APPENDIX 4

A-4. MONTGOMERY RUN

A-4.1 Watershed Information

Montgomery Run is in the eastern portion of the North Branch/Potomac River watershed and drains approximately 2.0 square miles (1301 acres), as shown in Figure A-4-1. The dominant land use in the watershed is forest, which covers 76.1 percent of the watershed. Other important land use types include agriculture (9.4 percent) and surface mining land (10.8 percent). All other individual land cover types account for less than 3.7 percent of the total watershed area. There are two impaired streams in the watershed, UNT/Montgomery Run, and Montgomery Run itself. Figure A-4-2 shows the impaired segments and the pollutants for which each is impaired.

Before establishing Total Maximum Daily Loads (TMDLs), WVDEP monitored each of the impaired streams in the North Branch/Potomac River watershed to characterize water quality and refine impairment listings. Monthly samples were taken at four stations throughout the Montgomery Run watershed from July 1, 2002, through June 30, 2003. Monitoring suites at each site were determined based on the types of impairments observed in each stream. Streams impaired by metals and low pH were sampled monthly and analyzed for a suite of parameters (including total iron, dissolved iron, total aluminum, dissolved aluminum, total suspended solids, selenium, pH, sulfate, and specific conductance). In addition, benthic macroinvertebrate assessments were performed at specific locations on the biologically impaired streams during the pre-TMDL monitoring period. Instantaneous flow measurements were also taken at strategic locations during pre-TMDL monitoring. More information about the location of monitoring stations and other geographic information can be found in the ArcExplorer project compact disk.

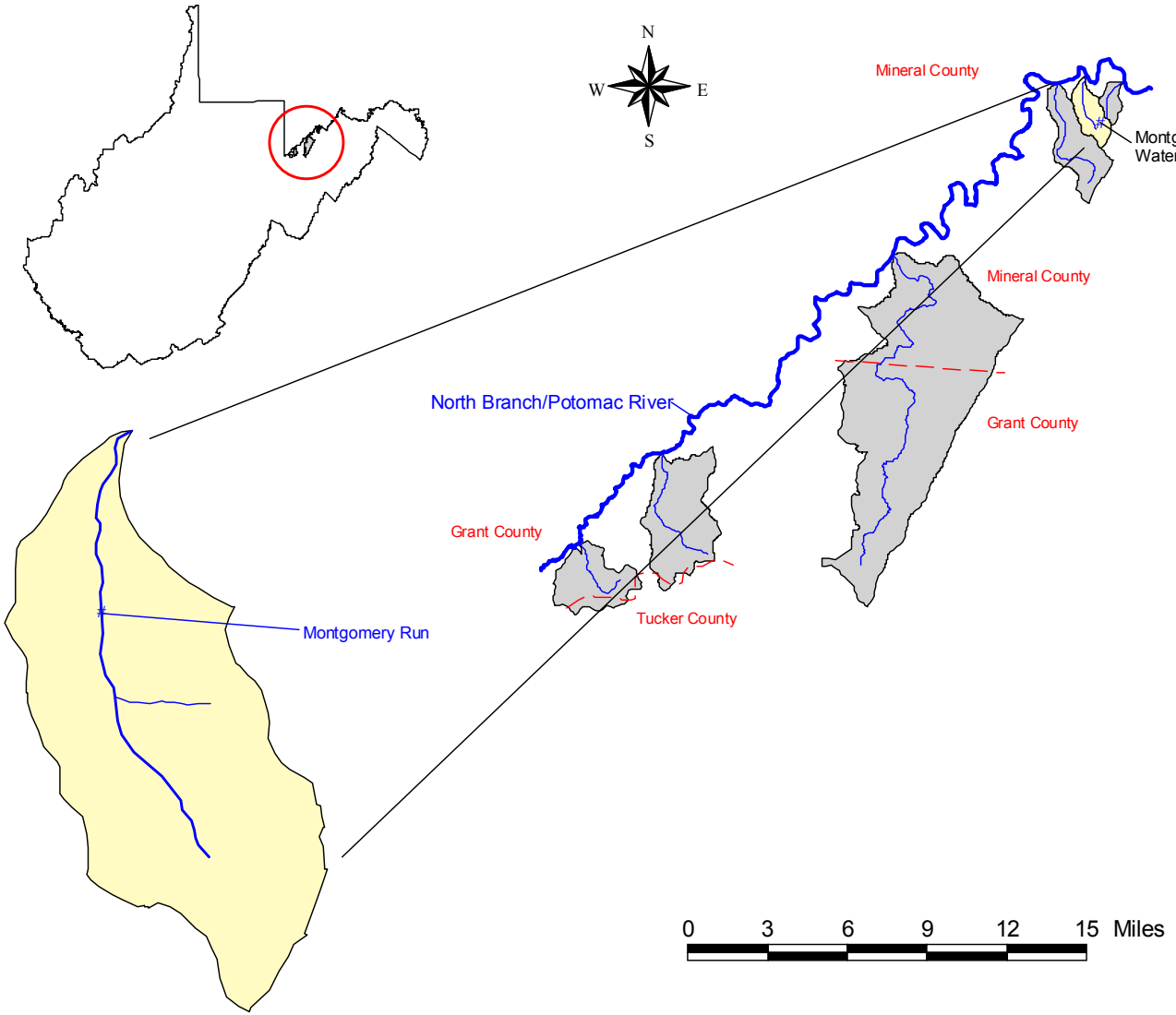


Figure A-4-1. Location of the Montgomery Run watershed.

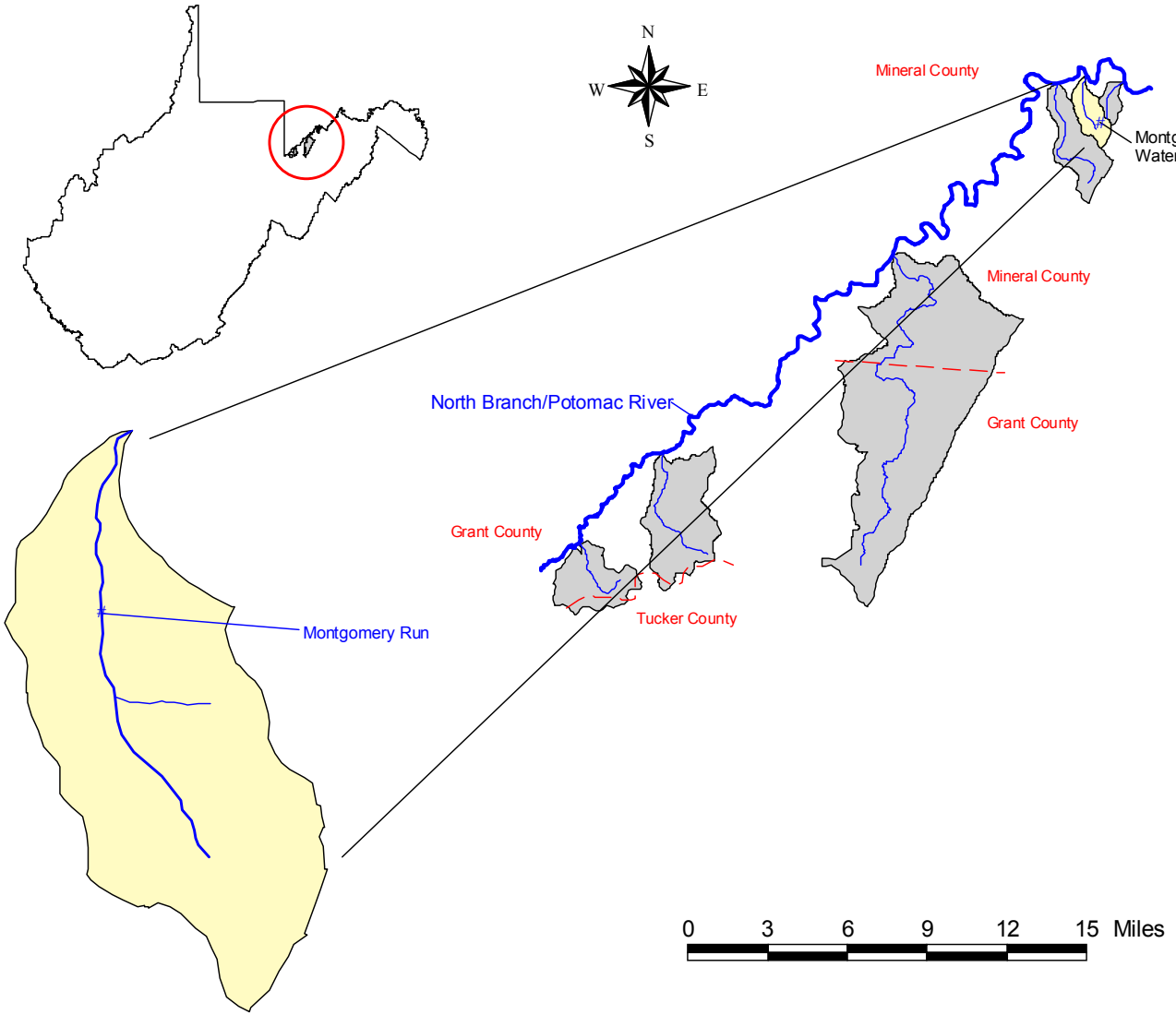
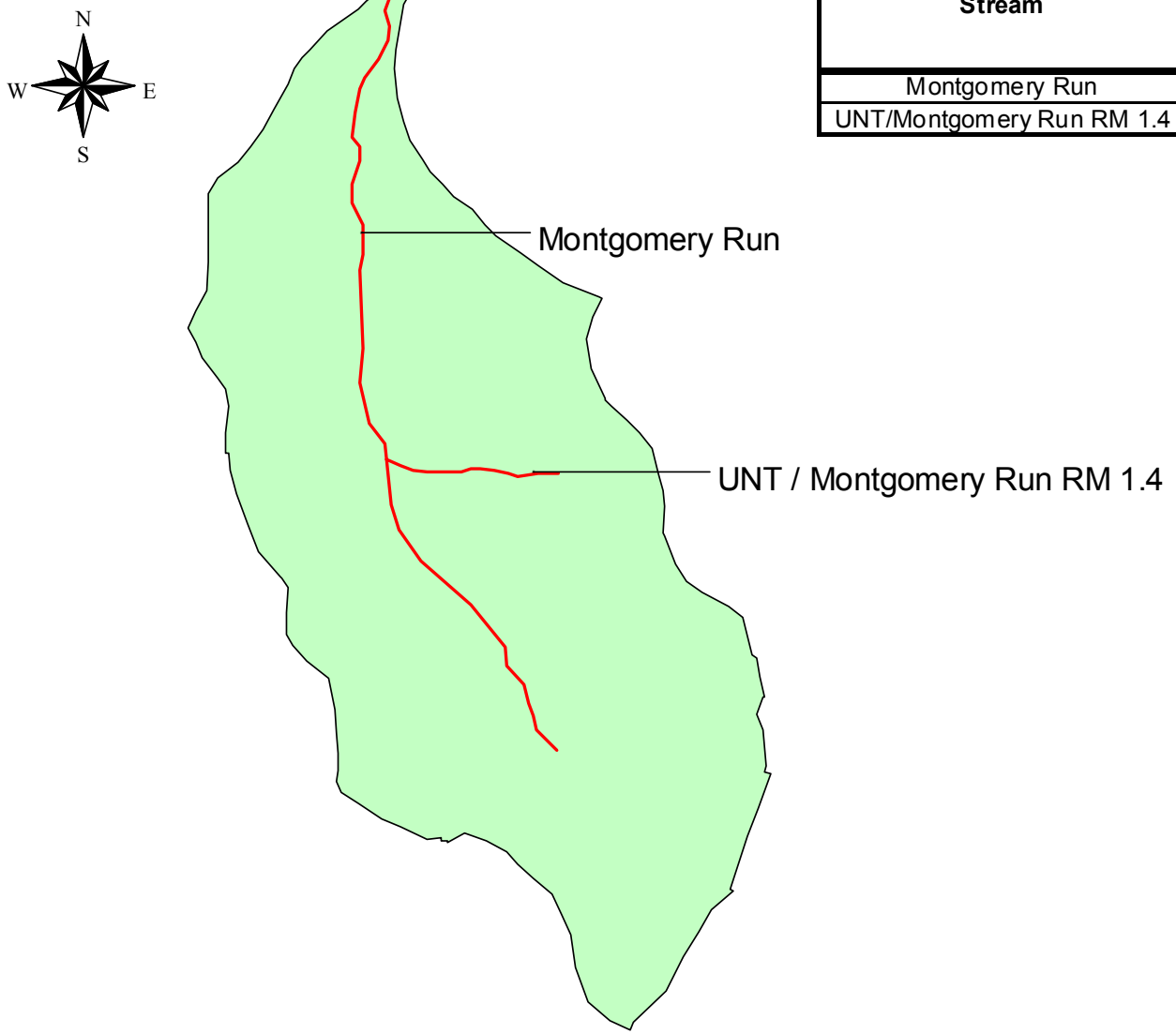
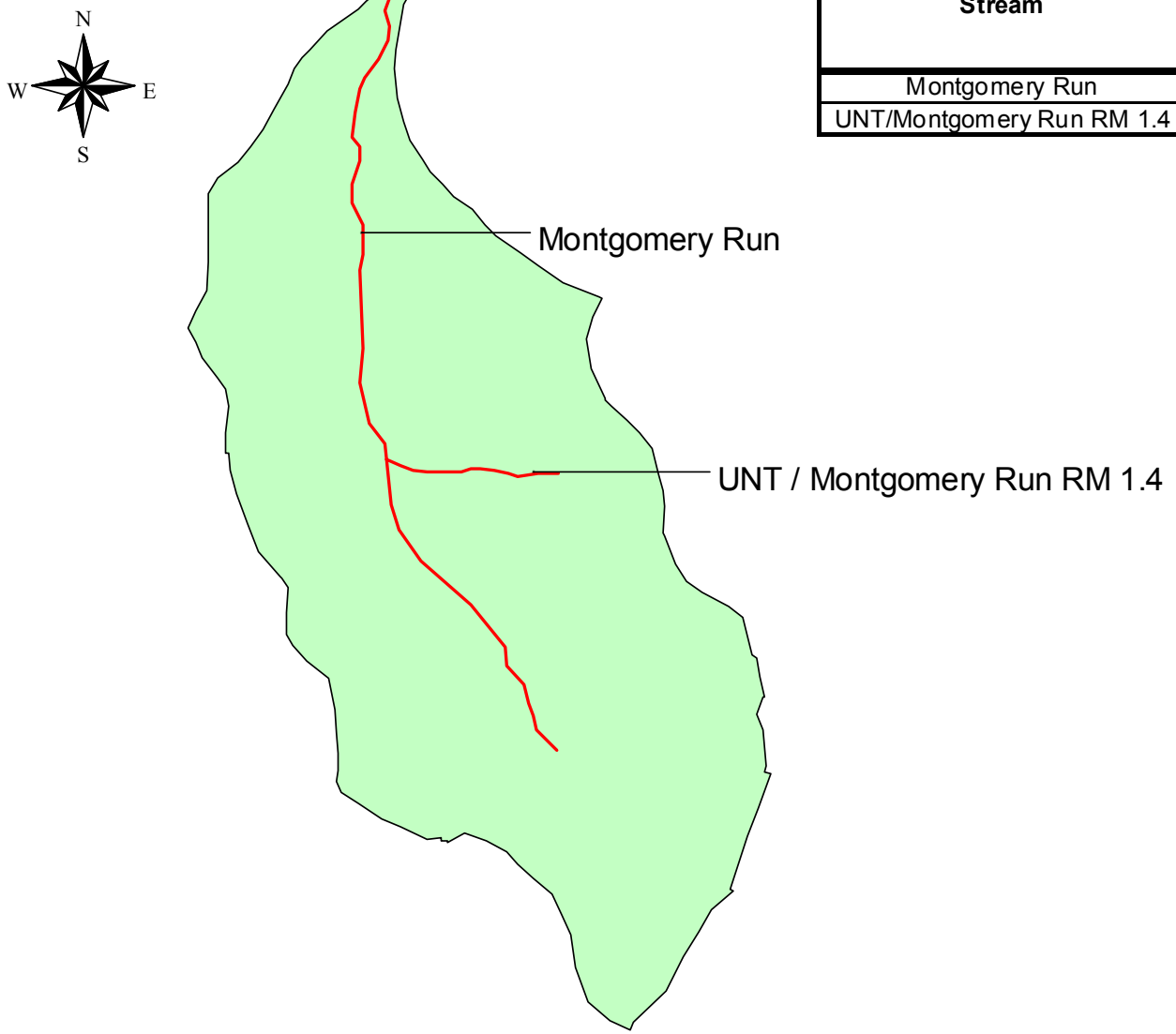


Figure A-4-1. Location of the Montgomery Run watershed.



Stream	Aluminum	Iron	pH	Biological
Montgomery Run	X	X	X	X
UNT/Montgomery Run RM 1.4	X		X	

Figure A-4-2. Impaired waterbodies in the Montgomery Run watershed.



Stream	Aluminum	Iron	pH	Biological
Montgomery Run	X	X	X	X
UNT/Montgomery Run RM 1.4	X		X	

Figure A-4-2. Impaired waterbodies in the Montgomery Run watershed.

A-4.2 Metals and pH Sources

This section identifies and examines the potential sources of aluminum, iron, and pH impairment in the Montgomery Run watershed. Sources are classified as either point sources (specific sources subject to a permit) or nonpoint sources (diffuse sources). Mining- and non-mining related permits are considered metals and pH point sources. Metals and pH nonpoint sources are diffuse, non-permitted sources such as abandoned or forfeited mine sites.

Pollution sources were identified using statewide geographic information system (GIS) coverages of point and nonpoint sources, and through field reconnaissance. As part of the TMDL process, WVDEP documented pollution sources by describing the pollution source in detail, collecting Global Positioning System data, and if necessary, collecting a water quality sample for laboratory analysis. WVDEP personnel recorded physical descriptions of the pollutant sources, such as the number of outfalls, the source of the outfalls, and the general condition of the stream in the vicinity of each outfall. These records were compiled and electronically plotted on maps using GIS software. This information was used in conjunction with other information to characterize pollutant sources. Significant metals sources in the watershed are shown in Figure A-4-3.

Based on scientific knowledge of sediment/metals interaction and knowledge of West Virginia's soils, it is reasonable to conclude that sediments contain high levels of aluminum and iron. Control of sediment-producing sources may be necessary to meet water quality criteria for dissolved aluminum and total iron during critical high flow conditions. Although some of these sediment-producing sources are not displayed in Figure A-4-3 (e.g., agriculture and unpaved roads), specific details relative to these sources are discussed in section A-4.2.2.

A-4.2.1 Metals Point Source Inventory

As described in the main report, the National Pollutant Discharge Elimination System (NPDES) program, established under Clean Water Act sections 318, 402, and 405, requires permits for the discharge of pollutants from point sources. Metals and pH point sources can be classified into two major categories: permitted non-mining point sources and permitted mining point sources.

In the Montgomery Run watershed, all NPDES permits for metals effluents are related to mining. There is 1 mining-related NPDES outlet in the Montgomery Run watershed. WVDEP's *HPU* GIS coverage was used to determine the locations of the mining permits; the detailed permit information came from WVDEP's *ERIS* database system. The permits related to these outlets are listed in the Technical Report, which shows the name of each responsible party and the total number of outlets that discharge to the Montgomery Run watershed. The Technical Report also contains specific data for each permitted outlet (including effluent type, drainage areas, and pump capacities) and permit limits for each of the mining-related NPDES outlets.

A-4.2.2 Metals Nonpoint Source Inventory

In addition to point sources, nonpoint sources also contribute to metals-related water quality impairments in the Montgomery Run watershed. Nonpoint sources are diffuse, non-permitted sources. Abandoned mine lands and facilities that were subject to the Surface Mining Control and Reclamation Act of 1977 and forfeited their bonds or abandoned operations can be a significant non-permitted source of metals. Non-mining land disturbance activities can also be a nonpoint source of metals, causing metals to enter waterbodies as a component of sediment. Examples of such land disturbance activities are agriculture, forestry, oil and gas wells, and the construction and use of roads. The applicable land disturbance activities in the Montgomery Run watershed are discussed below.

Abandoned Mine Lands and Bond Forfeiture Sites

Based on the identification of a number of abandoned mining activities in the Montgomery Run watershed, abandoned mine lands are a significant non-permitted source of metals and pH impairment in the watershed. WVDEP's Office of Abandoned Mine Lands identified the locations of abandoned mine lands in the Montgomery Run watershed. In addition, source-tracking efforts by WVDEP's Division of Water and Waste Management identified and characterized three abandoned mine seeps (Figure A-4-3).

WVDEP's Division of Land Restoration, Office of Special Reclamation, provided bond forfeiture information and data. This information included the status of both land reclamation and water treatment activities. Bond forfeiture sites are not present in the Montgomery Run watershed.

Land Disturbance Activities

Based on the GAP 2000 land use coverage, there are 122 acres (9.4 percent) of agricultural areas in the Montgomery Run watershed. Neither active logging operations, nor active oil and gas wells are present in the watershed. The length and area of paved roads were calculated using the Census 2000 TIGER/Line files roads coverage for West Virginia. Information on unpaved roads from TIGER was supplemented by digitizing any unpaved roads on topographic maps that were not included in the TIGER shapefile. There are 2.8 miles of paved roads and 9.6 miles of unpaved roads in the Montgomery Run watershed.

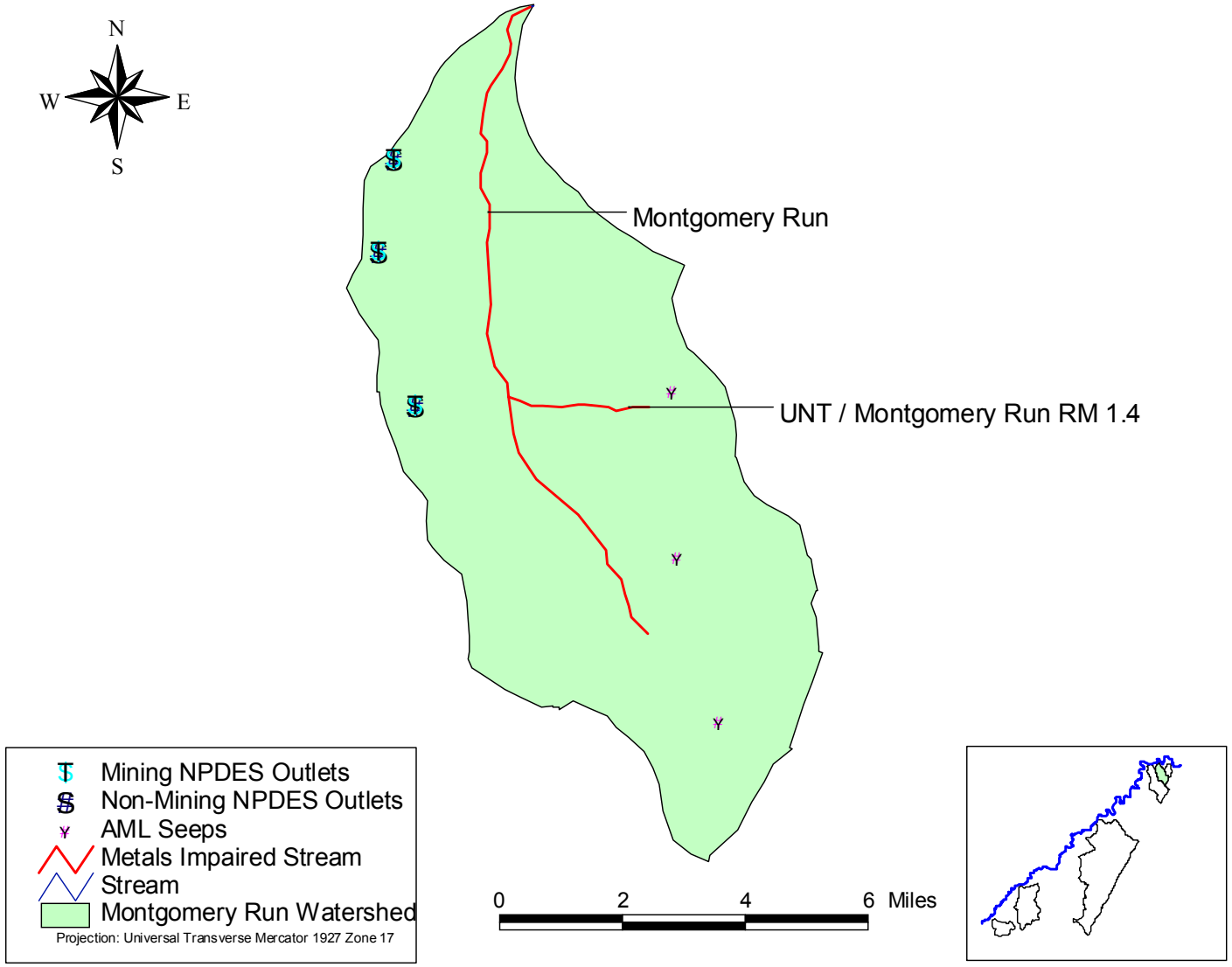


Figure A-4-3. Metals sources in the Montgomery Run watershed.

A-4.3 Stressors of Biologically Impaired Streams

The Montgomery Run watershed has one biologically impaired stream for which TMDLs have been developed. The stream is identified in Table A-4-1 along with the biological stressors of the streams' benthic community and the TMDLs required to address these impairments. A stressor identification process was used to evaluate and identify the primary stressors of impaired benthic community. Refer to the main report for a detailed description of the stressor identification process.

Table A-4-1. Primary stressors of biologically impaired stream in the Montgomery Run watershed

Stream	Biological Stressors	TMDLs Required
Montgomery Run	Metals toxicity (aluminum, iron) pH toxicity (acidity)	Aluminum Iron pH

UNT = unnamed tributary

TMDLs for each specific biological stressor are shown in Table A-4-5. Sediment TMDLs are required only when the stressor identification process indicates that a sedimentation problem is impairing the biological community. A Sediment TMDL is not required in Montgomery Run, as sedimentation was not identified as a stressor to the biological community during the stressor identification process. See section A-4.2.2 for additional sediment source information as it refers to metals bound to sediment particles.

A-4.4 TMDLs for the Montgomery Run Watershed

A-4.4.1 TMDL Development

TMDLs and source allocations were developed for impaired streams in the Montgomery Run watershed. A top-down methodology was followed to develop these TMDLs and allocate loads to sources. Headwaters were analyzed first because they have a profound effect on downstream water quality. Loading contributions were reduced from applicable sources for these waterbodies and TMDLs were developed. Refer to Section 6.4 of the main report for a detailed description of allocation methodologies used in the development of the pollutant-specific TMDLs.

The TMDLs for iron, aluminum, and pH are shown in Tables A-4-2 through A-4-5. The TMDLs for iron and aluminum are presented as annual average loads, in terms of pounds per year. All TMDLs are presented as average annual loads because they were developed to meet TMDL endpoints under a range of conditions observed throughout the year.

As stated in Section 6.3.1, a surrogate approach was used to develop pH TMDLs. It was assumed that reductions in metals concentrations to TMDL endpoints would result in compliance with the pH water quality standard. To verify this assumption, the Dynamic Equilibrium In-stream Chemical Reactions (DESC-R) model was run for an extended period under TMDL conditions — conditions where TMDL endpoints for metals were met. A median equilibrium pH was calculated based on the daily equilibrium pH output from the DESC-R model. The results, shown in Table A-4-4, are the TMDLs for the pH-impaired streams in the watershed. Refer to the Technical Report for a detailed description of the pH modeling approach.

A-4.4.2 TMDL Tables: Metals and pH

Table A-4-2. Iron TMDLs for the Montgomery Run watershed

Major Watershed	Stream Code	Stream Name	Metal	Load Allocation (lb/yr)	Wasteload Allocation (lb/yr)	Margin of Safety (lb/yr)	TMDL (lb/yr)
Montgomery Run	PNB-11	Montgomery Run	Iron	700	1,377	109	2,186

Table A-4-3. Aluminum TMDLs for the Montgomery Run watershed

Major Watershed	Stream Code	Stream Name	Metal	Load Allocation (lb/yr)	Wasteload Allocation (lb/yr)	Margin of Safety (lb/yr)	TMDL (lb/yr)
Montgomery Run	WVPNB-11	Montgomery Run	Aluminum	705	323	54	1,082
Montgomery Run	WVPNB-11-A	UNT/Montgomery Run RM 1.4	Aluminum	35	NA	2	37

NA = not applicable; UNT = unnamed tributary.

Table A-4-4. pH TMDLs for the Montgomery Run watershed

Major Watershed	Stream Code	Stream Name	Parameter	PH* (Under TMDL conditions)
Montgomery Run	PNB-11	Montgomery Run	pH	8.41
Montgomery Run	PNB-11-A	UNT/Montgomery Run RM 1.4	pH	8.62

UNT = unnamed tributary.

* Predicted pH assumes that all metals (aluminum and iron) meet TMDL endpoints.

A-4.4.3 TMDL Tables: Biological

Table A-4-5. Biological TMDLs for the Montgomery Run watershed

Stream	Biological Stressor	Parameter	Load Allocation	Wasteload Allocation	Margin of Safety	TMDL	Units
Montgomery Run PNB-11	Metals Toxicity	Aluminum	705	323	54	1,082	lb/yr
		Iron	700	1,377	109	2,186	lb/yr
	pH Toxicity (Acidity)	pH	Not Applicable			8.41	Standard Units