |   | 11/26/2002 | 463.66695  | 0         | 2563.686722 | 199.1440197 | 21.452279679 | 256.20151160 | 3477.498116 | 11.14404139 | 5962.062145 |
|    |   | 12/23/2002 | 471.048672 | 0         | 1376.123219 | 54.56942754 | 10.132704906 | 136.93303446 | 2035.598148 | 11.321458   | 4166.296542 |
|    |   | 1/30/2003  | 456.576615 | 0         | 5585.57673  | 434.6105430 | 27.21459782  | 738.03136143 | 7152.062149 | 76.81539707 | 12114.88548 |
|    |   | 3/4/2003   | 333.748692 | 0         | 2389.206858 | 220.9525026 | 11.550974903 | 268.76070426 | 2965.151301 | 40.10755175 | 5454.627038 |
|    |   | 3/30/2003  | 323.66466  | 0         | 2767.430782 | 207.2364189 | 11.435342936 | 312.60493597 | 3310.415093 | -7.77914485 | 6798.972603 |
|    |   | 4/30/2003  | 270.723492 | 0         | 3334.046404 | 271.4606089 | 12.297712147 | 372.51006371 | 4166.256660 |             | 8927.228077 |

Summary for 'MP' = 4 (9 detail records)

|            |  |             |             |             |              |              |              |             |             |
|------------|--|-------------|-------------|-------------|--------------|--------------|--------------|-------------|-------------|
| <b>Sum</b> |  | 0           | 21130.85586 | 1665.240028 | 118.49288990 | 2376.7242675 | 27135.45439  | 131.6093034 | 52632.6216  |
| <b>Avg</b> |  | 304.5025368 | 0           | 2347.872873 | 185.0266697  | 13.165876656 | 264.08047416 | 3015.050488 | 21.93488389 |
| <b>Min</b> |  | 0           | 0           | 0           | 0            | 0            | 0            | -7.77914485 | 0           |
| <b>Max</b> |  | 471.048672  | 0           | 5585.57673  | 434.6105430  | 27.21459782  | 738.03136143 | 7152.062149 | 76.81539707 |

| MP | 5 | Date       | galmin | Alklbsday | Acidlbsday  | Ironlbsday  | Manglbsday   | Alumlbsday   | Sulflbsday  | TSSlbsday   | TDSlbsday   |
|----|---|------------|--------|-----------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
|    |   | 9/9/2002   | 19.98  | 0         | 288.7748554 | 25.38875298 | 0.8211607262 | 14.451948571 | 405.6101798 |             | 746.7280288 |
|    |   | 9/30/2002  | 24     | 0         | 321.8711239 | 30.64986052 | 0.9950317003 | 22.516557925 | 409.2320231 |             | 920.6206340 |
|    |   | 10/30/2002 | 40.2   | 0         | 422.5632847 | 45.11142052 | 1.4589472046 | 32.236936081 | 593.0475458 | 0.966190202 | 1131.408726 |
|    |   | 11/26/2002 | 30     | 0         | 352.4431124 | 43.09640922 | 1.1103976945 | 25.261547550 | 456.5609222 | 0.721037464 | 726.0847262 |
|    |   | 12/23/2002 | 36     | 0         | 256.8479654 | 33.12590317 | 0.9863792507 | 18.200427666 | 295.4811527 |             | 654.1251873 |
|    |   | 1/30/2003  | 30     | 0         | 265.0173199 | 45.48304323 | 0.8508242075 | 20.358492795 | 305.3954179 | 28.1204611  | 642.4443804 |
|    |   | 3/4/2003   | 36     | 0         | 241.9657522 | 35.75624784 | 0.7743942363 | 18.304257061 | 325.4618905 | 2.595734870 | 648.0684726 |
|    |   | 3/30/2003  | 36     | 0         | 185.551781  | 22.66076542 | 0.6316288184 | 13.943422478 | 275.8400922 | -0.86524496 | 452.5231124 |
|    |   | 4/30/2003  | 36     | 0         | 239.3700173 | 25.49444265 | 0.7354582133 | 16.729511239 | 364.0085533 | 1.730489914 | 802.0820749 |

Summary for 'MP' = 5 (9 detail records)

|            |  |       |             |             |              |              |              |             |             |             |
|------------|--|-------|-------------|-------------|--------------|--------------|--------------|-------------|-------------|-------------|
| <b>Sum</b> |  | 0     | 2574.405212 | 306.7668455 | 8.3642220519 | 182.00310137 | 3430.637777  | 33.26866859 | 6724.085343 |             |
| <b>Avg</b> |  | 32.02 | 0           | 286.0450236 | 34.08520506  | 0.9293580058 | 20.222566818 | 381.1819753 | 5.544778098 | 747.1205937 |
| <b>Min</b> |  | 19.98 | 0           | 185.551781  | 22.66076542  | 0.6316288184 | 13.943422478 | 275.8400922 | -0.86524496 | 452.5231124 |
| <b>Max</b> |  | 40.2  | 0           | 422.5632847 | 45.48304323  | 1.4589472046 | 32.236936081 | 593.0475458 | 28.1204611  | 1131.408726 |

| MP | 6 | Date       | galmin    | Alklbsday | Acidlbsday  | Ironlbsday  | Manglbsday   | Alumlbsday   | Sulflbsday  | TSSlbsday   | TDSlbsday   |
|----|---|------------|-----------|-----------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
|    |   | 9/9/2002   | 23.4375   | 0         | 20.30734420 | 0.557677414 | 1.6955646614 | 1.1125382745 | 122.4355412 | 0.563310519 | 230.9573127 |
|    |   | 9/30/2002  | 86.625    | 0         | 58.60817831 | 1.415757061 | 6.3292668588 | 5.1529393012 | 440.6543851 |             | 809.8963184 |
|    |   | 10/30/2002 | 1152      | 0         | 610.5168415 | 10.52137867 | 46.654008069 | 43.746785014 | 3782.158755 | 55.37567723 | 6506.642075 |
|    |   | 11/26/2002 | 282.24072 | 0         | 216.7340316 | 2.950838928 | 14.991618463 | 18.451222724 | 1278.696869 | 6.783537766 | 2021.494254 |
|    |   | 12/23/2002 | 921.01416 | 0         | 566.6864761 | 3.873833333 | 29.441133330 | 50.581195233 | 2659.663285 | 22.13619047 | 4980.642857 |
|    |   | 1/30/2003  | 0         | 0         | 0           | 0           | 0            | 0            | 0           | 0           | 0           |
|    |   | 3/4/2003   | 580.98312 | 0         | 330.2411861 | 5.725111471 | 17.803700307 | 29.184104817 | 1839.715698 | 97.74580561 | 3113.902093 |
|    |   | 3/30/2003  | 807.63645 | 0         | 400.8413748 | 3.785184895 | 22.516997325 | 41.151753732 | 2247.817492 | -19.4112046 | 3358.138394 |

|   |             |   |             |             |              |              |             |             |             |
|---|-------------|---|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
| 4/30/2003                               | 760.3675500 | 0 | 432.2065012 | 4.751530246 | 24.488655884 | 31.98145358  | 2484.502065 | 219.301396  | 4916.006293 |
| Summary for 'MP' = 6 (9 detail records) |             |   |             |             |              |              |             |             |             |
| <b>Sum</b>                              |             | 0 | 2636.141934 | 33.58131202 | 163.9209449  | 221.36199268 | 14855.64409 | 382.494713  | 25937.6796  |
| <b>Avg</b>                              | 512.7005    | 0 | 292.9046593 | 3.731256891 | 18.213438322 | 24.595776964 | 1650.627121 | 47.81183912 | 2881.9644   |
| <b>Min</b>                              | 0           | 0 | 0           | 0           | 0            | 0            | 0           | -19.4112046 | 0           |
| <b>Max</b>                              | 1152        | 0 | 610.5168415 | 10.52137867 | 46.654008069 | 50.581195233 | 3782.158755 | 219.301396  | 6506.642075 |

| MP | 7 | Date       | galmin     | Alklbsday   | Acidlbsday  | Ironlbsday  | Manglbsday   | Alumlbsday   | Sulflbsday  | TSSlbsday   | TDSlbsday   |
|----|---|------------|------------|-------------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
|    |   | 9/9/2002   | 24         | 0           | 27.48594813 | 4.277194236 | 0.4470432277 | 2.702448415  | 100.714513  | 2.307319885 | 189.7770605 |
|    |   | 9/30/2002  | 30         | 0           | 30.17541787 | 5.836798271 | 0.6200922190 | 2.3866340058 | 123.2974063 | 2.163112392 | 239.3844380 |
|    |   | 10/30/2002 | 2184.375   | 13.12513509 | 1890.019452 | 402.1541390 | 40.95042147  | 134.13888058 | 8914.591751 |             | 14385.14805 |
|    |   | 11/26/2002 | 413.065488 | 0           | 528.1619603 | 73.41649806 | 7.843006554  | 41.796275433 | 1776.09351  | 79.42285118 | 2809.583360 |
|    |   | 12/23/2002 | 476.931024 | 0           | 616.7006773 | 63.73337855 | 9.8580405664 | 42.985642005 | 2050.701695 | 114.6283787 | 3828.587848 |
|    |   | 1/30/2003  | 388.695744 | 0           | 624.0549376 | 40.82515085 | 6.3993657519 | 52.035718595 | 1776.40788  | 28.02641935 | 2755.931236 |
|    |   | 3/4/2003   | 585.65958  | 0           | 760.108497  | 99.16600669 | 12.246192451 | 67.565199731 | 2800.436768 | 197.0651659 | 3997.607651 |
|    |   | 3/30/2003  | 550.270512 | 0           | 794.1925850 | 137.3470441 | 11.440076371 | 73.335518469 | 2770.746820 | 555.4719163 | 3927.979979 |
|    |   | 4/30/2003  | 747.42426  | 0           | 1021.255092 | 218.1731415 | 17.245468574 | 127.54461133 | 3253.285790 | 4455.079382 | 6736.511162 |

|   |             |             |             |             |              |              |             |             |             |
|---|-------------|-------------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
| Summary for 'MP' = 7 (9 detail records) |             |             |             |             |              |              |             |             |             |
| <b>Sum</b>                              |             | 13.12513509 | 6292.154568 | 1044.929351 | 107.04970718 | 544.49092857 | 23566.27613 | 5434.164545 | 38870.51079 |
| <b>Avg</b>                              | 600.0468453 | 1.458348343 | 699.1282853 | 116.1032613 | 11.894411909 | 60.498992063 | 2618.475126 | 679.2705682 | 4318.945643 |
| <b>Min</b>                              | 24          | 0           | 27.48594813 | 4.277194236 | 0.4470432277 | 2.3866340058 | 100.714513  | 2.163112392 | 189.7770605 |
| <b>Max</b>                              | 2184.375    | 13.12513509 | 1890.019452 | 402.1541390 | 40.95042147  | 134.13888058 | 8914.591751 | 4455.079382 | 14385.14805 |

| MP | 8 | Date       | galmin | Alklbsday | Acidlbsday | Ironlbsday | Manglbsday | Alumlbsday | Sulflbsday | TSSlbsday | TDSlbsday |
|----|---|------------|--------|-----------|------------|------------|------------|------------|------------|-----------|-----------|
|    |   | 9/9/2002   | 0      | 0         | 0          | 0          | 0          | 0          | 0          | 0         | 0         |
|    |   | 9/30/2002  | 0      | 0         | 0          | 0          | 0          | 0          | 0          | 0         | 0         |
|    |   | 10/30/2002 | 0      | 0         | 0          | 0          | 0          | 0          | 0          | 0         | 0         |

|            |   |   |   |   |   |   |   |   |   |
|------------|---|---|---|---|---|---|---|---|---|
| 11/26/2002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12/23/2002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1/30/2003  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3/4/2003   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3/30/2003  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4/30/2003  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Summary for 'MP' = 8 (9 detail records)

|            |   |   |   |   |   |   |   |   |   |
|------------|---|---|---|---|---|---|---|---|---|
| <b>Sum</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <b>Avg</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <b>Min</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <b>Max</b> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| MP | 9 | Date       | galmin      | Alklbsday | Acidlbsday  | Ironlbsday  | Manglbsday   | Alumlbsday   | Sulflbsday  | TSSlbsday   | TDSlbsday   |
|----|---|------------|-------------|-----------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|
|    |   |            |             |           |             |             |              |              |             |             |             |
|    |   | 9/9/2002   | 270         | 0         | 135.9516138 | 0.876060519 | 2.0116945245 | 12.427080692 | 687.8697406 |             | 1194.038040 |
|    |   | 9/30/2002  | 25.3125     | 0         | 11.68080692 | 0.90343741  | 0.2707270353 | 0.9368980548 | 70.32819164 |             | 125.9336996 |
|    |   | 10/30/2002 | 301.5       | 0         | 126.4501427 | 2.391320749 | 4.4203201729 | 9.492818732  | 747.1065735 |             | 1246.385360 |
|    |   | 11/26/2002 | 3116.01312  | 0         | 1722.517685 | 16.47625612 | 35.573734798 | 110.84026842 | 7361.890801 | 74.89207326 | 13630.35733 |
|    |   | 12/23/2002 | 890.71065   | 0         | 509.5070269 | 4.923807403 | 10.810968428 | 33.717376781 | 1475.001435 |             | 2890.060867 |
|    |   | 1/30/2003  | 2968.113984 | 0         | 1840.504387 | 16.05091035 | 20.331153108 | 104.50926071 | 6787.751643 |             | 10914.61904 |
|    |   | 3/4/2003   | 280.255008  | 0         | 136.4001932 | 1.414520522 | 1.9533854823 | 7.8135419291 | 623.0626107 | -6.73581201 | 969.9569291 |
|    |   | 3/30/2003  | 461.488456  | 0         | 251.2266018 | 2.329253262 | 2.7729205497 | 19.521360670 | 940.0200664 | -11.0916822 | 1342.093546 |
|    |   | 4/30/2003  | 499.118625  | 0         | 264.5141723 | 3.298929586 | 2.8190852828 | 15.95482309  | 1001.075178 | 155.9493986 | 2111.314935 |

Summary for 'MP' = 9 (9 detail records)

|                    |             |             |             |              |              |              |             |             |
|--------------------|-------------|-------------|-------------|--------------|--------------|--------------|-------------|-------------|
| <b>Sum</b>         | 0           | 4998.752629 | 48.66449592 | 80.963989382 | 315.21342909 | 19694.10624  | 213.0139777 | 34424.75975 |
| <b>Avg</b>         | 979.1680381 | 0           | 555.4169588 | 5.407166213  | 8.9959988202 | 35.023714343 | 2188.234027 | 53.25349442 |
| <b>Min</b>         | 25.3125     | 0           | 11.68080692 | 0.876060519  | 0.2707270353 | 0.9368980548 | 70.32819164 | 125.9336996 |
| <b>Max</b>         | 3116.01312  | 0           | 1840.504387 | 16.47625612  | 35.573734798 | 110.84026842 | 7361.890801 | 155.9493986 |
| <b>Grand Total</b> | 349663.0219 | 125015.6968 | 13934.43602 | 1881.6815462 | 12578.132852 | 587487.5557  | 56481.84393 | 1424276.585 |

## Appendix F – Chemical Concentrations by Source Location

# Chemical Concentrations by Source Location

| MONTRPOINT 1                                     |            |            |         |       |            |            |        |            |        |            |
|--|------------|------------|---------|-------|------------|------------|--------|------------|--------|------------|
|  | DATE       | LAB_PH     | CONDUCT | ALKAL | ACID       | IRON       | MANG   | SULF       | ALUM   | TDS        |
|  | 5/30/2002  | 3.03       | 1095    | 0     | 285.2      | 43.37      | 1.36   | 379.2      | 31.01  | 754        |
|  | 6/28/2002  | 2.62       | 2508    | 0     | 1128.7     | 197.83     | 4.68   | 710.4      | 114.05 | 572        |
|  | 7/26/2002  | 2.64       | 3586    | 0     | 2184.3     | 289.44     | 14.29  | 3144.2     | 288.39 | 5096       |
|  | 9/9/2002   | 2.84       | 3704    | 0     | 2382.3     | 221.15     | 17.19  | 3052.7     | 312.87 | 5394       |
|  | 9/30/2002  | 2.91       | 2496    | 0     | 1115       | 105.75     | 8.82   | 1586.2     | 152.24 | 3384       |
|  | 10/30/2002 | 3.18       | 1210    | 0     | 359.3      | 40.01      | 2.94   | 611.5      | 48.65  | 942        |
|  | 11/26/2002 | 3.05       | 1797    | 0     | 451.2      | 68.12      | 2.81   | 590        | 53.19  | 1056       |
|  | 12/23/2002 | 4.22       | 748     | 0     | 173.2      | 35.02      | 0.82   | 239.3      | 17.34  | 400        |
|  | 1/30/2003  | 2.78       | 2742    | 0     | 1203       | 176.77     | 6.36   | 1362.8     | 142.42 | 2466       |
|  | 3/4/2003   | 3.5        | 1030    | 0     | 222        | 36.5       | 1.52   | 323.7      | 29.21  | 538        |
|  | 3/30/2003  | 2.77       | 1594    | 0     | 451.5      | 72.82      | 2.48   | 663.2      | 53.77  | 974        |
|  | 4/30/2003  | 2.59       | 2930    | 0     | 1408.8     | 253.94     | 7.08   | 1732.1     | 166.26 | 3610       |
| Summary for 'MONTRPOINT' = 1 (12 detail records) |            |            |         |       |            |            |        |            |        |            |
| Avg  |            | 3.01083333 | 2120    | 0     | 947.041667 | 128.393333 | 5.8625 | 1199.60833 | 117.45 | 2098.83333 |
| Min  |            | 2.59       | 748     | 0     | 173.2      | 35.02      | 0.82   | 239.3      | 17.34  | 400        |
| Max  |            | 4.22       | 3704    | 0     | 2382.3     | 289.44     | 17.19  | 3144.2     | 312.87 | 5394       |
| MONTRPOINT 10                                    |            |            |         |       |            |            |        |            |        |            |
|  | DATE       | LAB_PH     | CONDUCT | ALKAL | ACID       | IRON       | MANG   | SULF       | ALUM   | TDS        |
|  | 5/30/2002  | 3.46       | 761     | 0     | 75.7       | 0.2        | 0.7    | 334.9      | 6.46   | 700        |
|  | 6/28/2002  | 3.45       | 777     | 0     | 95.2       | 0.21       | 0.85   | 320        | 8.05   | 742        |
|  | 7/26/2002  |            |         |       |            |            |        |            |        |            |

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|            |      |     |   |      |      |      |       |      |     |
|------------|------|-----|---|------|------|------|-------|------|-----|
| 9/9/2002   |      |     |   |      |      |      |       |      |     |
| 10/30/2002 |      |     |   |      |      |      |       |      |     |
| 12/23/2002 | 3.5  | 654 | 0 | 79.6 | 0.26 | 0.87 | 274.7 | 6.52 | 446 |
| 1/30/2003  | 3.55 | 773 | 0 | 88.5 | 0.55 | 0.78 | 354.7 | 9.1  | 594 |
| 3/4/2003   | 3.38 | 779 | 0 | 88.9 | 0.22 | 0.8  | 359.9 | 8    | 604 |
| 3/30/2003  | 3.37 | 676 | 0 | 72.8 | 0.21 | 0.62 | 295.4 | 6.87 | 478 |
| 4/30/2003  | 3.45 | 758 | 0 | 87.6 | 0.26 | 0.76 | 338   | 7.16 | 654 |

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Summary for 'MONTRPOINT' = 10 (10 detail records)

|     |            |              |   |            |            |            |            |            |            |
|-----|------------|--------------|---|------------|------------|------------|------------|------------|------------|
| Avg | 3.45142857 | 739.71428571 | 0 | 84.0428571 | 0.27285714 | 0.76857143 | 325.371429 | 7.45142857 | 602.571429 |
| Min | 3.37       | 654          | 0 | 72.8       | 0.2        | 0.62       | 274.7      | 6.46       | 446        |
| Max | 3.55       | 779          | 0 | 95.2       | 0.55       | 0.87       | 359.9      | 9.1        | 742        |

### MONTRPOINT 11

| DATE       | LAB_PH | CONDUCT | ALKAL | ACID  | IRON | MANG | SULF  | ALUM  | TDS |
|------------|--------|---------|-------|-------|------|------|-------|-------|-----|
| 5/30/2002  | 3.6    | 678     | 0     | 65.7  | 0.23 | 0.9  | 281.8 | 6.3   | 634 |
| 6/28/2002  | 3.7    | 662     | 0     | 74.7  | 0.45 | 1.07 | 300.4 | 6.99  | 638 |
| 7/26/2002  | 3.54   | 801     | 0     | 88.4  | 1.04 | 1.29 | 377.7 | 9.2   | 748 |
| 9/9/2002   | 3.62   | 864     | 0     | 102.3 | 2.47 | 1.6  | 425.8 | 12.46 | 824 |
| 9/30/2002  | 3.83   | 779     | 0     | 72    | 2.86 | 1.91 | 344.8 | 8.11  | 772 |
| 10/30/2002 | 4.02   | 676     | 0     | 61.2  | 0.76 | 1.88 | 361.7 | 7.08  | 556 |
| 11/26/2002 | 3.79   | 773     | 0     | 92.8  | 0.44 | 1.46 | 385.3 | 8.35  | 602 |
| 12/23/2002 | 3.75   | 596     | 0     | 67.9  | 0.15 | 1.08 | 253.3 | 5.59  | 434 |
| 1/30/2003  | 3.68   | 710     | 0     | 66.4  | 0.19 | 1.05 | 339.2 | 7.1   | 522 |
| 3/4/2003   | 3.55   | 687     | 0     | 72.4  | 0.2  | 1.04 | 307.1 | 6.79  | 524 |
| 3/30/2003  | 3.53   | 607     | 0     | 61.3  | 0.15 | 0.76 | 273.2 | 6.06  | 392 |
| 4/30/2003  | 3.28   | 684     | 0     | 74.4  | 0.38 | 0.88 | 313.4 | 6.54  | 608 |

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Summary for 'MONTRPOINT' = 11 (12 detail records)

|     |        |        |   |            |            |            |            |        |       |
|-----|--------|--------|---|------------|------------|------------|------------|--------|-------|
| Avg | 3.6575 | 709.75 | 0 | 74.9583333 | 0.77666667 | 1.24333333 | 330.308333 | 7.5475 | 604.5 |
| Min | 3.28   | 596    | 0 | 61.2       | 0.15       | 0.76       | 253.3      | 5.59   | 392   |
| Max | 4.02   | 864    | 0 | 102.3      | 2.86       | 1.91       | 425.8      | 12.46  | 824   |

### MONTRPOINT 12

| DATE       | LAB_PH | CONDUCT | ALKAL | ACID  | IRON | MANG | SULF  | ALUM | TDS  |
|------------|--------|---------|-------|-------|------|------|-------|------|------|
| 5/30/2002  | 3.53   | 1003    | 0     | 51.9  | 1.8  | 4.3  | 455.6 | 2.51 | 888  |
| 6/28/2002  | 3.44   | 987     | 0     | 64.7  | 2.06 | 3.48 | 446.2 | 3    | 910  |
| 7/26/2002  | 3.3    | 1056    | 0     | 73.7  | 1.77 | 3.32 | 438.1 | 3.9  | 824  |
| 9/9/2002   | 3.18   | 1155    | 0     | 101.6 | 2.65 | 2.99 | 537   | 7.26 | 938  |
| 9/30/2002  | 3.23   | 1182    | 0     | 88.5  | 2.52 | 3.13 | 518.8 | 4.9  | 1042 |
| 10/30/2002 | 3.23   | 1173    | 0     | 91.2  | 2.73 | 3.03 | 546.4 | 5.68 | 944  |
| 11/26/2002 | 3.31   | 1176    | 0     | 107.6 | 2.54 | 2.61 | 519.6 | 5.46 | 814  |
| 12/23/2002 | 3.31   | 1041    | 0     | 94.8  | 2.34 | 3.5  | 437.7 | 4.04 | 746  |
| 1/30/2003  | 3.37   | 1061    | 0     | 68.1  | 2.39 | 3.79 | 515.9 | 3.91 | 774  |
| 3/4/2003   | 3.28   | 1037    | 0     | 79.3  | 1.52 | 3.56 | 508.5 | 3.7  | 786  |
| 3/30/2003  | 3.39   | 950     | 0     | 61.7  | 1.7  | 3.77 | 426.7 | 3.35 | 668  |
| 4/30/2003  | 3.46   | 992     | 0     | 65.2  | 1.59 | 3.93 | 439.2 | 2.33 | 848  |

Summary for 'MONTRPOINT' = 12 (12 detail records)

|     |            |         |   |        |            |            |         |      |       |
|-----|------------|---------|---|--------|------------|------------|---------|------|-------|
| Avg | 3.33583333 | 1067.75 | 0 | 79.025 | 2.13416667 | 3.45083333 | 482.475 | 4.17 | 848.5 |
| Min | 3.18       | 950     | 0 | 51.9   | 1.52       | 2.61       | 426.7   | 2.33 | 668   |
| Max | 3.53       | 1182    | 0 | 107.6  | 2.73       | 4.3        | 546.4   | 7.26 | 1042  |

### MONTRPOINT 13

| DATE      | LAB_PH | CONDUCT | ALKAL | ACID | IRON  | MANG | SULF  | ALUM | TDS |
|-----------|--------|---------|-------|------|-------|------|-------|------|-----|
| 5/30/2002 | 6.28   | 391     | 28.1  | 12.9 | 8.22  | 0.83 | 142.8 | -0.1 | 316 |
| 6/28/2002 | 7.07   | 367     | 30.7  | 7.3  | 8.12  | 0.8  | 124.1 | 0.55 | 304 |
| 7/26/2002 | 6.58   | 339     | 19    | 13.9 | 10.09 | 0.96 | 127.6 | 0.25 | 232 |

|            |      |     |      |      |       |      |       |      |     |
|------------|------|-----|------|------|-------|------|-------|------|-----|
| 9/9/2002   | 6.11 | 344 | 22.9 | 29.6 | 11.98 | 0.95 | 140.8 | 2.06 | 262 |
| 9/30/2002  | 6.39 | 373 | 30   | 20.8 | 10.71 | 1.02 | 146.4 | -0.1 | 268 |
| 10/30/2002 | 6.62 | 424 | 49.2 | 17.1 | 8.33  | 0.7  | 148.4 | 0.17 | 338 |
| 11/26/2002 | 6.71 | 442 | 37.5 | 9.9  | 10.75 | 1.18 | 123   | 0.85 | 294 |
| 12/23/2002 | 6.43 | 371 | 27.6 | 13.6 | 9.32  | 0.87 | 141.5 | -0.1 | 268 |
| 1/30/2003  | 6.37 | 442 | 37.7 | 12.3 | 9.06  | 1.47 | 181.2 | -0.1 | 316 |
| 3/4/2003   | 6.55 | 435 | 35   | 23.5 | 7.43  | 0.85 | 156   | -0.1 | 276 |
| 3/30/2003  | 6.67 | 443 | 35.2 | 13.1 | 8.08  | 0.88 | 166.8 | 0.81 | 274 |
| 4/30/2003  | 7.16 | 391 | 26.6 | 2.1  | 8.9   | 1.01 | 135.2 | -0.1 | 338 |

Summary for 'MONTRPOINT' = 13 (12 detail records)

|     |            |              |        |        |            |      |            |            |       |
|-----|------------|--------------|--------|--------|------------|------|------------|------------|-------|
| Avg | 6.57833333 | 396.83333333 | 31.625 | 14.675 | 9.24916667 | 0.96 | 144.483333 | 0.34083333 | 290.5 |
| Min | 6.11       | 339          | 19     | 2.1    | 7.43       | 0.7  | 123        | -0.1       | 232   |
| Max | 7.16       | 443          | 49.2   | 29.6   | 11.98      | 1.47 | 181.2      | 2.06       | 338   |

#### MONTRPOINT 14

| DATE       | LAB_PH | CONDUCT | ALKAL | ACID | IRON  | MANG | SULF  | ALUM  | TDS |
|------------|--------|---------|-------|------|-------|------|-------|-------|-----|
| 5/30/2002  | 4.01   | 748     | 0     | 88.4 | 0.06  | 0.71 | 388   | 11.8  | 798 |
| 6/28/2002  | 3.91   | 676     | 0     | 82.8 | -0.04 | 0.51 | 319.1 | 9.15  | 668 |
| 7/26/2002  | 3.79   | 725     | 0     | 78.4 | 0.16  | 0.58 | 346.5 | 9.18  | 594 |
| 9/9/2002   | 3.79   | 803     | 0     | 90.3 | 0.08  | 0.68 | 386.3 | 11.75 | 790 |
| 9/30/2002  | 3.77   | 816     | 0     | 77.6 | -0.04 | 0.76 | 406.8 | 10.07 | 808 |
| 10/30/2002 | 3.76   | 831     | 0     | 83.7 | 0.08  | 0.75 | 428.1 | 10.62 | 778 |
| 11/26/2002 | 3.74   | 808     | 0     | 94.8 | -0.04 | 0.7  | 374.5 | 10.11 | 624 |
| 12/23/2002 | 3.77   | 682     | 0     | 77.6 | -0.04 | 0.51 | 304.4 | 6.12  | 534 |
| 1/30/2003  | 4      | 612     | 0     | 53.1 | -0.04 | 0.46 | 302.7 | 5.61  | 442 |
| 3/4/2003   | 3.78   | 698     | 0     | 71.2 | 0.12  | 0.57 | 361.7 | 7.26  | 538 |

|           |      |     |   |      |       |      |       |      |     |
|-----------|------|-----|---|------|-------|------|-------|------|-----|
| 3/30/2003 | 3.86 | 642 | 0 | 66.5 | -0.04 | 0.51 | 327.3 | 8.34 | 468 |
| 4/30/2003 | 3.78 | 649 | 0 | 57.5 | 0.05  | 0.55 | 318.3 | 9.38 | 596 |

Summary for 'MONTRPOINT' = 14 (12 detail records)

|     |      |              |   |        |            |        |            |            |       |
|-----|------|--------------|---|--------|------------|--------|------------|------------|-------|
| Avg | 3.83 | 724.16666667 | 0 | 76.825 | 0.02583333 | 0.6075 | 355.308333 | 9.11583333 | 636.5 |
| Min | 3.74 | 612          | 0 | 53.1   | -0.04      | 0.46   | 302.7      | 5.61       | 442   |
| Max | 4.01 | 831          | 0 | 94.8   | 0.16       | 0.76   | 428.1      | 11.8       | 808   |

### MONTRPOINT 15

| DATE       | LAB_PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF  | ALUM | TDS |
|------------|--------|---------|-------|------|------|------|-------|------|-----|
| 5/30/2002  | 6.54   | 437     | 43    | 12.3 | 0.21 | 0.18 | 148.2 | 0.21 | 342 |
| 6/28/2002  | 6.83   | 446     | 48.8  | 5.2  | 0.19 | 0.16 | 163.7 | 0.88 | 380 |
| 7/26/2002  | 7.22   | 495     | 57.2  | 11.1 | 0.21 | 0.18 | 193.8 | 0.86 | 360 |
| 9/9/2002   | 6.6    | 536     | 56.7  | 12.8 | 0.33 | 0.23 | 184.2 | 2.49 | 440 |
| 9/30/2002  | 6.75   | 529     | 62.7  | 10   | 0.25 | 0.23 | 198.1 | 0.62 | 400 |
| 10/30/2002 | 6.62   | 534     | 61.9  | 12.5 | 0.19 | 0.19 | 187.4 | -0.1 | 412 |
| 11/26/2002 | 6.56   | 508     | 47.7  | 10.4 | 0.05 | 0.18 | 178.9 | 0.47 | 350 |
| 12/23/2002 | 6.49   | 456     | 36.7  | 13.3 | 0.21 | 0.15 | 152.8 | 0.29 | 328 |
| 1/30/2003  | 6.68   | 489     | 45.9  | 6.4  | 0.11 | 0.18 | 186.1 | -0.1 | 322 |
| 3/4/2003   | 6.95   | 483     | 43.8  | 9.6  | 0.05 | 0.15 | 165.2 | -0.1 | 370 |
| 3/30/2003  | 6.84   | 455     | 42.5  | 7.1  | 0.15 | 0.14 | 185.5 | 0.58 | 294 |
| 4/30/2003  | 7.5    | 462     | 46.3  | 1.6  | 0.18 | 0.15 | 166.2 | 0.29 | 384 |

Summary for 'MONTRPOINT' = 15 (12 detail records)

|     |            |              |            |            |        |            |            |        |            |
|-----|------------|--------------|------------|------------|--------|------------|------------|--------|------------|
| Avg | 6.79833333 | 485.83333333 | 49.4333333 | 9.35833333 | 0.1775 | 0.17666667 | 175.841667 | 0.5325 | 365.166667 |
| Min | 6.49       | 437          | 36.7       | 1.6        | 0.05   | 0.14       | 148.2      | -0.1   | 294        |
| Max | 7.5        | 536          | 62.7       | 13.3       | 0.33   | 0.23       | 198.1      | 2.49   | 440        |

### MONTRPOINT 16

| DATE      | LAB_PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF | ALUM | TDS |
|-----------|--------|---------|-------|------|------|------|------|------|-----|
| 5/30/2002 | 7.32   | 321     | 61.4  | 3.5  | 0.39 | 0.17 | 80.7 | -0.1 | 246 |

|            |      |     |       |     |      |      |       |      |     |
|------------|------|-----|-------|-----|------|------|-------|------|-----|
| 6/28/2002  | 7.64 | 443 | 119.1 | 1.7 | 0.29 | 0.19 | 98.5  | 0.74 | 286 |
| 7/26/2002  | 8.33 | 660 | 213.9 | 0   | 0.46 | 0.15 | 129.1 | 0.99 | 424 |
| 9/9/2002   | 8.29 | 773 | 274   | -1  | 0.31 | 0.12 | 141.1 | 0.94 | 534 |
| 9/30/2002  | 8.16 | 626 | 200.7 | 1.5 | 0.28 | 0.22 | 117.3 | -0.1 | 426 |
| 10/30/2002 | 7.21 | 385 | 86.4  | 4.7 | 0.53 | 0.46 | 91.4  | 0.23 | 246 |
| 11/26/2002 | 7.49 | 360 | 81    | 3.7 | 0.32 | 0.18 | 73.6  | 0.2  | 226 |
| 12/23/2002 | 6.87 | 219 | 25.5  | 3.9 | 0.19 | 0.11 | 49.6  | -0.1 | 154 |
| 1/30/2003  | 7.83 | 511 | 144.1 | 1.2 | 0.59 | 0.22 | 104.3 | 0.21 | 302 |
| 3/4/2003   | 7.55 | 311 | 59.1  | 3.2 | 0.31 | 0.13 | 61.7  | 0.19 | 178 |
| 3/30/2003  | 7.48 | 338 | 70.8  | 6.3 | 0.37 | 0.14 | 74.9  | 0.68 | 178 |
| 4/30/2003  | 8.01 | 488 | 132.8 | -1  | 0.31 | 0.18 | 105.7 | -0.1 | 328 |

Summary for 'MONTRPOINT' = 16 (12 detail records)

|     |            |              |       |            |        |            |            |       |     |
|-----|------------|--------------|-------|------------|--------|------------|------------|-------|-----|
| Avg | 7.68166667 | 452.91666667 | 122.4 | 2.30833333 | 0.3625 | 0.18916667 | 93.9916667 | 0.315 | 294 |
| Min | 6.87       | 219          | 25.5  | -1         | 0.19   | 0.11       | 49.6       | -0.1  | 154 |
| Max | 8.33       | 773          | 274   | 6.3        | 0.59   | 0.46       | 141.1      | 0.99  | 534 |

### MONTRPOINT 17

| DATE       | LAB_PH | CONDUCT | ALKAL | ACID | IRON | MANG  | SULF | ALUM | TDS |
|------------|--------|---------|-------|------|------|-------|------|------|-----|
| 5/30/2002  | 6.91   | 150     | 24.9  | 2.8  | 0.28 | 0.03  | 28.6 | -0.1 | 112 |
| 6/28/2002  | 6.77   | 158     | 35.2  | 2.5  | 0.36 | -0.02 | 28.7 | 1.15 | 120 |
| 7/26/2002  | 7.37   | 320     | 54.2  | 2.3  | 0.38 | 0.05  | 85.4 | 0.93 | 248 |
| 9/9/2002   | 7.33   | 218     | 97.8  | 5.2  | 0.61 | 0.17  | 23.2 | 1.92 | 128 |
| 9/30/2002  | 7.52   | 208     | 62.9  | 2.9  | 0.2  | 0.05  | 32.6 | 0.15 | 156 |
| 10/30/2002 | 6.69   | 184     | 30    | 3.7  | 0.16 | 0.08  | 40.8 | -0.1 | 132 |
| 11/26/2002 | 6.76   | 192     | 23.3  | 3.7  | 0.05 | 0.03  | 41.2 | -0.1 | 126 |
| 12/23/2002 | 6.93   | 169     | 26    | 5.3  | 0.04 | -0.02 | 36.7 | -0.1 | 112 |

|           |      |     |      |     |      |       |      |      |     |
|-----------|------|-----|------|-----|------|-------|------|------|-----|
| 1/30/2003 | 6.84 | 214 | 31   | 2.5 | 0.06 | 0.03  | 54.9 | -0.1 | 116 |
| 3/4/2003  | 7.05 | 193 | 21.6 | 1.3 | 0.08 | -0.02 | 44   | 0.1  | 130 |
| 3/30/2003 | 6.71 | 160 | 22.1 | 2.9 | 0.12 | -0.02 | 39.4 | 0.48 | 88  |
| 4/30/2003 | 7.19 | 206 | 33.4 | 1.2 | 0.16 | 0.02  | 51.2 | -0.1 | 156 |

Summary for 'MONTRPOINT' = 17 (12 detail records)

|     |            |              |           |       |            |            |        |            |            |
|-----|------------|--------------|-----------|-------|------------|------------|--------|------------|------------|
| Avg | 7.00583333 | 197.66666667 | 38.533333 | 3.025 | 0.20833333 | 0.03166667 | 42.225 | 0.34416667 | 135.333333 |
| Min | 6.69       | 150          | 21.6      | 1.2   | 0.04       | -0.02      | 23.2   | -0.1       | 88         |
| Max | 7.52       | 320          | 97.8      | 5.3   | 0.61       | 0.17       | 85.4   | 1.92       | 248        |

### MONTRPOINT 18

| DATE       | LAB_PH | CONDUCT | ALKAL | ACID | IRON  | MANG | SULF  | ALUM | TDS |
|------------|--------|---------|-------|------|-------|------|-------|------|-----|
| 9/9/2002   | 4.35   | 874     | 0     | 30.8 | -0.04 | 0.72 | 422.2 | 3.79 | 796 |
| 9/30/2002  | 4.38   | 873     | 0     | 27.7 | 0.05  | 0.64 | 443.5 | 2.2  | 776 |
| 10/30/2002 | 4.33   | 863     | 0     | 32.1 | 4.14  | 0.58 | 417.3 | 2.89 | 744 |
| 11/26/2002 | 4.07   | 852     | 0     | 67.1 | 0.1   | 1.19 | 432.2 | 5.49 | 654 |
| 12/23/2002 | 3.91   | 739     | 0     | 46.7 | 0.19  | 0.92 | 363   | 3.8  | 648 |
| 1/30/2003  | 4.65   | 797     | -1    | 26.1 | 0.09  | 1.2  | 377.5 | 2.5  | 586 |
| 3/4/2003   | 3.93   | 751     | 0     | 29.5 | 0.16  | 1.14 | 374.7 | 3.13 | 574 |
| 3/30/2003  | 4.61   | 670     | -1    | 22.9 | 0.06  | 0.81 | 329.3 | 2    | 492 |
| 4/30/2003  | 4.61   | 688     | -1    | 15.5 | 0.13  | 1.02 | 367.6 | 1.7  | 652 |

Summary for 'MONTRPOINT' = 18 (9 detail records)

|     |            |              |            |            |            |            |            |            |     |
|-----|------------|--------------|------------|------------|------------|------------|------------|------------|-----|
| Avg | 4.31555556 | 789.66666667 | -0.3333333 | 33.1555556 | 0.54222222 | 0.91333333 | 391.922222 | 3.05555556 | 658 |
| Min | 3.91       | 670          | -1         | 15.5       | -0.04      | 0.58       | 329.3      | 1.7        | 492 |
| Max | 4.65       | 874          | 0          | 67.1       | 4.14       | 1.2        | 443.5      | 5.49       | 796 |

### MONTRPOINT 19

| DATE      | LAB_PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF  | ALUM | TDS |
|-----------|--------|---------|-------|------|------|------|-------|------|-----|
| 9/9/2002  | 6.9    | 484     | 104.6 | 10.7 | 0.85 | 0.14 | 138.4 | 2.04 | 344 |
| 9/30/2002 | 7.19   | 493     | 103.6 | 9.2  | 0.72 | 0.17 | 144.9 | -0.1 | 356 |

|            |      |     |       |      |      |      |       |      |     |
|------------|------|-----|-------|------|------|------|-------|------|-----|
| 10/30/2002 | 7.15 | 492 | 104.1 | 10.3 | 0.52 | 0.13 | 135.5 | -0.1 | 336 |
| 11/26/2002 | 7.03 | 482 | 92.4  | 11.3 | 0.43 | 0.08 | 140.4 | 0.26 | 336 |
| 12/23/2002 | 6.8  | 452 | 95.6  | 8.5  | 0.36 | 0.06 | 111.3 | -0.1 | 336 |
| 1/30/2003  | 6.92 | 465 | 86.9  | 5.3  | 0.37 | 0.08 | 134.3 | -0.1 | 280 |
| 3/4/2003   | 7.05 | 457 | 83.5  | 10.7 | 0.39 | 0.06 | 126.3 | -0.1 | 314 |
| 3/30/2003  | 7.2  | 434 | 83.7  | 7.5  | 0.29 | 0.05 | 135.9 | 0.41 | 268 |
| 4/30/2003  | 7.66 | 433 | 81.8  | 1.6  | 0.37 | 0.06 | 126.1 | -0.1 | 308 |

Summary for 'MONTRPOINT' = 19 (9 detail records)

|     |      |              |            |            |            |            |            |            |            |
|-----|------|--------------|------------|------------|------------|------------|------------|------------|------------|
| Avg | 7.1  | 465.77777778 | 92.9111111 | 8.34444444 | 0.47777778 | 0.09222222 | 132.566667 | 0.23444444 | 319.777778 |
| Min | 6.8  | 433          | 81.8       | 1.6        | 0.29       | 0.05       | 111.3      | -0.1       | 268        |
| Max | 7.66 | 493          | 104.6      | 11.3       | 0.85       | 0.17       | 144.9      | 2.04       | 356        |

## MONTRPOINT 2

| DATE       | LAB_PH | CONDUCT | ALKAL | ACID  | IRON  | MANG | SULF   | ALUM  | TDS  |
|------------|--------|---------|-------|-------|-------|------|--------|-------|------|
| 5/30/2002  | 3.09   | 1262    | 0     | 228.3 | 19.1  | 2.01 | 526.4  | 22.29 | 1132 |
| 6/28/2002  | 6.02   | 772     | 5.7   | 8.4   | 6.27  | 2.11 | 360.1  | 4.34  | 746  |
| 7/26/2002  | 4.33   | 1443    | 0     | 194.5 | 18.12 | 5.36 | 937.9  | 34.84 | 1660 |
| 9/9/2002   | 2.87   | 2220    | 0     | 699.5 | 43.81 | 5.64 | 1391.8 | 85.33 | 2956 |
| 9/30/2002  | 2.98   | 2346    | 0     | 736.7 | 51.56 | 6.27 | 1434.7 | 89.28 | 3348 |
| 10/30/2002 | 2.96   | 2290    | 0     | 752.9 | 50.41 | 5.59 | 1481.2 | 89.52 | 2566 |
| 11/26/2002 | 3.06   | 2320    | 0     | 758.5 | 48.47 | 5.16 | 1457   | 96.44 | 2318 |
| 12/23/2002 | 3.18   | 1311    | 0     | 313.9 | 15.97 | 2.12 | 648.9  | 34.63 | 1156 |
| 1/30/2003  | 3.06   | 1422    | 0     | 317.3 | 18.25 | 2.57 | 686.4  | 35.29 | 1094 |
| 3/4/2003   | 3.1    | 1146    | 0     | 222.5 | 13.5  | 1.94 | 515.9  | 27.09 | 808  |
| 3/30/2003  | 2.94   | 1257    | 0     | 244.5 | 17.45 | 1.97 | 547.8  | 25.41 | 988  |
| 4/30/2003  | 2.93   | 1328    | 0     | 242.5 | 18.1  | 2.07 | 508.2  | 26.54 | 1228 |

Summary for 'MONTRPOINT' = 2 (12 detail records)

|     |            |              |       |            |            |        |            |            |            |
|-----|------------|--------------|-------|------------|------------|--------|------------|------------|------------|
| Avg | 3.37666667 | 1593.0833333 | 0.475 | 393.291667 | 26.7508333 | 3.5675 | 874.691667 | 47.5833333 | 1666.66667 |
| Min | 2.87       | 772          | 0     | 8.4        | 6.27       | 1.94   | 360.1      | 4.34       | 746        |
| Max | 6.02       | 2346         | 5.7   | 758.5      | 51.56      | 6.27   | 1481.2     | 96.44      | 3348       |

**MONTRPOINT 3**

| DATE       | LAB_PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF  | ALUM | TDS |
|------------|--------|---------|-------|------|------|------|-------|------|-----|
| 5/30/2002  | 3.48   | 656     | 0     | 63.1 | 0.38 | 0.56 | 259.4 | 4.78 | 524 |
| 6/28/2002  | 3.47   | 658     | 0     | 64.5 | 0.32 | 0.52 | 257.6 | 4.51 | 526 |
| 7/26/2002  | 3.29   | 766     | 0     | 77.9 | 0.46 | 0.71 | 327.3 | 7.03 | 628 |
| 9/9/2002   | 3.4    | 830     | 0     | 91.7 | 0.72 | 0.79 | 355.8 | 6.91 | 684 |
| 9/30/2002  | 3.4    | 837     | 0     | 82.7 | 0.73 | 0.8  | 357.2 | 6.28 | 738 |
| 10/30/2002 | 3.35   | 846     | 0     | 87.9 | 0.54 | 0.81 | 375.5 | 8.16 | 634 |
| 11/26/2002 | 3.56   | 700     | 0     | 72.8 | 0.28 | 0.56 | 283   | 5.01 | 432 |
| 12/23/2002 | 3.41   | 643     | 0     | 67.6 | 0.29 | 0.5  | 254.2 | 4.19 | 438 |
| 1/30/2003  |        |         |       |      |      |      |       |      |     |
| 3/4/2003   | 3.24   | 694     | 0     | 67.5 | 0.35 | 0.59 | 284.8 | 5.38 | 436 |
| 3/30/2003  | 3.36   | 665     | 0     | 73.2 | 0.41 | 0.56 | 281.4 | 5.12 | 416 |
| 4/30/2003  | 3.38   | 696     | 0     | 67.6 | 0.47 | 0.61 | 294.6 | 4.84 | 602 |

Summary for 'MONTRPOINT' = 3 (12 detail records)

|     |            |              |   |            |      |            |       |            |            |
|-----|------------|--------------|---|------------|------|------------|-------|------------|------------|
| Avg | 3.39454545 | 726.45454545 | 0 | 74.2272727 | 0.45 | 0.63727273 | 302.8 | 5.65545455 | 550.727273 |
| Min | 3.24       | 643          | 0 | 63.1       | 0.28 | 0.5        | 254.2 | 4.19       | 416        |
| Max | 3.56       | 846          | 0 | 91.7       | 0.73 | 0.81       | 375.5 | 8.16       | 738        |

**MONTRPOINT 4**

| DATE      | LAB_PH | CONDUCT | ALKAL | ACID   | IRON   | MANG | SULF   | ALUM   | TDS  |
|-----------|--------|---------|-------|--------|--------|------|--------|--------|------|
| 5/30/2002 | 2.74   | 1613    | 0     | 571.3  | 44.02  | 3.15 | 743.7  | 59.37  | 1740 |
| 6/28/2002 | 2.63   | 2312    | 0     | 996    | 137.58 | 5.2  | 1204.1 | 97.05  | 2160 |
| 7/26/2002 | 2.58   | 2688    | 0     | 1553.4 | 202.16 | 6.96 | 1989.5 | 164.47 | 3638 |

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| 9/9/2002   |      |      |   |        |       |      |        |        |      |
|------------|------|------|---|--------|-------|------|--------|--------|------|
| 9/30/2002  | 2.71 | 1813 | 0 | 636.3  | 63.86 | 4.69 | 764.5  | 54.95  | 1888 |
| 10/30/2002 | 2.73 | 1788 | 0 | 580.3  | 39.42 | 5.05 | 849.6  | 62.2   | 1704 |
| 11/26/2002 | 2.95 | 1434 | 0 | 460.1  | 35.74 | 3.85 | 624.1  | 45.98  | 1070 |
| 12/23/2002 | 3.07 | 985  | 0 | 243.1  | 9.64  | 1.79 | 359.6  | 24.19  | 736  |
| 1/30/2003  | 2.87 | 2170 | 0 | 1018   | 79.21 | 4.96 | 1303.5 | 134.51 | 2208 |
| 3/4/2003   | 2.71 | 1592 | 0 | 595.7  | 55.09 | 2.88 | 739.3  | 67.01  | 1360 |
| 3/30/2003  | 2.67 | 1862 | 0 | 711.5  | 53.28 | 2.94 | 851.1  | 80.37  | 1748 |
| 4/30/2003  | 2.7  | 2272 | 0 | 1024.8 | 83.44 | 3.78 | 1280.6 | 114.5  | 2744 |

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Summary for 'MONTRPOINT' = 4 (12 detail records)

|     |      |              |   |            |        |            |        |            |            |
|-----|------|--------------|---|------------|--------|------------|--------|------------|------------|
| Avg | 2.76 | 1866.2727273 | 0 | 762.772727 | 73.04  | 4.11363636 | 973.6  | 82.2363636 | 1908.72727 |
| Min | 2.58 | 985          | 0 | 243.1      | 9.64   | 1.79       | 359.6  | 24.19      | 736        |
| Max | 3.07 | 2688         | 0 | 1553.4     | 202.16 | 6.96       | 1989.5 | 164.47     | 3638       |

**MONTRPOINT** 5

| DATE       | LAB_PH | CONDUCT | ALKAL | ACID   | IRON   | MANG | SULF   | ALUM  | TDS  |
|------------|--------|---------|-------|--------|--------|------|--------|-------|------|
| 5/30/2002  | 2.57   | 1727    | 0     | 519.1  | 32.11  | 1.84 | 777.8  | 34.59 | 1596 |
| 6/28/2002  | 2.48   | 2866    | 0     | 815.8  | 64.34  | 2.3  | 1106.3 | 52.73 | 2618 |
| 7/26/2002  | 2.29   | 3450    | 0     | 1098.3 | 101.22 | 2.83 | 1502.4 | 72.11 | 3158 |
| 9/9/2002   | 2.37   | 3644    | 0     | 1202.7 | 105.74 | 3.42 | 1689.3 | 60.19 | 3110 |
| 9/30/2002  | 2.39   | 3354    | 0     | 1116   | 106.27 | 3.45 | 1418.9 | 78.07 | 3192 |
| 10/30/2002 | 2.5    | 2586    | 0     | 874.7  | 93.38  | 3.02 | 1227.6 | 66.73 | 2342 |
| 11/26/2002 | 2.62   | 2728    | 0     | 977.6  | 119.54 | 3.08 | 1266.4 | 70.07 | 2014 |
| 12/23/2002 | 2.76   | 1851    | 0     | 593.7  | 76.57  | 2.28 | 683    | 42.07 | 1512 |
| 1/30/2003  | 2.75   | 2196    | 0     | 735.1  | 126.16 | 2.36 | 847.1  | 56.47 | 1782 |
| 3/4/2003   | 2.61   | 1813    | 0     | 559.3  | 82.65  | 1.79 | 752.3  | 42.31 | 1498 |

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|           |      |      |   |       |       |      |       |       |      |
|-----------|------|------|---|-------|-------|------|-------|-------|------|
| 3/30/2003 | 2.69 | 1667 | 0 | 428.9 | 52.38 | 1.46 | 637.6 | 32.23 | 1046 |
| 4/30/2003 | 2.63 | 2144 | 0 | 553.3 | 58.93 | 1.7  | 841.4 | 38.67 | 1854 |

Summary for 'MONTRPOINT' = 5 (12 detail records)

|     |       |              |   |            |            |            |            |            |        |
|-----|-------|--------------|---|------------|------------|------------|------------|------------|--------|
| Avg | 2.555 | 2502.1666667 | 0 | 789.541667 | 84.9408333 | 2.46083333 | 1062.50833 | 53.8533333 | 2143.5 |
| Min | 2.29  | 1667         | 0 | 428.9      | 32.11      | 1.46       | 637.6      | 32.23      | 1046   |
| Max | 2.76  | 3644         | 0 | 1202.7     | 126.16     | 3.45       | 1689.3     | 78.07      | 3192   |

### MONTRPOINT 6

| DATE       | LAB_PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF  | ALUM | TDS |
|------------|--------|---------|-------|------|------|------|-------|------|-----|
| 5/30/2002  | 4.07   | 489     | 0     | 34.1 | 0.52 | 2.04 | 221.5 | 3.1  | 424 |
| 6/28/2002  | 3.85   | 557     | 0     | 48   | 0.93 | 2.7  | 234.3 | 2.69 | 498 |
| 7/26/2002  | 3.68   | 703     | 0     | 64.9 | 1.3  | 3.99 | 330   | 4.95 | 638 |
| 9/9/2002   | 3.74   | 884     | 0     | 72.1 | 1.98 | 6.02 | 434.7 | 3.95 | 820 |
| 9/30/2002  | 3.88   | 813     | 0     | 56.3 | 1.36 | 6.08 | 423.3 | 4.95 | 778 |
| 10/30/2002 | 4.18   | 594     | 0     | 44.1 | 0.76 | 3.37 | 273.2 | 3.16 | 470 |
| 11/26/2002 | 4.18   | 734     | 0     | 63.9 | 0.87 | 4.42 | 377   | 5.44 | 596 |
| 12/23/2002 | 4.19   | 551     | 0     | 51.2 | 0.35 | 2.66 | 240.3 | 4.57 | 450 |
| 1/30/2003  |        |         |       |      |      |      |       |      |     |
| 3/4/2003   | 4.15   | 556     | 0     | 47.3 | 0.82 | 2.55 | 263.5 | 4.18 | 446 |
| 3/30/2003  | 4.08   | 517     | 0     | 41.3 | 0.39 | 2.32 | 231.6 | 4.24 | 346 |
| 4/30/2003  | 4.02   | 565     | 0     | 47.3 | 0.52 | 2.68 | 271.9 | 3.5  | 538 |

Summary for 'MONTRPOINT' = 6 (12 detail records)

|     |            |     |   |            |            |      |            |            |            |
|-----|------------|-----|---|------------|------------|------|------------|------------|------------|
| Avg | 4.00181818 | 633 | 0 | 51.8636364 | 0.89090909 | 3.53 | 300.118182 | 4.06636364 | 545.818182 |
| Min | 3.68       | 489 | 0 | 34.1       | 0.35       | 2.04 | 221.5      | 2.69       | 346        |
| Max | 4.19       | 884 | 0 | 72.1       | 1.98       | 6.08 | 434.7      | 5.44       | 820        |

### MONTRPOINT 7

| DATE      | LAB_PH | CONDUCT | ALKAL | ACID  | IRON | MANG | SULF  | ALUM  | TDS |
|-----------|--------|---------|-------|-------|------|------|-------|-------|-----|
| 5/30/2002 | 3.08   | 1139    | 0     | 168.3 | 9.96 | 1.35 | 364.3 | 12.88 | 846 |

|            |      |      |    |       |       |      |       |       |     |
|------------|------|------|----|-------|-------|------|-------|-------|-----|
| 6/28/2002  | 3.13 | 1039 | 0  | 154.2 | 17.42 | 1.36 | 405.3 | 11.68 | 806 |
| 7/26/2002  | 3.26 | 877  | 0  | 122   | 15.21 | 1.51 | 366.7 | 10.75 | 712 |
| 9/9/2002   | 3.82 | 805  | 0  | 95.3  | 14.83 | 1.55 | 349.2 | 9.37  | 658 |
| 9/30/2002  | 4.25 | 792  | 0  | 83.7  | 16.19 | 1.72 | 342   | 6.62  | 664 |
| 10/30/2002 | 4.57 | 774  | -1 | 72    | 15.32 | 1.56 | 339.6 | 5.11  | 548 |
| 11/26/2002 | 3.55 | 844  | 0  | 106.4 | 14.79 | 1.58 | 357.8 | 8.42  | 566 |
| 12/23/2002 | 3.61 | 949  | 0  | 107.6 | 11.12 | 1.72 | 357.8 | 7.5   | 668 |
| 1/30/2003  | 3.4  | 891  | 0  | 133.6 | 8.74  | 1.37 | 380.3 | 11.14 | 590 |
| 3/4/2003   | 3.27 | 896  | 0  | 108   | 14.09 | 1.74 | 397.9 | 9.6   | 568 |
| 3/30/2003  | 3.47 | 924  | 0  | 120.1 | 20.77 | 1.73 | 419   | 11.09 | 594 |
| 4/30/2003  | 3.32 | 880  | 0  | 113.7 | 24.29 | 1.92 | 362.2 | 14.2  | 750 |

Summary for 'MONTRPOINT' = 7 (12 detail records)

|     |            |              |            |            |         |        |         |            |            |
|-----|------------|--------------|------------|------------|---------|--------|---------|------------|------------|
| Avg | 3.56083333 | 900.83333333 | -0.0833333 | 115.408333 | 15.2275 | 1.5925 | 370.175 | 9.86333333 | 664.166667 |
| Min | 3.08       | 774          | -1         | 72         | 8.74    | 1.35   | 339.6   | 5.11       | 548        |
| Max | 4.57       | 1139         | 0          | 168.3      | 24.29   | 1.92   | 419     | 14.2       | 846        |

### MONTRPOINT 8

| DATE       | LAB_PH | CONDUCT | ALKAL | ACID  | IRON  | MANG | SULF  | ALUM  | TDS  |
|------------|--------|---------|-------|-------|-------|------|-------|-------|------|
| 5/30/2002  | 2.72   | 1790    | 0     | 524.3 | 71.59 | 1.79 | 793.3 | 36.13 | 1682 |
| 6/28/2002  | 2.77   | 1650    | 0     | 418.8 | 43.78 | 1.59 | 666   | 28.95 | 1550 |
| 7/26/2002  | 2.77   | 1590    | 0     | 401.5 | 50.81 | 1.62 | 760.6 | 32.63 | 1412 |
| 9/9/2002   | 2.99   | 1635    | 0     | 430.7 | 57.17 | 1.67 | 790.3 | 33.77 | 1562 |
| 9/30/2002  | 2.96   | 1712    | 0     | 434.5 | 32.57 | 1.84 | 705.5 | 37    | 1542 |
| 10/30/2002 | 2.94   | 1786    | 0     | 469.9 | 75.61 | 1.8  | 852.1 | 38.31 | 1518 |
| 11/26/2002 | 2.86   | 1788    | 0     | 462.9 | 75.74 | 1.82 | 844.2 | 37.43 | 1340 |
| 12/23/2002 | 3.03   | 1795    | 0     | 488.9 | 90.03 | 2.02 | 732.6 | 36.27 | 1502 |

|           |      |      |   |       |       |      |       |       |      |
|-----------|------|------|---|-------|-------|------|-------|-------|------|
| 1/30/2003 | 2.88 | 1744 | 0 | 490.4 | 61.5  | 1.89 | 783.7 | 40.11 | 1324 |
| 3/4/2003  | 2.81 | 1618 | 0 | 395.9 | 48.9  | 1.86 | 708.4 | 33.27 | 1318 |
| 3/30/2003 | 2.77 | 1654 | 0 | 426.3 | 43.16 | 1.73 | 707.8 | 36.05 | 1262 |
| 4/30/2003 | 2.84 | 1601 | 0 | 390.1 | 36.6  | 1.5  | 689.1 | 31.57 | 1430 |

Summary for 'MONTRPOINT' = 8 (12 detail records)

|     |            |              |   |            |            |            |       |            |        |
|-----|------------|--------------|---|------------|------------|------------|-------|------------|--------|
| Avg | 2.86166667 | 1696.9166667 | 0 | 444.516667 | 57.2883333 | 1.76083333 | 752.8 | 35.1241667 | 1453.5 |
| Min | 2.72       | 1590         | 0 | 390.1      | 32.57      | 1.5        | 666   | 28.95      | 1262   |
| Max | 3.03       | 1795         | 0 | 524.3      | 90.03      | 2.02       | 852.1 | 40.11      | 1682   |

### MONTRPOINT 9

| DATE       | LAB_PH | CONDUCT | ALKAL | ACID | IRON | MANG | SULF  | ALUM | TDS |
|------------|--------|---------|-------|------|------|------|-------|------|-----|
| 5/30/2002  | 3.92   | 390     | 0     | 34.3 | 0.35 | 0.46 | 160.9 | 2.29 | 316 |
| 6/28/2002  | 3.93   | 389     | 0     | 45.3 | 0.47 | 0.51 | 156.3 | 2.81 | 306 |
| 7/26/2002  | 3.85   | 423     | 0     | 38   | 0.76 | 0.62 | 182.8 | 3.54 | 346 |
| 9/9/2002   | 3.91   | 461     | 0     | 41.9 | 0.27 | 0.62 | 212   | 3.83 | 368 |
| 9/30/2002  | 3.85   | 491     | 0     | 38.4 | 2.97 | 0.89 | 231.2 | 3.08 | 414 |
| 10/30/2002 | 4.12   | 458     | 0     | 34.9 | 0.66 | 1.22 | 206.2 | 2.62 | 344 |
| 11/26/2002 | 4.18   | 502     | 0     | 46   | 0.44 | 0.95 | 196.6 | 2.96 | 364 |
| 12/23/2002 | 3.83   | 398     | 0     | 47.6 | 0.46 | 1.01 | 137.8 | 3.15 | 270 |
| 1/30/2003  | 3.87   | 450     | 0     | 51.6 | 0.45 | 0.57 | 190.3 | 2.93 | 306 |
| 3/4/2003   | 3.81   | 424     | 0     | 40.5 | 0.42 | 0.58 | 185   | 2.32 | 288 |
| 3/30/2003  | 3.65   | 408     | 0     | 45.3 | 0.42 | 0.5  | 169.5 | 3.52 | 242 |
| 4/30/2003  | 3.78   | 424     | 0     | 44.1 | 0.55 | 0.47 | 166.9 | 2.66 | 352 |

Summary for 'MONTRPOINT' = 9 (12 detail records)

|     |            |              |   |        |       |      |            |            |            |
|-----|------------|--------------|---|--------|-------|------|------------|------------|------------|
| Avg | 3.89166667 | 434.83333333 | 0 | 42.325 | 0.685 | 0.7  | 182.958333 | 2.97583333 | 326.333333 |
| Min | 3.65       | 389          | 0 | 34.3   | 0.27  | 0.46 | 137.8      | 2.29       | 242        |
| Max | 4.18       | 502          | 0 | 51.6   | 2.97  | 1.22 | 231.2      | 3.83       | 414        |