

APPENDIX 6

A-6. SLAUGHTERHOUSE RUN

A-6.1 Watershed Information

Slaughterhouse Run is a small first order stream that drains directly into the North Branch/Potomac River. The subwatershed is located the eastern portion of the North Branch/Potomac River watershed in Mineral County, West Virginia. It drains approximately 0.9 square miles (593 acres), as shown in Figure A-6-1. The dominant land use is forest, which covers 68.7 percent of the watershed. The other important land use is agriculture (30.5 percent). All other individual land cover types account for less than 0.8 percent of the total watershed area. There is one impaired stream in the watershed, Slaughterhouse Run. Figure A-6-2 shows the impaired segment and the pollutants for which it 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 one station in the Slaughterhouse 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.

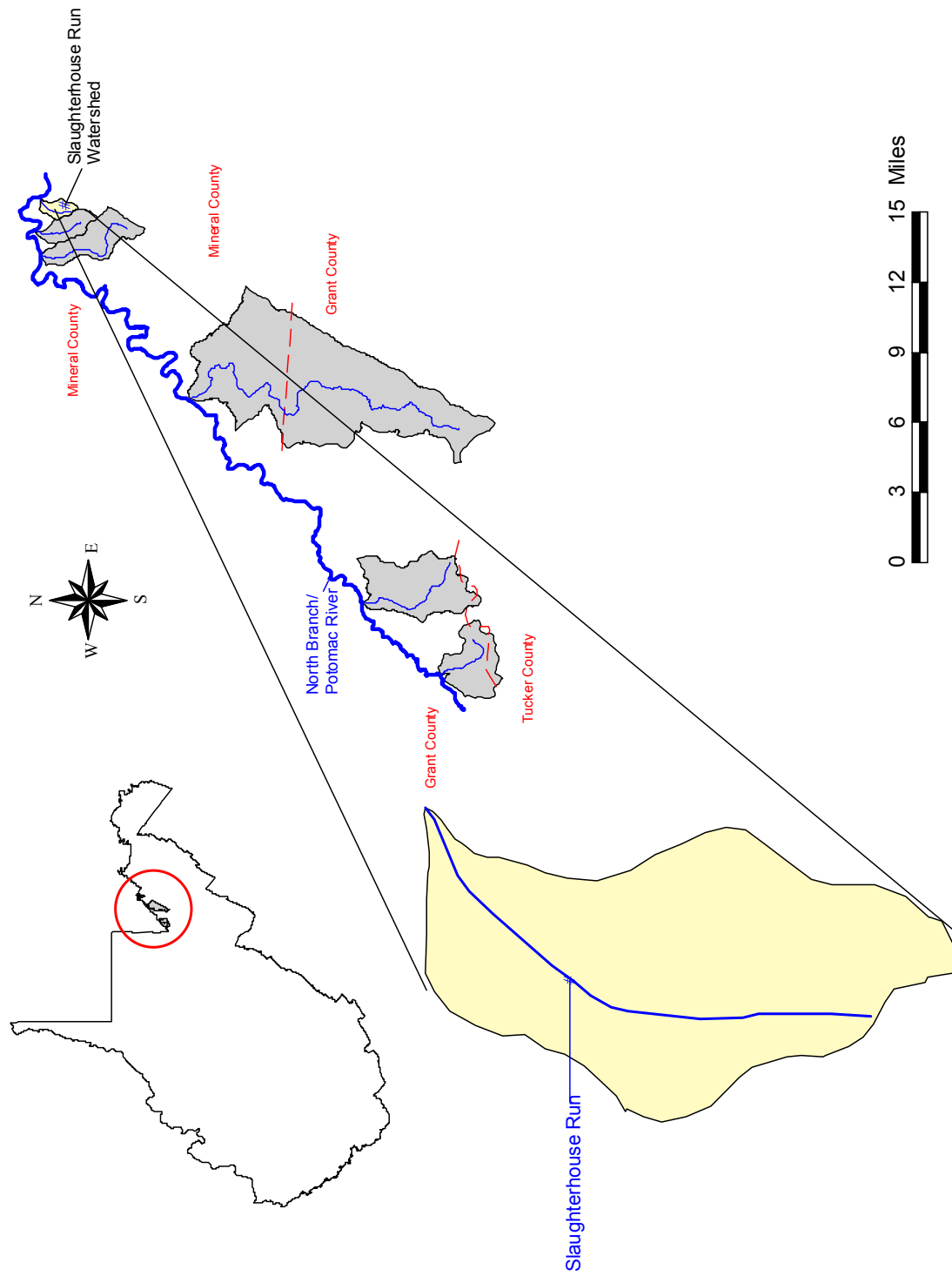


Figure A-6-1. Location of the Slaughterhouse Run watershed.

Stream	Slaughterhouse Run	X	X	X	X

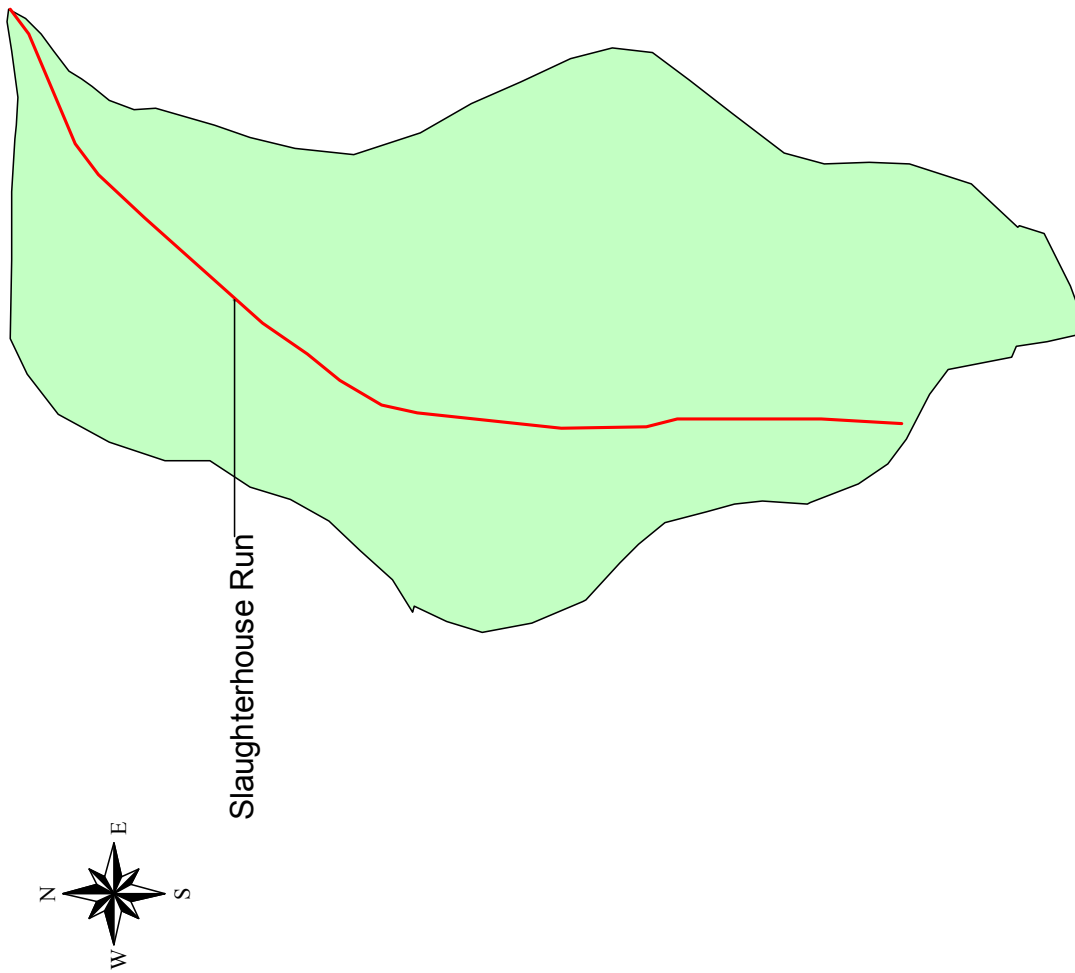


Figure A-6-2. Impaired waterbodies in the Slaughterhouse Run watershed.

A-6.2 Metals and pH Sources

This section identifies and examines the potential sources of aluminum, iron, and pH impairment in the Slaughterhouse Run watershed. Sources can be 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-6-3.

Based on scientific knowledge of sediment/metals interaction and knowledge of West Virginia's soils, it is reasonable to conclude that sediments in the watershed 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-6-3 (e.g., agriculture areas and unpaved roads), specific details relative to these sources are discussed in section A-6.2.2.

A-6.2.1 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.

There is one metals-related non-mining NPDES permit present in the Slaughterhouse Run watershed. The Piedmont solid waste landfill, permit WV0110868, is operated by the Upper Potomac River Commission. Mining-related NPDES outlets are not present in the Slaughterhouse Run watershed.

A-6.2.2 Metals Nonpoint Source Inventory

In addition to point sources, nonpoint sources also contribute to metals-related water quality impairments in the Slaughterhouse 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 Slaughterhouse Run watershed are discussed below.

Abandoned Mine Lands and Bond Forfeiture Sites

No abandoned mine lands appear in the information provided by WVDEP's Office of Abandoned Mine Lands. However, source-tracking efforts by WVDEP's Division of Water and Waste Management identified and characterized one abandoned mine source in the watershed. A collapsed mine portal is draining water into the headwater of Slaughterhouse Run (Figures A-6-4 through A-6-7).



Figure A-6-4. Collapsed mine portal with cloudy white aluminum present in the standing water.



Figure A-6-5. Aluminum rich mine drainage water that flows directly to Slaughterhouse Run.



Figure A-6-6. Slaughterhouse Run just below where the mine drainage enters the stream, cloudy white aluminum present in stream.



Figure A-6-7. Aluminum flocculent and coating observed in the headwater of Slaughterhouse Run.

The water chemistry sample from the seep indicates that the water is acidic (pH 4.52) and contains elevated dissolved aluminum (1.36 mg/l) concentrations. It appears that the aluminum precipitates along the stream bottom and edges in the headwater reaches of the stream as the water is naturally oxygenated and pH begins to rise. Therefore, the sampling station downstream near the mouth of Slaughterhouse Run did not detect high aluminum concentrations.

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 Slaughterhouse Run watershed.

Land Disturbance Activities

Based on the GAP 2000 land use coverage, agricultural areas in the Slaughterhouse Run watershed comprises 180 acres (30.5 percent). Neither 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 0.07 miles of paved roads and 2.8 miles of unpaved roads in the Slaughterhouse Run watershed.

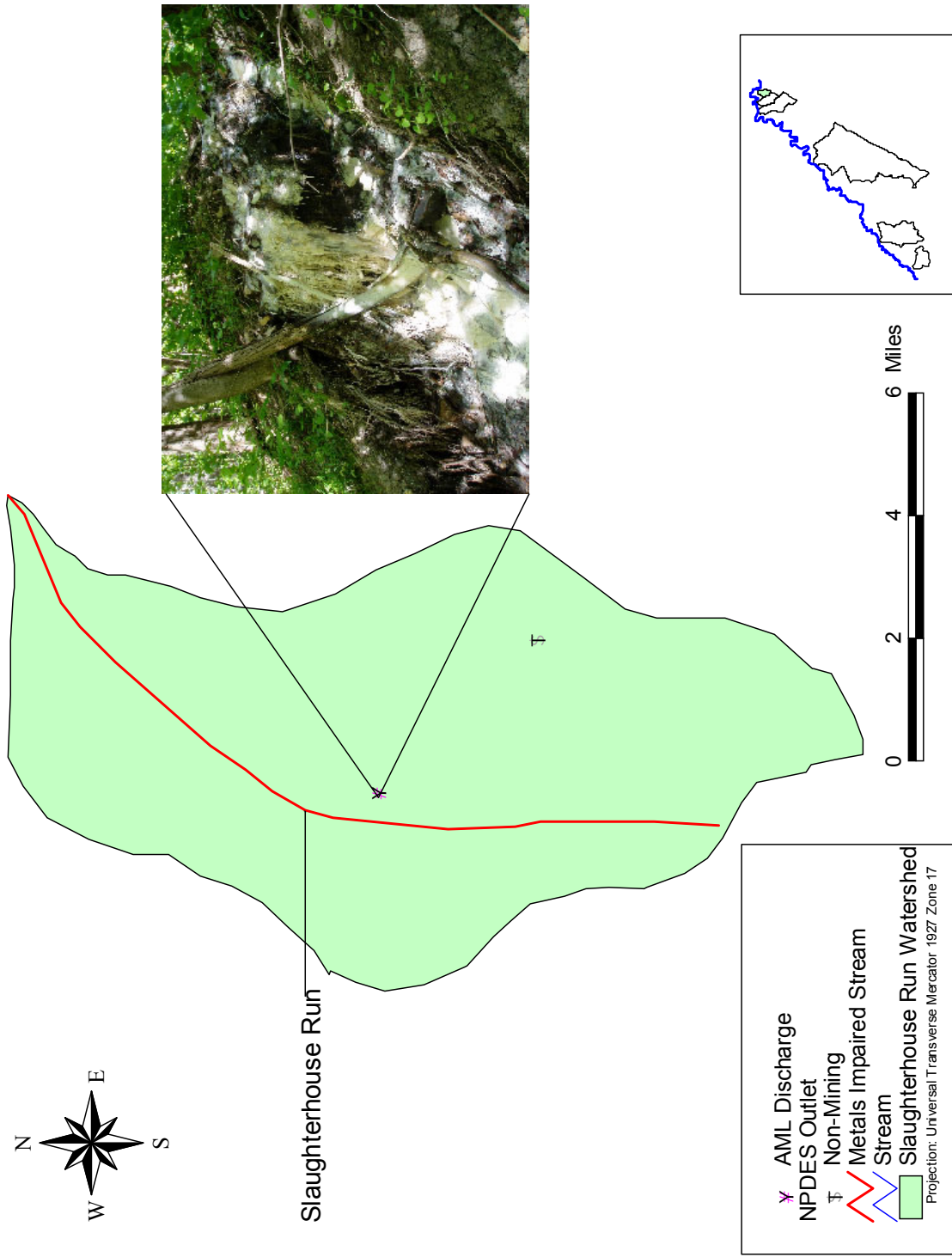


Figure A-6-3. Metals sources in the Slaughterhouse Run watershed.

A-6.3 Stressors of Biologically Impaired Streams

Slaughterhouse Run is biologically impaired stream and the Stressor Identification process determined aluminum toxicity as the primary stressor (shown in Table A-6-1). Refer to the main report for a detailed description of the stressor identification process.

Table A-6-1. Primary stressors of biologically impaired streams in the Slaughterhouse Run watershed

Stream	Biological Stressors	TMDLs Required
Slaughterhouse Run	Metals toxicity (aluminum)	Aluminum

The TMDL for the biological stressor (aluminum) is shown in Table A-6-4.

A-6.4 TMDLs for the Slaughterhouse Run Watershed

A-6.4.1 TMDL Development

TMDLs and source allocations were developed for impaired streams in the Slaughterhouse 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 and aluminum are shown in Tables A-6-2 through A-6-3. 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.

A-6.4.2 TMDL Tables: Metals and pH

Table A-6-2. Iron TMDLs for the Slaughterhouse 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)
Slaughterhouse Run	PNB-10	Slaughterhouse Run	Iron	142	1,388	81	1,610

Table A-6-3. Aluminum TMDLs for the Slaughterhouse 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)
Slaughterhouse Run	PNB-10	Slaughterhouse Run	Aluminum	133	1,565	89	1,787

A-6.4.3 TMDL Tables: Biological**Table A-6-4.** Biological TMDLs for the Slaughterhouse Run watershed

Stream	Biological Stressor	Parameter	Load Allocation	Wasteload Allocation	Margin of Safety	TMDL	Units
Slaughterhouse Run PNB-10	Metals Toxicity	Aluminum	133	1,565	89	1,787	lb/yr