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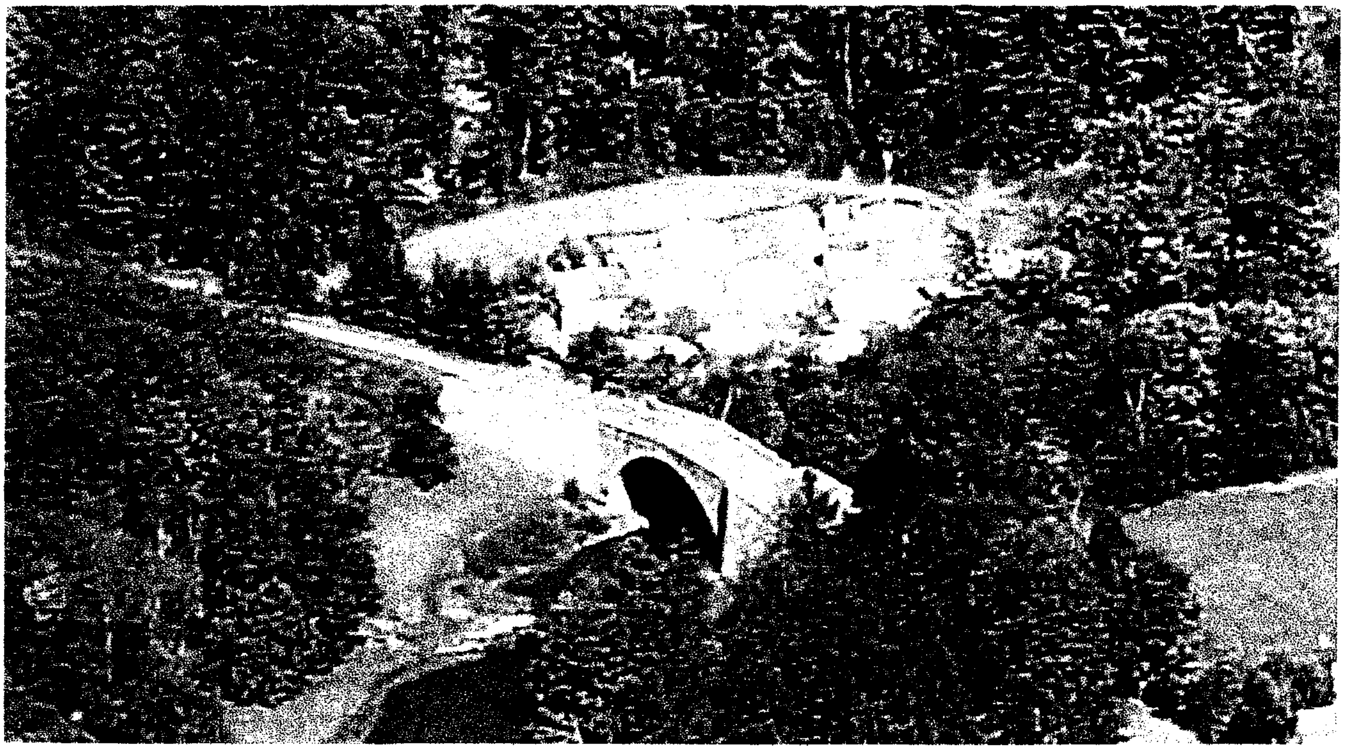
Casselman River Watershed Conservation Plan

EXECUTIVE SUMMARY



Prepared for the
Somerset County Conservancy

By

Appalachia Environmental Consulting

David L. Brant
Project Manager

Casselman River Watershed Conservation Plan

Executive Summary

Introduction

The purpose of this report is to provide a general understanding of the resources within the Pennsylvania portion of the Casselman River Watershed. The relationships between man, economy, and environment will be studied to rationally examine the problems associated with the resources and determine viable solutions which could support man's continued well-being while living in harmony with his surroundings. The report examines the physical features of the basin and impacts from man's development of the area's natural resources.

The plan begins with an inventory of all the relevant resources within the study area. These include natural, recreational, historic/cultural resources, and land use. The natural resource assessment includes the following; water quality assessment / stream survey, identification of major pollution sources, inventory of unique natural areas, inventory of species of special concern, identification of all publicly owned lands, wetlands inventory, and inventory of environmentally sensitive areas. Recreational uses of the waterways were evaluated and are included in the report under the following inventories; identification of current and future sites for trail development, identification of greenways, parking areas, access for fishing, boating, and swimming, hunting access to both public and private lands, and campgrounds. The cultural and historical resources study includes the following; inventory of all historic sites, inventory of all existing or potential cultural heritage sites, list all covered bridges in the watershed, and compile a list of local festivals and celebrations. The land use portion of the study contains the following information; identification of major land use patterns, projection of potential changes in future land use, inventory of potential conflicts in future land use, and mapping of general land use. A GIS database containing a base map of the watershed will be prepared in USGS1:24000 scale. The map contains stream locations and quality, roads municipal boundaries, major pollution sites, recreational sites cultural heritage / historic sites, environmentally sensitive areas, special protection / regulation areas, land use and geology. Threats to water quality, natural resources and overall health of the watershed are also included with appropriate actions to address problems. Economic opportunities are also part of the plan.

In order to develop a plan to help realize this concept, the Somerset County Conservancy (SCC) and Chestnut Ridge Chapter of Trout Unlimmited (CRTU) applied for a grant from the Pennsylvania Department of Conservation and Natural Resources (DCNR) to prepare a River Conservation Plan for the Youghiogheny River Corridor from the State line to South Connellsville and the Casselman River Watershed from the State line to the mouth of the river at Confluence, PA. When the grant was received, SCC and CRTU established Steering Committees for both parts of the project to offer guidance. The Casselman River Steering Committee, in turn, hired David L. Brant Consulting to gather data and conduct the necessary analysis for the Casselman River Watershed portion of the report. The Youghiogheny River Steering Committee hired Paul C. Rizzo Associates to gather data and conduct the analysis for the Youghiogheny portion of the project. The Somerset County Conservancy will act as the lead agency to enact the guidelines defined in this plan.

The DCNR Rivers Conservation Plan process has four main components: data collection and analysis, a Preliminary Findings Report, a Draft River Conservation Plan, and a Final River Conservation Plan. The Preliminary Findings Report, which is summarized here, presents the data collected to date, the results of the study team's analysis of the data, and some preliminary recommendations to act on the results. This information is presented to inform the public of existing conditions within the study area and to gather their reactions to the data analysis and preliminary recommendations, termed 'management options'.

Public input into the development of management options is critically important to the successful implementation of the plan. Comments on preliminary management options and suggestions for new management options are encouraged. In some cases, multiple management options have been suggested to address a single issue. Input on preferred options will decide which alternatives are carried on in the Final

River Conservation Plans. Management options included in the final plan approved by DCNR will automatically be eligible for 50 percent matching funds for implementation.

Project area characteristics

The Casselman River originates in the Savage River State Forest in Garrett County, Maryland. It flows north, entering Pennsylvania at the Mason-Dixon Line. As it flows north the Casselman River drains a majority of southern Somerset County and empties into the Youghiogheny River at Confluence, Pennsylvania. The total flow in Pennsylvania is 47 miles and the watershed includes 24 municipalities in 475 square miles. The elevation of the river drops from 2,080 feet above sea level to 1,330 feet above sea level, an average of 16 feet per mile. The stretch between the state line and Rockwood is relatively flat and is the best area for canoeing. Once past Rockwood the river takes on aggressive characteristics and is best floated by rafts or kayaks.

Major tributaries to the Casselman River include; Laurel Hill Creek, Middle Creek, Coxes Creek, Bigby Creek, Buffalo Creek, Blue Lick Creek, Elklick Creek, Flaugherty Creek, and Piney Creek. All of these tributaries have acid mine drainage (AMD) discharging into them, but most are able to neutralize it. The exception is Buffalo Creek, although it neutralizes enough AMD to support fish life (suckers and chubs), they are tolerant of lower pH's.

Other large AMD discharges enter the river from the Shaw Mines Complex (SMC), a 1900's era 5,000 acre underground mining complex. Three tributaries exit the SMC, they are Shaw Mines Run, Coal Run, and Weir-11. Wilson Creek also drains a large underground mining complex in the Blackfield/Wilson Creek area around Rockwood and is another source of AMD as it enters Coxes Creek. Other studies of the Casselman listed over 300 AMD seeps in the watershed, all of the identified seeps are listed in the GIS and listed in a table in the report.

Resource Data and Conclusions

<u>Land Resources</u>

Land use along the river is one of the major considerations of this report. Land use affects the quality and quantity of water in the river, the economic opportunities that exist within the study area, and the quality of life for watershed residents.

Most of the land within the study area is currently undeveloped, as a result of the numerous steep slopes that occur along the river and rural nature of the area. These slopes are mostly forested, which creates a natural buffer that helps protect the river from excessive runoff and the shoreline from flood damage. The forested condition along the river also creates the impression for river and trail users of an undeveloped, pristine valley.

Prime agricultural soils were also identified as important resources. There are an estimated 147,234 prime agricultural soil acres identified within the watershed. Approximately 22% of the land in the watershed is considered prime agricultural soil. 5% of the land in the watershed is considered urban, 64% is forested and 9% is listed under other uses. Another source of development potential is the reuse of abandoned mining and industrial sites, or 'brownfields'. There are more than 66 abandoned mine land or industrial locations, totaling over 3,000 acres, within the watershed.

Finding the best locations and establishing the appropriate character for new development within the study area is one of the most important steps in reviving the economy of the region. While the quiet and charm of the natural environment will attract people, it is the expansion of commercial and residential development that will contribute most to community development.

Geological Resources

The Casselman River Watetrshed lies entirely in the Allegheny Mountain section of the Appalachian Plateaus physiographic province. Topographically, the setting is typical of the mountain section. It has a series of parallel, rounded ridges oriented northeast and highly elevated, stream- dissected valleys. The more prominent ridges, from west to east, are Laurel Hill and the Allegheny Mountains. The highest point in the county and the State is Mount Davis, elevation 3,213 feet, on Negro Mountain. The lowest elevation is 1,330 feet at the mouth.

Sedimentary rock of Pennsylvanian, Mississippian, and Devonian ages are in the Casselman River Watershed. Pennsylvanian rocks, youngest of the group, cover most of the watershed. Mississippian rocks outcrop along Laurel Hill and Negro Mountain and on the narrow ridges represented by Little Savage, and Big Savage Mountains.

The Monongahela, Conemaugh, Allegheny, and Pottsville Groups represent the Pennsylvanian rocks. The Conemaugh Group is made up of the Glenshaw and Casselman Formations, and the Allegheny Group is made up of the Clarion, Kittanning, and Freeport Formations. The lithology is a cyclical sequence of sandstone, shale, coal, limestone, and some siltstone. The average thickness of Pennsylvanian beds is 1,500 feet.

The Mississippian rocks are the Mauch Chunk and Loyalhanna Formations and the Pocono Group. The lithology of the Mauch Chunk Formation is sandstone, shale, and some limestone. The Loyalhanna Formation is made up of sandy limestone, and the Pocono Group is made up of sandstone that has interbeds of shale and siltstone. Total thickness ranges from 600 to 1,600 feet.

The Catskill and Jennings Formations represent the Devonian rocks. The nonmarine Catskill Formation is an interbedded sequence of sandstone and shale and has a thickness of 1,600 feet. The Jennings Formation is a sequence of interbedded shale, siltstone, sandstone, and conglomerate as much as 5,500 feet thick.

Regional uplift and compression during the Permian Period caused intense folding of beds in the southeastern part of the county and less intense folding toward the northwestern part. The resulting anticline and syncline features have been reduced by erosion to the present day northeast-oriented ridges and valleys. This same orientation is the common bedrock strike throughout the county. Major near-surface faulting is not evident to any extent in the county; however, there is extensive faulting at greater depths. Some minor surface faulting has occurred at Negro Mountain.

Unconsolidated recent alluvial deposits are in stream and river valleys in the county. The larger deposits are common to the larger streams and river valleys. Other older alluvial terrace deposits at higher elevation than present stream levels are found near the confluence of the Casselman River, the Youghoigheny River, and Laurel Hill Creek.

Mineral Resources

Coal is the most valuable mineral resource in the Casselman River Watershed, and coal mined in the watershed ranks high in the state. This low to medium volatile bituminous coal is used for domestic heat, kiln firing, steam, and metallurgy. Recovery is accomplished by both surface mining and deep mining.

Coal resources are only in the rocks of Pennsylvanian age. Seams from the Monongahela Group, namely the Pittsburgh, Blue Lick, and Redstone, were the major re- sources but are rapidly being mined out. Coal from the Allegheny Group (upper and lower Freeport, upper and lower Kittanning, and

Brookville) are the major reservoirs of good-quality coal. Other coal mined to a smaller extent are the upper and lower Bakerstown and Wellersburg coal of the Conemaugh Group. Many other coal seams throughout the Pennsylvanian System are too thin or impure to mine.

Natural gas production is along the western border and central part of the watershed. The producing fields along the Laurel Hill anticline are the Ohiopyle Field north of Confluence, Seven Springs Field, and Kooser Pool west of Somerset.

Limestone is not a large resource, but it is mined in the central and southern parts of the watershed from rocks of Pennsylvanian and Mississippian ages. Presently, limestone is mined for use as concrete aggregate, agricultural purposes, and road metal from the Ames limestone of the Conemaugh Group and the Wymps Gap limestone of the Mauch Chunk Formation. Further mining for agricultural lime and cement has potential in the Fishpot and Restone limestone of the Monongahela Group.

Clay is an important mineral resource in the watershed. Most of the good-quality flint refractory clays are underclays associated with coal seams, mainly from the Allegheny Group. Other low-quality semirefractory clays are in the Conemaugh Group. Small quantities of surficial clay from alluvium and lacustrine deposits are mined to produce brick and tile.

Shale is not a valuable resource in the watershed, but some shale is mined and used for road surfaces and fills. The most extensive outcrop for mining is shales of the Conemaugh Group. Most of the shales in the watershed have some potential for producing Portland cement and ceramics.

Sandstone is throughout the stratigraphic sequence represented in the watershed. Most of the sandstone comes from rocks of Pennsylvanian age. Currently, Kittanning and Freeport sandstones from the Allegheny Group are quarried for building stone and aggregates. Other sandstone from the Pottsville and Conemaugh Groups have been mined for aggregates and building stone. The Pocono sandstone of Mississippian age and the Catskill Formation of Devonian age are quarried for building stone.

Water Resources

Somerset County has mean annual precipitation of about 42 inches and mean annual runoff of 25 inches. Sources of water supply in the watershed are drilled wells dug wells, springs, and storage reservoirs. Rural residents use wells and springs. Municipal water supplies are derived from storage reservoirs and are supplemented by wells. Further development of dug wells and springs has been replaced by the advent of drilled wells

Ground water yields are most productive from sand stone formations. The Pottsville sandstone is the most productive aquifer. High hydrogen sulfide and high hardness content are common in the sandstone aquifers. One exception is sandstone from the Conemaugh Group where the quality of water is generally good. Shale is throughout the entire stratigraphic sequence represented in the watershed. Ground water yield from shale formations is generally not high, except in units where joints and bedding planes are prevalent. Limestone formations are not important producers of ground water, but yields are high in a few wells and springs.

Although the Casselman has historically been a river polluted by industrial and mining pollution, it has made a substantial comeback. However, the river still faces numerous pollution hazards today including untreated and undertreated sewage discharges, sediment runoff from development and agriculture along its tributaries, and acid mine drainage. It is unclear which of these factors (or which combination) poses the greatest threat to the river because there is a lack of long-term, comprehensive water quality monitoring within the watershed. Without this type of scientific data, it is difficult to determine the most effective strategy to clean up the water and maintain it in that condition.

All of the major municipalities along the Casselman River have flood control projects in place. Areas that do not have any type of flood control projects in place should be handled by nonstructural measures including; flood plain regulation, flood insurance, permanent flood proofing and flood forecasting.

Outdoor recreation needs have been identified for swimming, rafting/canoeing, fishing, hunting, picnicking, hiking, and biking. Recreation facilities should be constructed to provide the greatest access for the greatest population. Due to low water levels in the summer and early fall, it is the general consensus of watershed residents that the river should not be placed under any special regulations or limits and can support both warm water and cold water species.

Biological Resources

The forested tracts of land that cover more than 75 percent of the watershed land area provide excellent habitat for wildlife, including at least 43 threatened or endangered species. These forests, which mostly occur on the steeply sloped hills along the river, also provide a buffer that protects the river from excessive runoff and helps slow the force of flood waters during storms.

While coldwater species, such as rainbow trout, are frequently stocked in the river by area sportsmen's clubs, it also maintains its own breeding populations of popular warmwater gamefish, like the smallmouth bass. Residents have also observed northern pike in the Casselman around Rockwood. The recreational fishing industry is one of the prime opportunities for economic expansion along the Casselman River.

Cultural Resources

The category of cultural resources includes both recreational and historical/archaeological assets. The Casselman River Watershed is fortunate to have numerous items in both of these areas.

By far the most used recreational resource is the Allegheny Highlands Trail. It follows an abandoned railroad and is a fairly level hiking and biking trail. This trail will eventually be completed from Pittsburgh, PA to Washington, DC.

Increasing tourism and overnight visits to study area communities was identified as a priority by residents that attended the public meetings. One method of encouraging this is to capitalize on the many festivals and historical sites located in the area. Dating from as early as the prehistoric Indians, there are many historic and archaeological sites within the watershed, as recognized by federal, state, and local organizations. This density of sites provides an ideal opportunity to expand heritage tourism into a major industry within the Casselman River Watershed.

Preliminary Management Options

After carefully analyzing the data gathered in the preparation of this report and considering the input of the project manager, Steering Committee, and watershed residents, we have developed a series of management options. These management options, which are identified as preliminary until further public comment is received, are intended to address the many issues identified in the analysis phase of the project.

The preliminary management options are as follows:

Study Watershed Characteristics

- Protect prime agricultural soils currently being farmed.
- Conduct an income survey in all towns within the study area to determine eligibility for federal Community Development Block Grant funding.

Land Resources

- Conduct an inventory of abandoned industrial sites, and identify their redevelopment potential and eligibility status for PA Act 2 (Industrial Site Reuse).
- Inventory undeveloped, non-farm, prime agricultural soil areas for potential development opportunities.
- Develop a plan to identify, quantify and remove mine tailing piles and trash dumps.
- Implement a survey of abandoned mines within the study area to develop a reclamation strategy.
- Create a volunteer trash removal program to ensure continued maintenance along the river corridor and trail.
- Maintain and improve the visual quality of the river corridor by requiring a vegetative barrier along the river's edge and protecting the scenic view from the river and trail.
- Identify areas that may qualify for conservation easments or protection

Geological Resources

- Re-mining should be encouraged to remove acid mine drainage causing materials from abandoned mines and spoil piles

Water Resources

- Develop a water quality monitoring program.
- Link the communities along the trail with a supply line to provide potable water to communities that may need additional during a drought
- Encourage deficient municipalities to develop a formal sewage treatment plan.
- Prioritize the construction of sewage treatment facilities, facility upgrades, and sewer line extensions through data obtained from the water quality monitoring program.
- Coordinate with county conservation district, landowners, and farmers to review and enforce sedimentation control regulations and techniques.
- Coordinate with local officials to manage stormwater.
- Implement erosion control measures in areas which have exposed banks.
- Protect natural and free-flowing streams.
- Develop programs to abate acid mine drainage
- Control nonpoint source pollution and prevent pollution incidents by requiring adequate product and waste handling safeguards
- Provide dry hydrants for local fire protection

Biological Resources

- Develop a fish stocking program which concentrates on both trout and popular warmwater gamefish species such as smallmouth bass, walleye, and muskellunge.
- Keep the river unrestricted for fishing
- Develop in-stream structures to support aquatic life.
- Increase habitat for game and nongame species.
- Protect wetlands, wild areas, natural areas, and other fragile areas.

Cultural Resources

Recreational

- Complete the trail.
- Develop spur trails.
- Create tourist information centers.
- Develop a travel link for tourists to move between study area communities, using trails, roads, railroads, and the river.

- Develop additional boat launches in underserved locations.
- Promote the Casselman River in fishing, hunting, canoeing, bicycling magazines.
- Provide picnic tables, benches, and fire rings at scenic areas along the trail
- Repair Pinkerton Tunnel for the trail
- Provide camping areas along the trail
- Provide restroom facilities at trail access and parking areas
- Construct maintenance ditches large enough to handle water runoff
- Provide more parking areas and access for fishing

Archaeological/Historical

- Preserve existing historical structures within the study area and integrate these sites with local communities and recreational activities.
  - Study the archaeology of Fort Hill with modern techniques.
  - Develop a plan to promote development of culturally and historically significant buildings and properties

<u>Education</u>

- Continue Envirothons for high school students.
- Interpretive signs along the trail to educate the public about the issues concerning the river and local geology.
- Schedule a series of public presentations on various river-related topics which may include erosion and sedimentation control techniques, citizen water quality monitoring programs, cultural and historical significant areas and structures, and recreation opportunities (coordinate with local historical societies and sporting groups.)

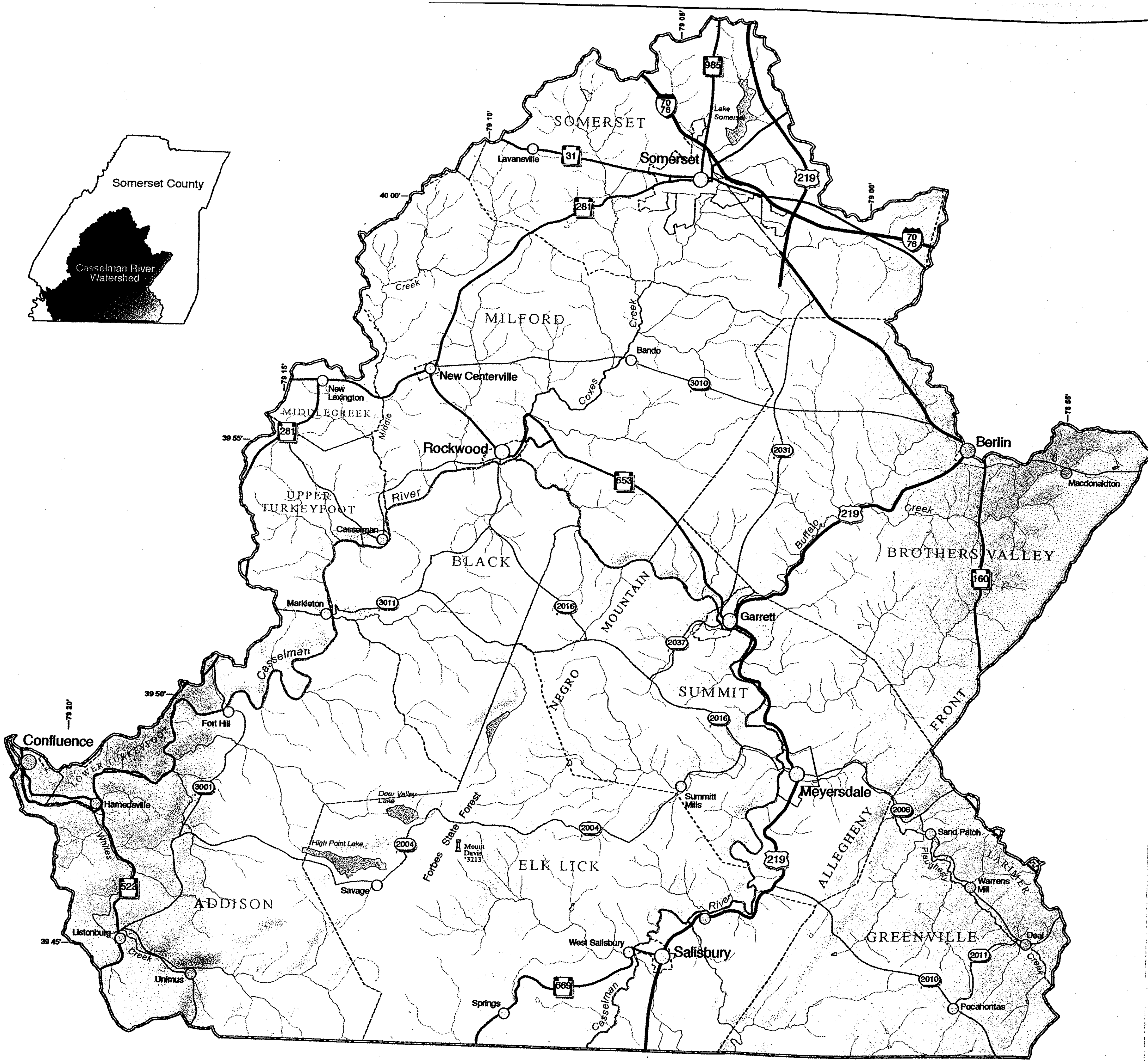
Action Plan Summary Table

Action Items	Measures and Approach	Potential Management Agent	Funding Options	Priority Level	Phasing and Timetable
Land Resources					
Protect prime agricultural soils	Institute a program to prevent the loss of prime farmlands	Somerset Conservation District and the PA extension service	Clean and Green, NRCS, USDA	1	2001-2002
Inventory AML sites and Identify redevelopment or restoration potential	Develop a program to identify prior industrial or mined sites that can be redeveloped for industry or restored to original condition	Somerset Conservation District, Somerset Chamber of Commerce, Somerset County Conservancy, Southern Alleghenies Conservancy, & RC&D	NRCS, Clean and Green, PA DEP, PA DCNR, RAMP, ACSI, EPA, USGS	1	2001-2002
Inventory coal refuse piles and trash dumps (landfills)	Develop a program to identify and remove caol refuse piles and trash dumps	Somerset Conservation District, Somerset County Conservancy, Southern Alleghenies Conservancy, & RC&D	PA DEP, RAMP, NRCS, EPA, Private Foundations	1	2001-2002
Inventory Underground Storage Tank Sites and old Gas Stations	Develop a program to identify and remediate UST sites.	Somerset County Planning Commission, Somerset Conservation District, Somerset County Conservancy, PA DEP, Somerset County Redevelopment Authority	Growing Greener, EPA	1	2001-2002
Land Use Planning	Promote a land use planning program for critical areas: steep slopes, wetlands, logging, and floodplains	Somerset County Planning Commission, Somerset Conservation District	State Planning Assistance Grants, PA Environmental Education Act, ASFS	1	2001-2002
Inventory non-prime farmland	Identify non-agricultural lands for development or preservation	Somerset Conservation District, Somerset County Conservancy	Private Foundations	2	2002-2003
Maintain or improve visual quality along the Allegheny Highlands Trail and river valley	Develop a program to encourage land owners along the trail and river to leave or plant a vegetative barrier beside the trail and river	Municipalities, Somerset County Conservancy, Somerset County Parks & Recreation Board	NRCS, Clean and Green, PA DEP, PA DCNR, RAMP, ACSI, EPA	2	2002-2003
Identify areas that may qualify for conservation easements or protection (Big Spring at Mt. Davis and the Former Somerset State Hospital Property)	Develop a program to encourage property owners containing significant ecological value to donate, sell, or place an easement on the property for future protection and use	Somerset County Conservancy, Southern Alleghenies Conservancy	Private Foundations, Nature Conservancy, Western PA Conservancy,	3	2004-2005
Geological Resources					
Re-mining	Develop a program to encourage re-mining where-ever it is feasible, this will remove and treat any acid causing material from abandoned mines	PA DEP, USDI-OSM	Self Supporting (the sale of coal will pay for the cost of day-lighting the mine)	1	2001-2003

Action Items	Measures and Approach	Potential Management Agent	Funding Options	Priority Level	Phasing and Timetable
Water Resources					
Water quality monitoring & Aquatic life monitoring	Develop a water quality & Aquatic life monitoring programs	Casselman River Watershed Association, Somerset County Conservancy, Yough River Watch, Casselman River Conservancy	NRCS, Clean and Green, PA DEP, PA DCNR, RAMP, ACSI, EPA	1	2000-2005
Acid mine drainage	Develop programs to abate acid mine drainage	Somerset Conservation District, Somerset County Conservancy, Casselman River Watershed Association, Southern Alleghenies Conservancy	NRCS, Clean and Green, PA DEP, ACSI, EPA	1	2000-2005
sewage treatment planning	Encourage deficient municipalities to develop a formal sewage treatment plan	Somerset County Planning Commission, PA DER, Municipalities, EPA, Somerset County Redevelopment Authority	PA DEP, EPA, Penn Vest	1	2000-2005
Prioritize the construction of sewage treatment facilities, facility upgrades, and sewer line extensions	Use data obtained from the water quality monitoring program.	Somerset County Planning Commission, PA DER, Municipalities, Somerset County Redevelopment Authority	PA DEP, EPA	1	2000-2001
Sedimentation control	Coordinate with county conservation district, Timber Companies, landowners, and farmers to review and enforce sedimentation control regulations and techniques	Somerset Conservation District, Somerset County Conservancy, Casselman River Watershed Association, PA Game Commission, USDA-NRCS	NRCS, Clean and Green, PA DEP	1	2000-2004
Stormwater management	Coordinate with local officials to manage stormwater	Municipalities	NRCS, Clean and Green, PA DEP	2	2003-2004
Erosion control	Implement erosion control measures in areas which have exposed banks	Somerset Conservation District, County Extension, PA Game Commission, PA Fish and Boat Commission	NRCS, Clean and Green, PA DEP	2	2003-2004
Free-flowing streams	Protect natural and free-flowing streams	PA DEP, Somerset Conservation District, PA Fish and Boat Commission, Trout Unlimited, PA Federation of Sportsmen	NRCS, Clean and Green, PA DEP	2	2003-2004
Nonpoint source pollution and Pollution prevention	Control nonpoint source pollution and prevent pollution incidents by requiring adequate product and waste handling safeguards	PA DEP, Somerset Conservation District, USDA-NRCS	NRCS, Clean and Green, PA DEP, PA DCNR, EPA	2	2003-2004
Wellhead & Aquifer protection plans	Update wellhead protection plans, Develop an aquifer protection plan	Municipalities	PA DEP, EPA	3	2004-2005
Wetlands	Identify and protect wetlands, Natural and Man-made	District, Somerset County Conservancy, Casselman River Watershed Association	NRCS, Clean and Green, PA DEP, PA DCNR, EPA	3	2004-2005
Dry hydrants	Provide dry hydrants for fire protection	Municipalities, Local Fire Departments	Local Fire Departments, Municipalities, Private Foundations	3	2004-2005

Action Items	Measures And Approach	Potential Management Agent	Funding Options	Priority Level	Phasing and Timetable
Biological Resources					
Improve Fishing	Develop a fish stocking program	PA Fish and Boat Commission, Local Sportsmens Clubs,Truout unlimited, Casselman River Watershed Association	Local Sportsmens Clubs, Trout unlimited, USFWS	1	2000-2005
Improve fish habitat	Provide instream structures	PA Fish and Boat Commission, Local Sportsmens Clubs, Truout unlimited, Casselman River Watershed Association	Local Sportsmens, TU, USFWS, PADEP	1	2000-2005
Improve terrestrial habitat	Plant buffer zones, create overgrown and brushy areas, plant native fruits and berries for game/ nongame food supply	PA Game Commission, Local Sportsmens Clubs	Private foundations, USFWS	2	2002-2003
Protect wetlands, natural areas, wild areas, and other fragile areas	Identify and protect wetlands and other significant areas	District, Somerset County Conservancy, Casselman River Watershed Association	Pa DCNR, PA DEP, Grownig Greener	2	2002-2003
Keep fishing unrestricted (year round access)	Keep special regulations off of the Casselman	PA Fish and Boat Commission, Local Sportsmens Clubs	PA Fish and Boat Commission, Local Sportsmens Clubs	3	2003-2005
Recreational Resources					
Allegheny Highlands Trail	Complete construction, and develop spur trails (Turkeyfoot Trail) and repair structures (Pinkerton Tunnel0	Somerset Rails to Trails, Somerset County Conservancy, Somerset County Parks and Recreation Board, & Somerset County Planning Commission	PA DCNR, PA Rails to Trails, Private Foundations	1	2000-2005
Tourist information & education centers	Construct tourist information centers at trailheads	Somerset Rails to Trails, Somerset County Conservancy, Somerset County Parks and Recreation Board	PA DCNR, PA Rails to Trails, Private Foundations	1	2000-2002
Travel links for tourists	Provide travel for tourists between communities, using trails, railroads,roads and the Casselman River	Somerset Rails to Trails, Somerset County Conservancy, Somerset County Parks and Recreation Board	PA DCNR, PA Rails to Trails, Private Foundations	1	2000-2002
River Access	Develop boat launches and river access along roads, and parking for the trail	PA Fish and Boat Commission, Local Sportsmens Clubs Somerset Rails to Trails, Somerset County Conservancy, Somerset County Parks and Recreation Board	PA Fish and Boat Commission, PA DCNR, PA Rails to Trails, Private Foundations	1	2000-2002
Comfort areas	Provide restrooms, fire rings, camp grounds near the trail	Local Sportsmens Clubs Somerset Rails to Trails, PA DCNR, PA Rails to Trails, Private Foundations, Somerset County Parks and Recreation Board	PA DCNR, PA Rails to Trails, Private Foundations	2	2003-2005
Cultural, Historical and Archaeological Resources					
Fort Hill and Gnagey sites	Study old Indian sites with modern equipment	Local Historical Organizations PA DCNR, PA Rails to Trails, Private Foundations	PA DCNR, PA Rails to Trails, Private Foundations	1	2003-2004
Preserve, acquire and protect historical structures & sites	Develop a plan to preserve old covered bridges and structures	Local Historical Organizations	PA DCNR, PA Rails to Trails, Private Foundations	1	2003-2004

Location Map
Casselman River Watershed



LEGEND

- Watershed Boundary
- River or Stream
- Municipal Boundary
- Town or Place Name
- PA Turnpike
- U.S. Route
- PA Route
- Other Road
- 70/76 Interstate Traffic Route
- 219 U.S. Traffic Route
- 281 Pennsylvania Traffic Route
- 2010 Other Route

North

1:12000

0 — 6.5 Kilometers
0 — 4 Miles

Mapping & GIS Compiled By:

LandVision
Planning and Mapping Services

Introduction

The headwaters of the Casselman River begin in Garrett County, MD in the Savage River State Forest near the Pleasant Valley Recreation Area. The watershed includes 525 square miles of which 135 square miles is located in the Laurel Hill Watershed. The river flows northward into Pennsylvania, following the Berlin Syncline. It then turns westward where it cuts the Negro Mountain Anticline between Garrett and Rockwood. At Rockwood it turns south toward the Youghiogheny River following the Lower Youghiogheny Syncline to its confluence with the Youghiogheny River at Confluence, PA.

The elevation at the mouth of the river is 1332 feet above mean sea level (msl). While the highest point in the watershed is Mt. Davis at 3213 feet msl, which is also the highest point in Pennsylvania. The drainage area receives flow from a variety of geologic formations including sandstones of the catskill and pocono formations, shales, limestones, and calcariuos sandstones of the loyalhanna and mauch chunk formations, and the coalbeds, shales, clays, sandstones, limestones of the potsville,allegheny, connemaugh, and mongaleha groups.

The Casselman River is in the Allegheny Mountain section of the Appalachian Plateau Province of Pennsylvania. It is bounded by Laurel Hill to the west and Allegheny Mountain to the east. It is in the non-glaciated portion of the state. Annual precipitation averages between 40 – 46 inches.

Three forest types are found in the watershed. They are: oak / hickory / pine forest, northern hardwood (deciduous) forest, and appalachian oak forest. Outstanding scenic geologic features include: Casselman River Gorge, Mt. Davis, Baughman Rocks, Blue Hole, Cole Run Falls, High Point Lookout, & Vought Rocks. Major impoundments in the watershed include: Laurel Hill Lake, Lake Somerset, Hogh Point Lake, Deer Valley Lake, Rockwell Lake, Cranberry Glade Lake.

The major resources of the watershed include: coal, limestone, natural gas, and fire clay. Forestry is the largest renewable resource with woodlands covering a major portion of the watershed. Portions of Forbes State Forest are within the drainage basin. Agricultural lands rank second in land use in the area. State game lands #50, 111, 231, &271 are in the watershed. Kooser, Laurel Hill, and portions of Laurel Ridge State parks are also within the watershed.

The major industries in the area include two ski resorts (Seven Springs & Hidden Valley), sewing factories, boot manufacturing, camping trailer assembly, hose nozzle & sprinkler manufacturing, home health care product production, door trim hardware manufacturing, furniture manufacturing, machine shops, wood products manufacturing, plastic injection moulding, truck body manufacturing, and fire truck manufacturing. Service and tourism / travel industries are also large in the watershed. Two state prisons are also located in the drainage basin. One landfill will be opening in the watershed.

The major pollutant in the watershed is acid mine drainage from abandoned surface and underground mines. The coal seams involved are the Pittsburgh, Brookville,and Lower Kittanning. Agriculture is responsible for nutrient runoff and suspended solids. Industrial and municipal wastewater and active mining are well regulated and are not a problem in general. Acid precipitation impacts streams that have a low buffering capacity due to low amounts of limestone in the geology.

GEOLOGICAL RESOURCES

Introduction

The Casselman River watershed lies in Southern Somerset County, which encompasses an area of approximately 630 square miles in southwestern Pennsylvania. Somerset County is bounded on the west by Fayette County, on the east by Bedford County and on the south by the counties of Garrett and Allegheny in western Maryland. The southern Somerset country area lies within the three fifteen minute quadrangles of Confluence, Meyersdale, and Berlin, as well as parts of the 7 ½ minute quadrangles of Friendsville, Accident, Grantsville, Avilton, Frostburg, and Cumberland in Maryland. Map 1 shows the approximate boundaries of the study area.

The western border of southern Somerset County is delineated by the Youghiogheny River and the crest of Laurel Hill. The Maryland-Pennsylvania state line forms the southern boundary of the county, and the eastern boundary follows Little Allegheny Mountain northeast to Wills Creek, and then approximately north to the northern edge of the Berlin quadrangle in the vicinity of New Baltimore.

Physiography

The eastern portion of the United States is divided into several physiographic provinces known as the Coastal Plains, Piedmont, Blue Ridge, Ridge and Valley, Appalachian Plateaus, and the Central Lowlands. Southern Somerset County falls within the Allegheny Mountains section of the Appalachian Plateaus province. The province is separated from the Ridge and Valley province by the Allegheny Front, which in Southern Somerset County consists of Allegheny Mountain as it winds in a southwesterly direction in the northeast corner of the Berlin quadrangle to the vicinity of New Baltimore. The front then runs in a southeasterly trend around the Wellersburg syncline, and then to the southwest again through the southern end of the Berlin quadrangle, where it joins Little Allegheny Mountain in Maryland. To the west of Cumberland, the ridge which separates the Appalachian Plateaus and Ridge and Valley provinces is commonly known as Piney Mountain; a southwesterly extension is also known as Dans Mountain.

In Somerset County, the terrain consists of somewhat open folds having flank dips that occur in a range of between 5 and 20 degrees. In the adjacent Ridge and Valley province, flank dips of less than 30 degrees are unusual. The Allegheny Mountains section of the province has more pronounced folding than areas to the west, as in the general area of Pittsburgh, where folding is much more broad and open, and flank dips usually are less than 5 degrees. Familiar markers of the landscape in the Allegheny Mountains section are the Chestnut, Laurel, Negro, Allegheny, Savage, and Little Allegheny ridge systems. This particular area has been included in the Appalachian Plateaus province, rather than the Ridge and Valley province, since the region shares more closely the characteristics of the Appalachian Plateaus, such as relatively high valleys underlain by gently inclined, mostly clastic strata of Paleozoic age having a high degree of dissection. In the Ridge and Valley province, however, major valleys usually occur at lower elevations, and are formed from early Paleozoic rocks.

Topography and Drainage

A series of generally parallel ridges with a general northeasterly trend is the most prominent feature of the gross topography of Southern Somerset County. From west to east lie Laurel Hill, Negro Mountain, Allegheny Mountain, Big Savage, and Allegheny Mountain. Mount Davis (elevation 3,213 feet) occurs along a slight prominence on Negro Mountain approximately four miles north of the Pennsylvania-Maryland state line. This summit is the highest elevation in the state. Local relief in the region is approximately 1,000 feet, and the total relief of the area (measured from Mount Davis to the low point where the Youghiogheny River passes through Laurel Hill at about 1,270 feet) is around 2,000 feet. Some areas between the ridges occur that have relief of around 500 feet. This relief generally is most pronounced in the vicinity of the larger streams and less important at distance from major valleys. Terrain ranges from relatively moderate in the Berlin-Brotherton region to considerably more rugged in the Casselman River valley and the areas near its major tributaries at Confluence, Rockwood, Meyersdale, and Garrett.

These ridges are defined by the upturned outcrops of resistant sandstone beds. Pottsville sandstones are prevalent at Laurel Hill, Negro Mountain, Allegheny Mountain, Big Savage Mountain, and Little Allegheny Mountain. Little Savage Mountain is defined by Pocono sandstone. Large float blocks and copious amounts of rubble are known among all of these ridge systems. The slopes of the ridges are generally steep and forested with thin, rocky soil, while the region's valleys are distributed between forest and fields.

The Pocono formation is quite resistant to erosion, and along with the sandstones belonging to the Pottsville and Allegheny formations, underlies Allegheny Mountain, with additional exposures at Negro, Little Savage, and Little Allegheny Mountains. It is also visible at Laurel Hill where the ridge is cut by the Youghiogheny River, both in Somerset and Fayette counties. At Little Allegheny Mountain, the Pocono-Pottsville sequence comprises a single ridge, but in other places, such as at Little Savage Mountain and along the Allegheny Front, the two formations form distinct ridges. Little Savage Mountain is the Pocono formation ridge on the eastern flank of the Deer Park anticline, and the Pottsville formation ridge Big Savage Mountain is adjacent to it.

The Jennings-controlled areas consist of well-dissected hilly terrain with relief of between 300 and 600 feet. Summit elevations in the region range from 2,400 feet at Mt. Zion to 2,700 feet near Pocahontas. General topography shows a series of knobs oriented in such a way that they parallel the general strike of the most resistant units of rock within the Jennings formation.

Thin soils and outcrops are common in the Jennings area. Soil color ranges from buff to light brown, contrasting the red soils dominating the Catskill formation. Siltstone and fine-grained sandstone are also common in the region.

In the Jennings formation outcrop area, most streams drain into either the Wills Creek or Juniata River watersheds. Two notable exceptions are Flaugherty Creek and Piney Creek. Flaugherty Creek flows west across the Catskill outcrop on the western flank of the Deer Park anticline through Allegheny Mountain to join the Casselman River at Meyersdale. Piney Creek also cuts through Allegheny Mountain, roughly paralleling Flaugherty Creek about 5 miles to the northeast, also joining the Casselman River in the vicinity of Boynton.

Catskill red beds occur along the middle and lower eastern slope of Allegheny Mountain, on the west slope of Little Savage Mountain, and on the eastern slope of Little Allegheny Mountain. Local relief runs approximately 200-300 feet, with outcrop belts about a mile in average width. Streams generally flow in a transverse direction to the strike of Catskill rocks; however some flow in a parallel or subparallel manner, and are thought to be controlled by the weaker shales in the red beds. The Catskill formation does not tend to have continuous ridges underlain by highly resistant sandstones, but rather the tendency lies toward series of hilltops controlled by resistant sandstones oriented in a parallel manner to the rock strike. The gentle dip in the terrain and a significantly wider outcrop belt near the Allegheny Front in the Allegheny Mountain Catskill belt makes these features somewhat more prominent. Catskill soils are quite a bit more red than the nearby Jennings and Pocono rock units.

Loyalhanna limestone occurs in a layer approximately 50 feet thick in the region, but has little effect on the area's topography. Along with the Pocono sandstones, however, it does form an important bench layer between the steep slopes of the lower and middle Pocono formation on the lower side, and the Mauch Chunk formation shales on the upper side. Such bench layers are often preferred for use as road beds; an example is Route 160 (Plank Road), where just east of Allegheny Mountain lies a two-mile stretch of road constructed on the Loyalhanna-Pocono bench layer.

Pottsville sandstone rubble from overlying layers commonly litters the Mauch Chunk slopes on the upper side of the Loyalhanna-Pocono bench; this is believed to occur because the contact zone of the Mauch Chunk formation and the Pottsville formation occurs considerably downslope from Pottsville ridges, and the Pottsville rocks slowly creep down over those in the Mauch Chunk formation, gradually breaking loose blocks of Pottsville sandstone.

Pennsylvanian coal-bearing rocks generally occur in synclines, but the Allegheny Formation contains a significant area of coal-rich strata on the Negro Mountain anticline southeast of Somerset, as well as on the Centerville Dome to its southwest. Topographically significant units in the coal bearing strata sufficient to produce major prominences or depressions are absent. The resistance of the sandstone strata, however, gives them a tendency to form hillside benches, and where the dip is essentially at the same angle as the slope of the ground surface, long spurlike ridges leading away from ridge summits are formed. Scarp slope-dip slope asymmetry of hills capped by sandstones in gently sloping areas is a good sign of regional dip direction.

The coal-bearing syncline possesses relief of from 100 to 200 to 400 to 500 feet, with a dependence upon their position in relation to major stream valleys and uplands. Synclinal terrain is usually highly dissected, as in the Brotherton-Roxbury region, where northward and southward drainage are separated by a divide.

Drainage to the west of Allegheny Mountain is to the Gulf of Mexico via the Youghiogheny, Monongahela, Ohio, and Mississippi Rivers. Some northwesterly drainage occurs north of Berlin, flowing via Stony Creek to the Conemaugh River. Overall, however, most of the area's drainage is by way of the Casselman River. The Casselman enters Somerset County near Salisbury, flowing north from Maryland. The northern flow continues through Meyersdale and Garrett, where the river then bends westward, flowing through a gorge in Negro Mountain to Rockwood. From Rockwood the river continues on a southwesterly track to Confluence, where it meets the Youghiogheny River. An interesting feature to note is that the Casselman River flows through a major anticlinal ridge (Negro Mountain), suggesting that it may be an antecedent river whose course was determined at an earlier period; as regional uplift occurred, the river continued to slice its way through the anticline on roughly the same course it had previously followed.

Only two streams in Pennsylvania, Flaugherty Creek (near Meyersdale), and Piney Creek (near Salisbury) head east of Allegheny Mountain and flow westward through the mountain to join the Mississippi drainage basin. These two streams likely once actually headed on the western slope of Allegheny Mountain, but due to headward erosion, have extended their valleys through to the eastern flank of the ridge. This pattern is unique; all other drainage east of Allegheny Mountain flows to the Atlantic Ocean by way of the Wills Creek-Potomac system or the Juniata-Susquehanna system.

Stratigraphy

Introduction

The Pennsylvania Geological Survey report from which most of the geological information for this paper was found covers only surficial stratigraphy. As of its writing (1965), little was known of subsurface stratigraphy in southern Somerset County. A few wells had been drilled at the time, and most of the information regarding subsurface rocks was through extrapolation. In general, the stratigraphic distribution in southern Somerset County follows the sequence:

SYSTEM	***ROCK UNIT***
Pennsylvanian	Monongahela Group (top layers partially eroded) Conemaugh Group Allegheny Group Pottsville Group
Mississippian	Mauch Chunk Formation Loyalhanna Formation Pocono Formation
Devonian	Catskill Formation Jennings Formation

The surficial column thickness is approximately 8,000 feet. Major constituents of the column are shale, siltstone, and sandstone. Devonian strata are devoid of carbonate species, while both the Mississippian and Pennsylvanian strata contain some carbonate minerals. Limestone content generally increases from the Jennings Formation upward to the Monongahela group, but not at a constant rate.

Red beds are noted within the Catskill and Mauch Chunk Formations, as well as in the Conemaugh Group. Pennsylvanian strata possess more varied lithology and overall the strata are thinner than in other systems. Pennsylvanian strata contain coal, clay, shale, siltstone, sandstone, and limestone.

Marine and non-marine stratigraphic sequences tend to alternate within the total column. For example, the Jennings Formation, Loyalhanna Formation, and at least part of the Mauch Chunk Formation are considered to be marine. Marine beds have also been noted in the Conemaugh Group. The remainder of the units are regarded as being non-marine in origin.

The stratigraphic column generally is poorly exposed. The Pottsville and Pocono Formations, which generally occur on the crests and flanks of ridges, are frequently covered to completion with debris. Pennsylvanian rocks are difficult to find in natural exposure due to the fact that the shales and clays present weather readily into heavy soils, obscuring the more resistant layers. Open-pit coal mines are usually the best exposures of Pennsylvanian rocks, but do not expose the entire Pennsylvanian section.

Devonian System

Introduction

Devonian exposures in southern Somerset County are limited to the upper units of the system. Little information has been gathered on the middle and lower strata as little subsurface drilling has been done. Knowledge of pre-Devonian rocks is scant, though some extrapolations have been done from outcrops of Devonian rocks or deep wells in other areas that penetrate the strata. The Mowry well located in the Deer Park anticline is one such reference.

The upper units of the Devonian rocks in the region are completely clastic. A basic subdivision has been made into the marine Jennings Formation and the non-marine Catskill Formation. Approximate thicknesses are about 4,000 feet and 1,600 feet, respectively.

The Jennings Formation is primarily made up of gray, olive, or brown shales and siltstones, with some red shales, gray sandstones, and a few minor conglomerates. Marine fossils occur in varying amounts throughout the rock sequence of the formation.

The Catskill rocks are mostly red, and consist of an interbedded set of sandstones and shales. At the base of the Catskill Formation, an alternating sequence of red and non-red strata forms a transition zone between the non-marine Catskill red beds and the marine non-red beds of the Jennings Formation. This zone is approximately 400 feet thick. Officially, however, the Jennings-Catskill boundary is considered to be determined by the highest occurrence of marine fossils, rather than by the lowest occurrence of red strata.

The main Devonian system exposure is along the eastern Deer Park anticline, but 2 other significant exposures occur at Negro Mountain near the Maryland state line and at the Youghiogheny gorge where the river cuts through Laurel Hill.

Jennings Formation

Introduction

The Jennings Formation is composed of a sequence of marine shales and sandstones that lie underneath the Catskill red beds that are possibly correlated to the Chemung rocks of New York, but has been named because of probable closer similarities to stratigraphy in the western Maryland, eastern West

Virginia and northern Virginia area; the name was borrowed from a unit occurring there that lies between the Hampshire formation (equivalent to the Catskill Formation) and the Romney Shales. The Jennings rocks probably date to the Portage age, and possibly to the Hamilton age. At its boundary with the Catskill Formation, the Jennings intermingles with the rocks of the Catskill in an east-west direction, with the non-marine Catskill beds thickening and sloping downward to the east, while the marine Jennings rocks thicken and slope upward to the west.

Lithology and Thickness

The basic lithology of the Jennings Formation consists of an interbedded series of shales, siltstones, and fine-grained sandstones. Some conglomerate sandstones are also present in minor amounts. The rocks of the Jennings are usually grayish-green, olive, or chocolate brown. Weathered pieces often take on a rusty appearance at the edges of fossil molds due to the presence of limonite. Fossils of marine flora and fauna are widespread throughout the unit, with a somewhat sporadic distribution of remnants between beds in the formation. Most fossils identified are Brachiopoda (primarily spiriferids) and crinoid stem fragments, but pelecypoda and gastropoda have also been found to occur. Jennings bedding layers range from thin to medium. Platy chunks of weathering sandstone among formation outcrops are common. At some points, bed thicknesses approach 2 to 3 feet, commonly associated with a conglomeratic sandstone belt that has a total thickness of about 50 feet, and occurring approximately 1,600 feet below the uppermost layers of the Jennings Formation.

Estimates place the regional extent of the Jennings Formation in southern Somerset county at approximately 5,000 to 5,500 feet; At least 4,000 feet of the unit is known to be exposed within the study area. The lowest units exposed are in the area of the Deer Park anticline, near the crestal region.

A detailed analysis of the upper 2,000 feet of the Jennings Formation is available from a log study performed by People's Natural Gas during the drilling of the company's No.1 marker well. Total depth of the well is 5135 feet, and gives a good view of the Mauch Chunk Formation, Loyalhanna Limestone, Pocono Formation, Catskill Formation, Catskill-Jennings Transition Zone, Jennings Formation, and the Jennings conglomerate zone. The well's approximate location is 39°52.5' N, 79°7.5' W, locating it about 3.5 miles west of Garrett, PA. The stratigraphic analysis is as follows:

Top	***Bottom***	***Description***
		0-483 Feet: Mauch Chunk Formation
0	17	Surface.
17	30	Sandstone; light gray, very fine.
30	47	Sandstone; buff to white, fine.
47	60	Sandstone; white, fine to medium, free and clustered.
60	66	Siltstone; gray with 50% white, fine calcareous sandstone.
66	68	Sandstone; white, fine to medium. Slightly calcareous.
68	84	Shale; gray, silty. Contains siderite.
84	90	Siltstone; greenish-gray, coarse, sandy.
90	95	Sandstone; light gray, fine, micacaeous.
95	100	Shale; greenish-gray. Contains siderite.
100	111	Shale; red and grayish-green. Contains siderite.
111	125	Shale; red.
125	139	Shale; gray, silty.
139	159	Sandstone; light gray, fine, micaceous.
159	161	Sandstone; gray, fine calcareous.
161	164	Sandstone; gray, very fine, micaceous.
164	168	Sandstone; light gray, fine.
168	175	Shale with interbedded siltstone; gray.
175	184	Sandstone; light gray, fine to medium, micaceous.
184	189	Siltstone; greenish-gray.
189	196	Shale; variegated.

196	208	Shale; red with a little interbedded green shale.
208	214	Shale; red.
214	226	Shale; red with interbedded green siltstone. Calcareous.
226	233	Siltstone; green.
233	245	Shale; red.
245	262	Shale; red with a very little interbedded green shale and siltstone. Calcareous 251-256.
262	280	Shale; red, silty.
280	288	Shale; greenish-gray, silty.
288	298	Sandstone; greenish-gray, very fine and silty, micaceous.
298	314	Shale; greenish-gray, silty. Base of shale has a rusty, weathered appearance.
314	325	Limestone; Wymps Gap, brownish-gray, oolitic.
325	337	Shale; gray, fossiliferous.
337	343	Shale; gray, fossiliferous with 25% gray, oolitic, impure limestone.
343	355	Siltstone; greenish-gray with a trace of above fossiliferous shale and limestone.
355	369	Sandstone; light greenish-gray to white, very fine, calcareous.
369	374	Limestone; variegated, sandy. Also contains a little red shale.
374	381	Limestone; white to red, oolitic, sandy.
381	389	Shale; greenish-gray to gray.
389	395	Shale; red, sandy, calcareous. Contains a little green and gray shale.
395	401	Shale; red, contains 15-20% light green fine, calcareous sandstone.
401	411	Sandstone; white, fine to medium, calcareous with 50% red sandy shale.
411	421	Shale; red, silty.
421	430	Sandstone; light green to white, fine with 50% red shale.
430	436	Shale; red.
436	454	Sandstone; white, medium with equal amount of green siltstone, red shale and a dark greenish-gray shale. Green siltstone grades into a very fine sandstone in lower half.
454	460	Shale; red, sandy with 25% dark gray shale.
460	467	Sandstone; green, very fine to medium with an equal amount of red and dark gray shale.
467	483	Shale; red
		Loyalhanna Limestone, 483-529
483	491	Limestone; red, sandy.
491	507	Limestone; red, sandy. Sand grains range from fine to coarse. Many are rounded and frosted.
507	513	Limestone; like above with 50% red calcareous siltstone.
513	529	Limestone; red, sandy. Sand grains range from fine to coarse. Many are rounded and frosted.
		Pocono Formation, 529-1087
529	556	Sandstone; variegated, fine to medium, free and clustered.
556	589	Sandstone; variegated, fine. ***Note:*** The sample at 529 is predominantly various shades of red with a minor amount of green. The green sandstone increases in amount downward as the various shades of red decrease so that at 589 the sample consists entirely of light greenish-gray sandstone.
589	628	Sandstone; light greenish-gray, fine.
628	637	Sandstone; light gray, fine. Contains a little siderite.
637	650	Sandstone; light gray, very fine to fine.
650	688	Sandstone; light gray, fine. Contains a little siderite.
688	721	Siltstone; greenish-gray, coarse, sandy with interbedded gray, silty shale.
721	726	Sandstone; light greenish-gray, very fine.
726	772	Sandstone; light greenish-gray, fine.
772	802	Sandstone; greenish-gray, fine to very fine, dense. Contains a thin gray shale break at the top.

802	809	Sandstone; greenish-gray, very fine and silty with a little interbedded greenish-gray, gray and dark gray shale.
809	825	Sandstone; greenish-gray, very fine.
825	837	Shale; dark gray, silty with 35% light greenish-gray, fine sandstone. Also contains a few fragments of brown calcareous shale.
837	845	Siltstone; brownish- to greenish-gray. Calcareous.
845	861	Shale; dark gray to dark brownish-gray with a little interbedded siltstone like above.
861	867	Siltstone; light greenish-gray with 25% dark gray shale.
867	882	Siltstone; greenish-gray with interbedded gray to greenish-gray shale.
882	894	Sandstone; light greenish-gray, fine to very fine.
894	916	Sandstone; light greenish-gray to white, fine, free and clustered.
916	922	No sample.
922	925	Sandstone; white, fine, free and clustered with 25% greenish-gray, very fine, silty sandstone. Also a few fragments of brown limestone.
925	931	Sandstone; white, medium to coarse, free and clustered.
931	947	Sandstone; light greenish-gray, fine, pebbly with interbedded greenish-gray and dark gray shale. Dolomitic.
947	960	Sandstone; greenish-gray, very fine and silty.
960	965	Sandstone; like above with 50% light greenish-gray, fine, free and clustered sandstone.
965	980	Sandstone; greenish-gray, fine, free and clustered. Contains considerable interbedded gray to greenish-gray shale.
980	986	Shale; gray to greenish-gray.
986	1007	Shale; gray to greenish-gray with a little interbedded greenish-gray siltstone. Fossiliferous and highly calcareous.
1007	1020	Siltstone; greenish-gray.
1020	1041	Shale; gray with 10-20% light greenish-gray fine sandstone.
1041	1060	Sandstone; light greenish-gray, fine.
1060	1072	Sandstone; like above with 25-35% gray to dark gray shale.
1072	1087	Sandstone; light greenish-gray, fine, micaceous.
		Catskill Formation 1087-2695
1087	1094	Shale; red, silty with a little greenish-gray siltstone, highest red bed.
1094	1103	Shale with interbedded siltstone; greenish-gray.
1103	1113	Shale; red, silty with a little greenish-gray siltstone.
1113	1123	Sandstone; greenish-gray, very fine and silty.
1123	1133	Sandstone; like above with 25% red siltstone.
1133	1149	Shale with a little interbedded siltstone; greenish-gray.
1149	1156	Shale; variegated. Red fragments are slightly dolomitic.

1156	1180	Sandstone; red, very fine and silty, micaceous.
1180	1182	Shale; light greenish-gray with a little light greenish-gray, very fine sandstone.
1182	1187	Siltstone; red, sandy, dolomitic.
1187	1198	Sandstone; red, very fine and silty, micaceous.
1198	1221	Sandstone; variegated, very fine and silty, micaceous.
1221	1279	Shale; red.
1279	1310	Shale with a little interbedded siltstone; greenish-gray. Carbonaceous at top.
1310	1380	Shale; red.
1380	1389	Shale; red with 20% light green, fine sandstone.
1389	1402	Shale; red, silty.
1402	1409	Shale with interbedded very fine shaly sandstone; red and light greenish-gray.
1409	1422	Shale; light greenish-gray.
1422	1433	Shale with interbedded siltstone; greenish-gray.
1433	1442	Sandstone; white, fine with interbedded light greenish-gray siltstone.
1442	1502	Shale; red.
1502	1521	Shale; red, silty.
1521	1531	Siltstone; greenish-gray.
1531	1550	Sandstone; light greenish-gray, fine to very fine.
1550	1557	Shale; read and greenish-gray.
1557	1586	Shale; red.
1586	1613	Sandstone; red, fine, micaceous.
1613	1623	Sandstone; variegated, fine and free and clustered.
1623	1643	Shale; red.
1643	1651	Shale; greenish-gray with 25% light greenish-gray fine sandstone.
1651	1671	Shale; red. Quite silty at top.
1671	1689	Shale with interbedded siltstone; greenish-gray.
1689	1701	Shale; red, sandy.
1701	1711	Shale with interbedded siltstone; greenish-gray.
1711	1744	Shale; red.
1744	1754	Sandstone; red, fine.
1754	1761	Shale; red, silty.
1761	1771	Siltstone; red.
1771	1781	Sandstone; red, very fine and silty.
1781	1792	Shale; red, sandy.
1792	1805	Sandstone; red, fine, shaly.
1805	1811	Sandstone; green, very fine to fine.
1811	1830	Shale with interbedded siltstone; greenish-gray.
1830	1842	Sandstone; red and light greenish-gray, fine, pebbly.
1842	1858	Shale; red. Contains abundant embedded sand grains in top.
1858	1875	Shale; greenish-gray, grayish-red, and red.
1875	1880	Shale; red.
1880	1892	Sandstone; red, fine.
1892	1902	Shale; red.
1902	1914	Sandstone; red, very fine and silty.
1914	1925	No sample.
1925	1949	Sandstone; red, very fine and silty. Contains interbedded red shale and siltstone.
1949	1988	Sandstone; red, very fine and silty, micaceous. Dolomitic from 1968-1978.
1988	1997	Sandstone; light green and red, fine to very fine with interbedded red and greenish-gray shale.
1997	2005	No Sample.
2005	2068	Shale; red with a little interbedded red, very fine and silty sandstone.
2068	2088	Shale; red.
2088	2102	Sandstone; red, very fine and silty, micaceous.

2102	2110	Shale; greenish-gray and red.
2110	2122	Sandstone; variegated, very fine.
2122	2132	Sandstone; red, very fine and silty.
2132	2142	Sandstone; variegated, fine, pebbly with 25% greenish-gray shale.
2142	2158	Sandstone; red, fine to very fine, shaly.
2158	2173	Shale; red.
2173	2183	Sandstone; red and green, very fine and silty with 25% red and green shale.
2183	2192	Sandstone; light green, fine to very fine.
2192	2194	Shale; light green.
2194	2201	Sandstone; red, fine and silty, micaceous.
2201	2209	Shale; dark greenish-gray, silty and interbedded with greenish-gray very fine silty sandstone.
2209	2215	Sandstone; light greenish-gray, fine.
2215	2228	Sandstone; red, very fine and silty.
2228	2232	Shale; greenish-gray.
2232	2242	Sandstone; greenish-gray, very fine and silty.
2242	2251	No sample.
2251	2275	Siltstone with interbedded shale; red.
2275	2295	Shale; red.
2295	2032	Siltstone; red.
2302	2322	Shale; red and greenish-gray.
2322	2355	Shale; red.
2355	2375	Siltstone; red. Grades downward into a very fine silty sandstone.
2375	2384	Shale; red, sandy.
2384	2414	Sandstone; red, very fine and silty, micaceous.
2414	2420	Sandstone; red and light green, very fine and silty, micaceous.
2420	2428	No sample.
2428	2438	Sandstone; greenish-gray, very fine, dense with 25% red shale.
2438	2451	Shale with interbedded siltstone; red.
2451	2460	Shale; red and green, sandy.
2460	2521	Shale; red. Contains abundant embedded sand grains and a few fragments of green, fine sandstone.
2521	2538	Shale with interbedded siltstone; red.
2538	2548	Shale; gray with 25-35% gray, fine to medium, dolomitic sandstone.
2548	2555	Sandstone; greenish-gray, fine. Slightly dolomitic.
2555	2567	Sandstone; greenish-gray, and red, very fine and silty.
2567	2577	Sandstone; light greenish-gray, fine to very fine. Slightly dolomitic.
2577	2587	Shale; red, silty.
2587	2596	Shale; gray to greenish-gray.
2596	2604	Sandstone; variegated, very fine with 25% red shale.
2604	2614	Shale with interbedded siltstone; red. Also 20% light green, fine sandstone.
2614	2625	Shale with interbedded siltstone; greenish-gray.
2625	2637	Sandstone; red, very fine and silty.
2637	2649	Sandstone; light green, fine.
2649	2668	Shale; greenish-gray with a very little interbedded green, very fine to medium sandstone.
2668	2674	Sandstone; variegated, very fine with a little interbedded gray, greenish-gray and red shale.
2674	2695	Sandstone; red, fine to very fine, shaly, micaceous.

		Catskill-Jennings Transition Zone 2695-3099
2695	2717	Shale; greenish-gray.
2717	2727	Shale; greenish-gray with 35% gray to greenish-gray, very fine silty sandstone.
2727	2735	Sandstone; like above with 25% gray shale.
2735	2740	Shale with interbedded siltstone; greenish-gray. Also 10-15% sandstone like above.
2740	2747	Shale with a little interbedded siltstone; greenish-gray.
2747	2757	Shale; green, greenish-gray, gray and dark gray. Also 10-15% green fine dense sandstone.
2757	2759	Shale with a little inbreeded siltstone; greenish-gray.
2759	2827	Shale greenish-gray.
2827	2847	Shale; greenish-gray with a little interbedded greenish-gray pebbly siltstone.
2847	2857	Shale; greenish-gray.
2857	2865	Shale; greenish-gray with 25% gray to greenish-gray, very fine to coarse, poorly sorted pebbly sandstone. Also 15% gray to dark gray shale.
2865	2874	Sandstone; green, very fine to fine, pebbly with 50% red, greenish-gray, gray and dark gray shale.
2874	2913	Shale; red, sandy. Contains a little interbedded variegated very fine, silty sandstone.
2913	2927	Sandstone; gray to greenish-gray, very fine and silty.
2927	2949	Shale; red. Sandy at base.
2949	2960	No sample.
2960	2983	Sandstone; variegated, very fine, micaceous.
2983	2992	Sandstone; red, very fine, micaceous.
2992	3001	Sandstone; green and red, very fine, micaceous.
3001	3011	Shale; grayish-green.
3011	3023	Shale; red and green.
3023	3046	Shale; grayish-green.
3046	3058	Shale; red with 25-30% grayish-green shale and a few fragments of green, fine sandstone.
3058	3064	Sandstone; greenish-gray, very fine and silty.
3064	3086	Shale with interbedded siltstone; grayish-green.
3086	3099	Shale; red to greenish-gray (lowest red bed).
		Jennings Formation 3099-5135
3099	3108	Shale; greenish-gray.
3108	3125	Sandstone; light green, fine to very fine with considerable interbedded greenish-gray shale in upper 7 feet.
3125	3300	Shale; greenish-gray with a little interbedded greenish-gray siltstone.
3300	3308	Shale with interbedded siltstone; greenish-gray. Also 20-25% greenish-gray, fine, dense sandstone.
3308	3320	Sandstone; greenish-gray, fine, dense with 10-20% greenish-gray shale.
3320	3350	Sandstone; light greenish-gray, fine, dense. Contains a very little interbedded gray to greenish-gray shale.
3350	3366	Shale; gray with 50% greenish-gray, fine sandstone.
3366	3370	Shale; gray to greenish gray with a little interbedded greenish-gray coarse siltstone.
3370	3386	Shale; gray to greenish-gray with interbedded greenish-gray siltstone.
3386	3422	Shale with interbedded siltstone; greenish-gray.
3422	3439	Siltstone with a little interbedded shale; greenish-gray.
3439	3453	Siltstone; light greenish-gray. Fossiliferous.
3453	3493	Shale; greenish-gray.
3493	3510	Siltstone with interbedded shale; gray to greenish-gray.
3510	3520	Siltstone with a little interbedded shale; greenish-gray.

3529	3549	Siltstone; greenish-gray.
3549	3574	Shale; greenish-gray.
3574	3617	Shale with interbedded siltstone; greenish-gray.
3617	3627	Siltstone with a little interbedded shale; greenish-gray.
3627	3675	Shale with interbedded siltstone; greenish-gray.
3675	3699	Siltstone with a little interbedded shale; greenish-gray. Much of siltstone has a slight reddish cast.
3699	3708	Shale with a little interbedded siltstone; grayish-red and greenish-gray.
3708	3717	Siltstone; greenish-gray, fossiliferous with a little above shale and siltstone.
3717	3733	Shale; gray to greenish-gray with interbedded siltstone. Most of siltstone is greenish-gray, but a few fragments have a reddish cast.
3733	3739	Siltstone; greenish-gray and grayish-red with a little interbedded greenish-gray shale.
3739	3750	Siltstone with a little interbedded shale; greenish-gray.
3750	3762	Shale; grayish-red to greenish-gray.
3762	3765	Siltstone; greenish-gray with a little shale like above.
3765	3775	Shale; grayish-red and greenish-gray with a little interbedded greenish-gray siltstone.
3775	3798	Siltstone with a little interbedded shale; greenish-gray.
3798	3802	Shale; greenish-gray with interbedded greenish-gray siltstone. Some of the siltstone has a reddish cast.
3802	3855	Shale; greenish-gray with a little interbedded greenish-gray siltstone.
3855	3865	Shale; gray to greenish-gray with interbedded greenish-gray fossiliferous siltstone.
3865	3877	Shale; gray to greenish-gray with a few fragments of light gray, very fine, dense sandstone.
3877	3905	Siltstone; gray to greenish-gray with a little interbedded gray shale. Some siltstone is quite coarse and may grade into a very fine sandstone.
3905	3916	Shale with interbedded siltstone; gray to greenish-gray.
3916	3928	Siltstone; gray to greenish-gray, fossiliferous with a little interbedded gray to greenish-gray shale.
3928	3954	Siltstone; greenish-gray; fossiliferous with a little interbedded greenish-gray shale.
3954	4000	Shale with interbedded siltstone; greenish-gray. Occasional fossil.
4000	4017	Siltstone with a little interbedded shale; greenish-gray.
4017	4051	Shale with interbedded siltstone; greenish-gray.
4051	4066	Siltstone; greenish-gray.
4066	4087	Siltstone; light greenish-gray, coarse, fossiliferous.
4087	4115	Siltstone with interbedded shale; greenish-gray.
4115	4125	Siltstone; greenish-gray, coarse with a little interbedded greenish-gray shale.
4125	4150	Siltstone with interbedded shale; greenish-gray.
4150	4162	Siltstone; greenish-gray, coarse, fossiliferous.
4162	4185	Siltstone with interbedded shale; greenish-gray.
4185	4200	Siltstone; greenish-gray, coarse, fossiliferous with a little interbedded greenish-gray shale.
4200	4286	Siltstone with a little interbedded shale; greenish-gray. Occasional fossil.
4286	4297	Shale; greenish-gray.
4297	4348	Shale; gray to greenish-gray with interbedded greenish-gray siltstone.
4348	4371	Shale; gray to dark gray and greenish-gray.
4371	4390	Shale; gray to greenish-gray with interbedded greenish-gray siltstone.
4390	4396	Shale; gray to greenish-gray with 25% greenish-gray, very fine and silty, fossiliferous sandstone.
4396	4406	Shale; gray.
4406	4417	Shale; gray with 35% light greenish-gray, very fine sandstone. Also a few

		fragments of coarse pebbly sandstone.
		Conglomerate Zone, 4417-4468
4417	4427	Sandstone; light green, very fine with many coarse, pebbly fragments. Also 25% gray shale.
4427	4431	Shale; gray with 35% sandstone like above.
4431	4450	Shale; gray.
4450	4460	Sandstone; light gray, very fine to coarse, pebbly, poorly sorted with 50% gray shale.
4460	4468	Sandstone; light greenish-gray, very fine to fine with 50% gray shale.
4468	4475	Shale; gray.
4475	4500	Shale; gray with a little interbedded greenish-gray sandy siltstone.
4500	4546	Shale; gray.
4546	4555	Shale; gray with 25% light greenish-gray, very fine sandstone.
4555	4564	Shale; gray with 50% sandstone like above.
4564	4613	Shale; gray.
4613	4616	Sandstone; light gray, fine, pebbly with 50% gray shale.
4616	4627	Sandstone; light gray, fine to medium, pebbly, with 25% gray shale. Very good sand.
4627	4645	Shale; gray with 20% light greenish-gray, very fine sandstone. Also a fragments of sandstone like above.
4645	4663	Shale; gray with a little interbedded greenish-gray siltstone.
4663	4673	Shale; gray.
4673	4678	Shale; gray with 25% chocolate, very fine sandstone.
4678	4690	Shale; gray.
4690	4708	Shale; gray with 25% chocolate, very fine sandstone.
4708	4733	Shale; gray with interbedded greenish-gray siltstone.
4733	4743	Sandstone; light gray to chocolate, very fine. Contains 25% gray shale.
4743	4755	Sandstone; light gray, very fine with 10-20% gray shale.
4755	4767	Shale; gray with interbedded greenish-gray, very fine and silty sandstone.
4767	4786	Shale; gray with a little inter bedded greenish-gray siltstone.
4786	4797	Shale; gray with 50% greenish-gray, very fine and silty sandstone.
4797	4851	Shale; gray with interbedded greenish-gray siltstone. Fossiliferous in top 20'.
4851	4873	Shale; gray with a little interbedded gray to greenish-gray siltstone.
4873	4874	Sandstone; light gray with a few dark chocolate fragments, fine, pebbly.
4874	4884	Sandstone; light chocolate gray, fine, pebbly.
4884	4887	Sandstone; light gray, very fine with 50% gray shale.
4887	4906	Sandstone; light gray, very fine. Has a chocolate cast at base.
4906	4918	Shale; gray with a little interbedded gray to greenish-gray siltstone.
4918	4931	Shale; gray with a little interbedded gray to greenish-gray siltstone. Also a few fragments of dark gray mottled siltstone.
4931	4958	Shale; gray.
4958	4981	Shale; gray with interbedded gray siltstone.
4981	5011	Shale; gray with interbedded gray to greenish-gray siltstone.
5011	5041	Shale; gray with a little interbedded greenish-gray, fossiliferous siltstone.
5041	5057	Shale; gray.
5057	5089	Shale; gray with interbedded dark gray siltstone.
5089	5135	No sample

Jennings Foundation Conglomerate Zones

The Jennings Formation incorporates two conglomerate zones, with one occurring fairly near the top of the formation and the other about 1,600 feet lower. The amount of float produced by the lower zone is noted to vary widely from location to location. This unit has a notable exposure in the vicinity of Brush Creek about 1 ½ miles from the former village of Johnsburg, which lies in the Berlin quadrangle. Only three good exposures are known to show in the study area, and this one is considered to be the best. A fourth exposure lies somewhat outside the study area near Rockville, MD (about 7 miles southeast of New Baltimore), lying in the Hyndman quadrangle. The conglomerate zone outcrops on the northeastern side of the nose of the Wellersburg syncline.

The lower Jennings conglomerate consists of quartz-pebble sand, having a grain size ranging from coarse sand to pea-sized. The bed is not wholly conglomerated throughout its entire extent, but possesses lenticular beds of conglomeratic sandstone as well as conglomerate within. Some shale interbedding is also noted. Overall, erosion resistance is high, and float block (some measuring greater than 2 feet in their long dimension) are abundant near any outcrop of the zone. Weathering to a light gray or white color is common. High porosity is noted due to widespread fossiliferous areas in both the sandstone and the conglomerate. An exposure of these porous blocks can be found on the hillside east of Hillegas Run, about 1 ½ mile west-northwest of Glen Savage. Some other rubble-producing sandstones do occur in the Jennings formation, but only this one produces float blocks of such size.

The lower conglomerate zone of the Jennings Formation was identified by Stevenson in 1882, who correlated it with adjacent rocks in Bedford County. The unit was named the "Lower Conglomerate of the Chemung Formation", and was described to have a thickness of approximately 10 feet. This unit forms a ridge at some locations in Bedford County. In Juniata Township, it forms an arcuate ridge, from West End near Route 31 and heading eastward around the nose of the Wellersburg syncline; the strata dip in the area is on the order of 10 degrees. Heading westward into Somerset County, no solid correlation can be made between the conglomerate layer and the regional topography, probably because the beds tend to dip at 15-20 degrees in Somerset County. In addition, the conglomerate layer is most likely too thin to have an effect on the topography there.

The upper conglomerate zone occurs near the top of the Jennings Formation, at approximately the same area as the Catskill-Jennings transition zone, where the highest marine fossils of the Jennings Formation are found. The layer is believed to be persistent throughout Somerset County, as a large number of exposures are present. One notable exposure is at the Western Maryland railroad cut about ¾ mile southeast of Sand Patch. A stratigraphic analysis of the area reveals four relatively thin conglomerate beds all within a general interval of about 25 feet:

Description	**Thickness**	
	Feet	**Inches**
1. Sandstone, dull red and pale green, fine-grained; with interbedded red and some green siltstone and shale	50	
2. Siltstone, pale green, with interbedded sandstone	13	0
3. Conglomerate, with quartz pebbles up to 1 inch in diameter	0	7
4. Sandstone, pale green, with some interbedded shale	6	0
5. Shale, olive green	Not given	Not given
6. Conglomerate	0	2 ½
7. Siltstone, with interbedded shale and sandstone, one brachiopod seen	16	0
8. Conglomerate	0	5
9. Siltstone, interbedded shale, and sandstone	Not given	Not given
10. Conglomerate	1	4
11. Sandstone, pale green, massive	6	0
12. Siltstone	Not given	Not given

Fossils are present in the upper conglomerate zone, but are less widespread than in the lower zone. The upper zone also is much more firmly cemented, tending to break through its pebbles rather than around them as in the lower zone. Abundant dark chert pebbles and poorly-sorted dark matrix material are also widely present in the upper zone.

In Somerset County, the upper conglomerate zone is regarded as being a ridge marker, with lines of knobs on both flanks of the Deer Park anticline. The conglomerate beds, however, are only significant in topography when combined with their adjacent sandstone beds, due to their relative thinness.

Catskill Formation

Introduction

.W. Mather (1840) first used the name "Catskill Mountains Series" to annotate the beds between the Helderburg Limestone and the coal-bearing strata of the Carboniferous age. More recently, Catskill refers to Devonian continental strata with numerous red beds with ages in between Hamilton and Chemung. These beds interfinger with and grade westward into gray marine shales.

The top of the Catskill Formation is defined to be at the position of the highest of the red beds. There is an interval of approximately 1,600 feet from this level to the highest position of marine fossils in the Jennings Formation, which delineates the Catskill-Jennings transition zone.

In general, no attempt has been made to subdivide the Catskill Formation in Somerset County and nearby areas, due to the lithological similarity of the shales and sandstones present. Some lenticular features are notable; however, it is very difficult to trace a given unit of this formation from one outcrop to another because of the relative similarity of one unit to another. Some traceable units have been recognized; a 10 foot fossiliferous green shale unit was reported by Woodward in 1943 located in the Hampshire Formation of Pocahontas County, West Virginia. This unit was correlated with the Saxton Shale unit of the Catskill Formation found in the Broad Top coal basin located in Pennsylvania.

Lithology and Thickness

Approximate total thickness of the Catskill Formation in Somerset County is about 2,000 feet, as per the aforementioned marker well drilled on the Negro Mountain anticline by People's Natural Gas. The section having predominantly red beds has an interval of about 1,600 feet. In general, the highest Jennings marine fossils occur about 100 feet below the base of the predominantly red zone, giving an approximate thickness of this zone of about 1,700 feet.

The Catskill Formation thins somewhat as it progresses to the west. Measurement by Richardson in 1934 estimated a thickness of 1,800 to 2,000 feet in the Somerset-Windber area, while Woodward reported a thickness of about 1,000 feet near the Somerset-Fayette County border. In extreme western Pennsylvania, a total absence of the Catskill Formation is apparent from well logs.

At the Negro Mountain marker well, the Catskill red beds contain about 61% shale, 32% sandstone, and 7% siltstone. About 65% of the beds in the sequence have reddish coloration, and the remaining 35% have a green or greenish-gray cast. Although at some points in Somerset County sandstone appears to be somewhat more prevalent (due to erosion resistance), these values are accepted to be fairly uniform for the formation as it pertains to the area.

Studies of well samples and outcrop observations reveal that Catskill sandstone are mostly fine-grained and quartzose, with some being conglomeratic. Abundant mica has been noted. Enough matrix material is present that some sandstones have been classified as subgraywackes and possibly even true graywackes. A petrographic study of 43 sandstone samples was performed by Leeper in 1960. Of the 43, 24 are feldspathic graywackes, 14 are feldspathic sandstones, 2 are lithic graywackes, 2 are protoquartzites, and one is an arkose. Cross-stratification, mudcracks, ripple marks, and sole markings are widespread. A study of these bedding structures in southern Somerset County was performed (also by Leeper) in 1960. A cross-stratification vector mean of 311 degrees was determined. Interpretation of this finding suggested a source area located to the southeast and paleocurrent transport to the northwest. This orientation is supported by grove and flute casts, and ripple mark orientation in the Catskill beds.

Catskill shales for the most part are poorly bedded, and weather to small, irregular pieces. Some outcrops intermix red and green shales. The reddish color is attributed to hematite (containing ferric iron), whereas the greenish cast is produced by ferrous iron. Red beds, therefore, tend to suggest an oxidizing environment during deposition, and greenish beds were probably deposited under more reducing conditions. Woodward lends support (1943) by stating that most of the fragmentary plant fossils were found to occur in the green sandstones, suggesting that carbonaceous plant material may have played a large role in developing such reducing environments.

Most Catskill beds are not fossiliferous; some poorly preserved fossils have been found. Cleaves and Stephenson (1949) observed ostracoderm plates in a Catskill exposure on the Pennsylvania Turnpike near New Baltimore. Martin (1902) found apparent poorly preserved fish plates in the Hampshire Formation in Maryland (this unit correlates to the Pennsylvania Catskill Formation). Prosser and Swartz (1913) found pelecypoda in the Hampshire Formation in Garrett County, Maryland. Woodward located no marine fossils in the Hampshire, but observed linguoid Brachiopoda and some macerated plants in Pocahontas County, West Virginia.

Jennings Formation – Catskill Formation Transition Zone

In contrast to the mostly red Catskill Formation, the Jennings Formation contains few reddish layers. In the transition zone between the formations, however, lies an interesting alternation of red and non-red strata. This zone is about 400 feet thick and reaches from the lowest red bed of the Catskill Formation to the base of a predominantly red sequence. The zone outlines a gradual transition from exclusively Jennings Formation lithology to that of the Catskill. The lower part of the transition zone contains marine fossils absent in the upper layers. The Jennings-Catskill contact is generally placed at a position about 100 feet below the top of the transition zone; this convention, however is somewhat arbitrary because of the difficulty in locating the highest marine fossils in the field and in well studies.

Mississippian System

Introduction

Mississippian rocks in southern Somerset County have three subdivisions: the basal Pocono Formation, the intermediate Loyalhanna Formation, and the topmost Mauch Chunk Formation. Overall the series is mostly clastic, but the Loyalhanna and Mauch Chunk Formations contain some carbonate rocks.

Sandstones are the major component of the Pocono Formation, along with small amounts of shale and siltstone. The sandstones tend to concentrate in the upper half of the formation. The thickness of the Pocono rocks ranges from about 500 to 1,000 feet. With the exception of the Burgoon sandstone near the top of the formation, no subdivision of the Pocono rocks has been undertaken.

The Loyalhanna limestone unit is one of the most notable strata in the Pocono Formation. The layer consists of approximately 60% calcite and 40% quartz in a 50 foot thick bed. Petrology of the bed indicates a marine origin, in contrast to previous hypotheses of aeolian origin. Prominent cross-bedding is often seen in the Loyalhanna limestone, especially on weathered outcrops.

The Mauch Chunk Formation contains roughly equivalent amounts of shale and sandstone, and traces of limestone. Red, green and gray colorations may be observed. Thickness of the formation ranges from 250 to 500+ feet. A thin bed of limestone at the base of the Mauch Chunk is mined as Deer Valley limestone. Another well-known bed has variously been termed the "Greenbrier" or "Wymp's Gap" limestone.

Extensive outcropping of the Mauch Chunk Formation occur on the Negro Mountain anticline extending in a southwesterly direction from the Casselman River, and on the eastern flank of the Laurel Hill Anticline. Some thin beds of Mississippian rocks also can be found on either flank of the Deer Park anticline.

Pocono Formation

Introduction

The Pocono Formation was named by J.P. Lesley in 1876. Type locality for the formation is not specified, but is generally accepted to be in northeastern Pennsylvania near the Pocono Mountains. Stratigraphically, the Pocono lies between the Mauch Chunk and Catskill Formations, both mainly red units. Where Loyalhanna limestone exists, as in southern Somerset County, it underlies the Pocono Formation. Some named units, such as the Burgoon sandstone, the Patton shale, the Corry sandstone, and the Knapp conglomerate, are recognized, but only the Burgoon sandstone is significant in southern Somerset County. Murrysville sandstone is possibly located about 350 feet below the top of the Formation, but insufficient exposures and poor subsurface knowledge do not allow a positive correlation of this unit.

Lithology

The Pocono Formation at the PNG marker well on Negro Mountain consists of 72% sandstone, 15% shale, and 13% siltstone. Sandstone is somewhat more abundant than in the upper layers, but in the lower strata sandstone and shale are in approximately equal abundance. The Pocono Formation is mainly feldspathic sandstones, but subgraywackes, protoquartzites, feldspathic graywackes, lithic graywackes, and orthoquartzites are also represented. The Pocono was given a lithic arenite type by Pelletier (1958); he felt that a fluvatile origin and a source consisting of clastic sediments and low-ranking metamorphic rocks was appropriate.

At an exposure near Fairhope, a 12 foot interval of the Pocono formation presents several 1 to 2 inch stringers of coal; this is the only observation of Pocono coal-bearing strata in the southern Somerset County area. Petrographic study of the coal reveals that the coal was derived from Lepidodendroid plants, particularly the central stele of such. Heat-swelling and reflectivities suggest a medium-volatile bituminous rank for the coal in these seams.

The lower 50 to 100 feet of the Pocono Formation bears invertebrate fossils. Some correlations have been made to the fossiliferous Oswayo Formation shale. The Oswayo is the topmost Devonian unit, extending up to the base of the Murrysville sandstone. However, the correlation is not conclusive; the Murrysville sandstone is very difficult to trace, and some fauna found in a similar position in the Broad Top Basin (Girty, 1927) are known to occur in both Devonian and Mississippian rock strata.

Most Pocono sandstones, shales, and siltstone are gray to greenish-gray. However, in the upper 50 feet of the formation, a mix of purple, red, gray, and green in common. These rocks are generally cross-bedded and flaggy. The stone was quarried near Salisbury at the M and S quarry. This feature has been observed at numerous scattered outcrops, and is assumed to be uniform throughout the study area.

Pocono sandstones have fine to medium grain size, with occasional beds of coarse-grained rocks being observed. Bedding is generally thi to medium, with widespread cross-bedding.

Thickness

A wide variation in thickness occurs in the Pocono Formation. At the PNG marker well on Negro Mountain, the measured thickness is 555 feet. Measurement at the Neel well on Laurel Hill shows a thickness of 675 feet; at the Allegheny Front, the thickness increases to about 1,000 feet. At Chestnut Ridge, in western Fayette County, the thickness ranges from 635 to 740 feet. A general westward thinning of the Pocono is evident, with sometimes wide variation in local intervals. The variation in thickness is likely due to the contact of the Pocono Formation with the underlying Catskill rocks.

Correlation and Age

There is general agreement that the Pocono Formation is at least partly of early Mississippian age, most likely Burlington. The shaly, fossiliferous lower 200 to 300 feet of the formation may correlate to the Devonian Oswayo Formation, which runs from northwestern Pennsylvania to southwestern New York. The upper Pocono most likely correlates with the Logan Formation of Ohio. In northwestern Pennsylvania, the Knapp conglomerate is known to occur at the base of the Pocono Formation, and in southwestern Pennsylvania, it is believed that the Murrysville sandstone may occupy a similar position. If, in fact the Knapp and Murrysville strata are correlated, then the layers lying between the Murrysville sandstone and the Catskill Formation may be of Upper Devonian heritage, and may correlate with the Oswayo Formation.

Loyalhanna Formation

Introduction

The Loyalhanna Formation is defined by a limestone seam approximately 50 feet in thickness lying just above the Pocono Formation. The Mauch Chunk Formation lies above the Loyalhanna Formation in Pennsylvania; in West Virginia and Maryland, the unit is defined as the lowest member of the Greenbrier Limestone unit which underlies the Mauch Chunk Formation in those areas. Occasionally the Loyalhanna limestones are referred to as Greenbrier limestones, but this is incorrect; the Pennsylvania Greenbrier limestone is not related to the units of the Loyalhanna Formation. The formation is named after its exposures along the Loyalhanna Creek gorge located in the Chestnut ridge area between Ligonier and Latrobe in Westmoreland County, Pennsylvania.

Stratigraphy

The Loyalhanna Formation is noted for displaying abundant high-angle cross-stratification patterns on its weathered surfaces. The limestone mostly is red in color in southern Somerset County, but in the more northern Ligonier-Johnstown area it has a coloration that ranges from light gray to bluish-gray. It is often used as a stratigraphic guide layer, as its identification is generally very easy.

Petrography studies reveal that the reddish coloration is due to interstitial hematite as well as hematite coating the clastic grains; the gray and bluish-gray color is produced by inclusions of calcite and quartz.

Thickness / Bedding Characteristics

Generally in southern Somerset County, the thickness of the Loyalhanna Formation is about 50 feet. Some thinning is noted in a northeasterly direction, and the formation disappears altogether at about the latitude of the Conemaugh River, although this may be due to erosion rather than stratigraphic thinning. Abundant evidence of cross-stratification is visible in the Loyalhanna Formation, although it is less prominent in the upper layers of the formation. Simple, planar, and trough cross-stratifications have been identified. The planar type is of a high angle, usually between 35 and 45 degrees. The simple and trough types generally have somewhat lower angles, on the order of 20 degrees.

Thin banding is another widespread feature of the Loyalhanna limestone. Bed thickness ranges from under an inch to several inches. Loyalhanna banding is due to vertical variations in the amount of quartz present, as well as in quartz grain size. Bands having a higher quartz content tend to weather more slowly, and serve to make the bedding patterns of the Loyalhanna Formation more visible.

Contact Features

An abrupt lithologic change occurs at the contact zone between the Pocono and Loyalhanna Formations, where the sandy limestone of the Loyalhanna meets the non-calcareous sandstones of the Pocono. Examples of this have been observed at various exposures in southern Somerset county, such as at the Western Maryland railroad cut approximately 2 ½ miles east of Meyersdale. Other exposures have been noted at Salver (near Johnstown) in Cambria County, at Allegrippis Station on the Allegheny Front in Blair County, and south of Connellsville in Fayette County.

The contact zone between the Loyalhanna Formation and overlying beds is less well-defined than the lower contact zone. At some locations, the sandy Loyalhanna limestone changes to a high quality, non-sandy limestone (Deer Valley Limestone). Where the Deer Valley Limestone is absent, red shale layers overlay the Loyalhanna strata; in the McCance-Torrance area on Chestnut Ridge, the Loyalhanna Formation is overlain by calcareous sandstone. In this area the overlying limestone is about 20 feet thick, and the Loyalhanna Limestone is about 40 feet thick. The typical red siltstone and sandstone beds of the Mauch Chunk Formation overlie the calcareous sandstone layers. The gradual transition from sandy limestone to calcareous sandstone to interbedded siltstones and shales in the series of rocks in this particular interval is suggestive of a change from a marine environment to a continental one. In the areas where the Loyalhanna Limestone is overlain by red shale, the transition from a marine environment to a non-marine environment is much more sudden. At the locations where Deer Valley Limestone overlies the Loyalhanna Limestone, the rocks suggest that the marine environment persisted throughout the deposition of the Deer Valley Limestone.

Petrology and Petrography

The limestone of the Loyalhanna Formation is composed mostly of quartz, calcite granules, and calcite cement; traces of feldspar, chert, rock fragments, and heavy minerals are also present. The majority of quartz grains are single grains, having uniform extinction in polarized light, but some grains with undulatory extinction are also present. Some muscovite, tourmaline, and zircon are also present in significant amounts. Though considered to be only a minor part of the Loyalhanna limestones, chert is found in almost every sampling of the formation. Most of the quartz and chert grains are subround to round.

Some quartz grains display the effects of corrosion; microscopic examination shows frayed edges. This generally indicates exposure to a basic solution, rather than suggesting an aeolian origin of the sample.

When feldspar is present in Loyalhanna limestone, it is usually orthoclase, although some microcline and plagioclase feldspars have also been observed, particularly in samples from the area of the Casselman Gorge. The Casselman Gorge area strata also carry numerous rock fragments in the layers near the top of the Loyalhanna Formation. They have also been observed near Bidwell, in Fayette County, but not in the northern areas of Somerset County, such as Johnstown and Ligonier.

Three major classes of calcite granules have been postulated as appearing in the Loyalhanna limestone:

1.) Oolitic grains
2.) Fossil fragments
3.) Intraclasts

Intraclasts (which appear to be the most abundant) are presumed to be some sort of clastic calcite formed as a result of the disruption of unconsolidated carbonate sediments in the deposition basin, producing clastic fragments. Most of the intraclastic fragments were spheroidal to ellipsoidal, brown cryptocrystalline calcite with little or no observable structure. A less abundant type displays crystalline structure, is spherical, and incorporates calcite twinning. There is a possibility that these grains have formed as a result of recrystallization of the cryptocrystalline grains. A third intraclast of brown, elongated grains of cryptocrystalline calcite is also present.

The oolitic grains are fairly rare, and are seldom well-developed. Approximately 1-2 percent of Loyalhanna samplings contain these grains. Loyalhanna oolites are pale brown calcite with no apparent radial structure, and usually have one outer layer of calcite surrounding an inner cryptocrystalline calcite layer. The grains range from spheroids to ellipsoids; the long dimension is typically about three times that of the short dimension.

Some Loyalhanna samples displayed accessory minerals, to about 1 percent content. Both opaque and nonopaque heavy minerals were observed. The opaque minerals leucoxene, hematite, magnetite, and limonite are present; some nodules of pyrite have also been found, but these are quite rare. Nonpaque minerals include tourmaline (both green and brown), zircon, chlorite, muscovite, and sericite.

The only cementitious material reported in the Loyalhanna is calcite, with the exception of a few thin siltstone beds such as those at East Conemaugh and McCance. A detrital matrix material is reported for these beds. The calcite cement in the Loyalhanna is mostly crystalline / microcrystalline, however some cryptocrystalline cement does occur. Most of the crystalline cement has been recrystallized from the cryptocrystalline material. There is no evidence of dolomitic replacement.

The terrigeneous content of the Loyalhanna limestones is about 45 percent. About 23 percent is clastic calcite, and on the average, carbonate-cement content is about 32 percent.

Approximately 94 percent of the terrigeneous material is quartz and the rest is composed of accessory minerals, feldspars and rock fragments. In the Casselman Gorge exposure, the ratio of calcite to quartz is about 60%:40%. Overall, throughout the Loyalhanna bed, the ratio is closer to 55%:45%; the total range, however, is from 15%:85% to 73%:27%.

About 42 percent of the total calcite content is clastic calcite. About 95 percent of this clastic calcite are intraclasts. The other, non-clastic 58 percent is made up of calcite cement. Both crystalline and cryptocrystalline cement is present. The ratio of crystalline to cryptocrystalline cement is about 2.6:1.

Most textures in the Loyalhanna limestones are of detrital origin. Most common is a well-sorted mix of quartz and calcite sand that is cemented by crystalline and microcrystalline cement. Most of the grains contact other grains at multiple points, with the cements filling in the pore spaces. It is not uncommon, however, for the cement to completely enclose detrital grains. Under this circumstance, the cement is partially a recrystallization product of cryptocrystalline brown calcite. In areas where this material is common, oolitic and intraclastic calcite grains are usually rare.

Thin sections generally show banding features. Coarse material bands are usually thinner than those made up of finer materials. Coarse material bands are on the order of 1 cm wide, while the finer material bands are about 3 to 5 cm wide. Coarse material grain size is about .4-.5 mm in diameter, while fine material grain size is about 0.15 mm in diameter. The sections formed by coarse material has cement with a higher degree of crystallinity than in the fine material sections. Recrystallization of both grains and cement is noted to be prevalent.

The amount of clastic components in Loyalhanna limestones tend to be higher in southern Somerset County and neighboring Fayette County than in areas more to the north. In the south, these components tend to make up about 70.9 percent of the Loyalhanna, decreasing to 61.4 percent in the area near Johnstown, in Cambria County. In contrast, the terrigeneous material content in the north averages 46.8 percent in the north and 41.0 percent in the south. This infers that there is a increase in clastic carbonate species in Loyalhanna limestone to the south in the county. Some agreement to this suggestion is provided by studies in the Greenbrier limestones of West Virginia (with which the Loyalhanna series is thought to be correlated.)

Early studies of the Loyalhanna Formation (1920-940) suggested an aeolian origin based upon:

1.) high-angle cross-stratification
2.) frosting of some of the quartz grains
3.) a general lack of fossils in the structure

However, more recent work theorizes a marine origin based upon the following evidence:

1.) the deposit has a tabular, uniform shape
2.) some fossils have been identified near the top of the unit

3.) some correlations have been made between the Loyalhanna limestones and the Union Limestone in West Virginia, whose origin is definitely agreed upon as being marine.

Most likely, the marine origin hypothesis is correct. The Loyalhanna siltstone beds grade upwards into the cross-stratified limestone beds. The siltstones are not well sorted enough to be of aeolian origin, and the upward grade into sandy limestone points to a continuous sedimentation process with a gradual change of the type of sediment material being deposited over time.

Generally, terrigeneous grains in the Loyalhanna are not frosted, further lessening the likelihood of aeolian origin. It is felt that the small fraction of frosting present is probably from exposure to basic etching during deposition.

The high-angle cross-stratification is the most suggestive evidence of aeolian origin; however, it is not conclusive. This phenomenon may have resulted from sub-aqueous deposition of well-sorted, angular grains. Some experimental data has been shown to confirm this possibility (McKee, 1953).

A lack of abundant fossil remains in the Loyalhanna may result from deposition in a marine basin with high turbulence, resulting in fossil fragmentation.

Overall, areal and petrographic data seem to suggest that the Loyalhanna limestones were deposited in a shallow, turbulent, sea. terrigeneous sediment was being supplied from lowlands to the north, northwest and the east; calcite formed within the depositional basin. Less turbulence was present during the late phases of the deposition of the Loyalhanna limestone unit. Some occasional influxes of terrigeneous material from the east occurred, possibly because of tectonic activity. After the Loyalhanna deposition, a major marine regression occurred; it was during this period that the sediments of the Mauch Chunk Formation were emplaced.

A petrographic study of the Loyalhanna limestone is as follows

Quartz	Chert	Silicas	Feldspar	Rock	Access.	Oolites	Fossils	Intraclasts	Cryptocrystalline Ooze	Calcite Cement	T. Calc.	Total (%)
40.5	1.2	41.7	1.0	---	.7	.7	1.6	38	3.9	12.5	56.6	100.0
41.0	5.9	46.9	2.0	---	0.5	---	---	4.5	28.5	17.6	50.6	100.0
31.4	1.4	32.8	---	---	---	---	1.9	41.5	0.4	32.2	67.0	99.8
36.9	2.1	39.1	0.5	---	0.8	0.4	2.1	32.5	0.8	23.9	59.7	100.1
38.0	2.4	40.4	1.0	0.5	0.8	0.5	1.2	31.9	4.3	19.3	57.4	100.0
14.0	---	14.0	---	---	---	2.3	---	52.9	---	30.7	85.9	99.9
36.6	1.7	38.3	0.5	---	1.7	---	---	21.6	8.6	29.3	59.4	100.4
43.8	4.0	47.8	2.0	---	---	---	---	13.7	7.9	26.9	48.5	100.1
24.3	0.4	25.7	0.5	---	0.9	6.7	2.2	38.2	---	25.8	72.8	100.2
40.0	0.5	40.5	1.5	0.5	1.4	2.3	0.9	29.0	1.4	22.0	55.6	99.9

Mauch Chunk Formation

Lithology and Thickness

The Mauch Chunk Formation in southern Somerset County marks the highest extent of the Mississippian system. It is bounded by the Loyalhanna Formation and the Pottsville Group. The Mauch Chunk Formation is made up of interbedded layers of shale and sandstone, with some minor traces of limestone and siltstone. Data from the PNG marker well on Negro Mountain show the formation to be 56 percent shale, 36 percent sandstone, 7 percent siltstone, and 0.5 percent limestone. Throughout southern Somerset County, the Mauch Chunk Formation rocks are known to have similar composition. Approximately half the Mauch Chunk beds have a red color, and about 15 percent are green to greenish-gray. The reddish coloration is mostly correlated with the shale beds, and the green or gray cast generally is found in the sandstone or siltstone layers. There are also some variegations at various positions in the formation.

The Mauch Chunk Formation shows a general decrease in thickness in the northward and westward directions. In the area of Laurel Hill, the formation's thickness is about 250 feet. In the central part of southern Somerset County it is about 500 feet thick, and in Carbon County's Southern Anthracite Field, the thickness of the formation approaches 3,000 feet. In extreme northwestern Pennsylvania, the formation disappears altogether from the stratigraphic record.

Mauch Chunk Subdivision

In the PA Geological Survey report from which most of the information for this paper was taken, the author makes an informal subdivision. The upper part of the formation does not contain any limestone beds, and is predominantly red shale. Some sandstones and calcareous shales are also present. Calcareous shale and calcareous sandstone are abundant in the lower portion of the formation, along with two beds of commercially viable limestone. Both beds are about 8 feet thick. The author in this case proposes the name Wymps Gap limestone for the upper bed and Deer Valley limestone for the lower bed.

Deer Valley Limestone

The Deer Valley limestone is found at the base of the Mauch Chunk Formation. Its type locality is a mile southwest of Mount Davis, the highest point in Pennsylvania. The area known as Deer Valley is actually a combination of two valleys: the first, is north of Glade Mountain, and contains the headwaters of Cove Run (McClintock Run). The second is south of Glade Mountain and contains the headwaters of Glade Run. Both valleys are broad and are located at the crest of the Negro Mountain anticline. Cove Run has been impounded to from an artificial lake, and a swampy area is located at the head of Glade Run. The type locality outcrop of the Deer Valley limestone is at the Keystone Lime Company quarry, located about ¼ mile northwest of the Peck School (approx. 39°46'26" N x 79°12'24" W). In this area the limestone bed is about 10 feet in thickness. The lower 7 feet of the bed is a bluish-gray, fine crystalline limestone that contains sparsely distributed fossil remains. This portion of the bed is quarried for commercial use, both as crushed limestone and as agricultural lime. This bed is overlain by a 3 foot thick seam of gray, green, and pale red siliceous limestone, which is disposed of during quarrying. This siliceous layer is overlain by a 15 foot thick bed of brick-red shale to the top of the quarry face. This shale contains a sequence of irregular beds of calcareous shale and shaly limestone.

The approximate extent of the Deer Valley limestone bed is from the extreme eastern edge of Fayette County, north to the vicinity of Garrett, and east to near Hoblitzell in Bedford County. The eastern limit of the depositional basin will remain unknown, as those strata have long been eroded, lying east of the Allegheny Front in southwestern Bedford County.

The thickness of the eastern edge of the Deer Valley limestone bed at Hoblitzell is approximately the same as anywhere else in the southwestern Pennsylvania region; this suggests that the bed once extended considerably further to the east. A lack of exposure areas and well data makes establishment of the southern extent of the Deer Valley bed extremely difficult. An exposure has been found near Hi-Point in Garrett County, Maryland. Allegheny County, Maryland has a quarry exposing the limestone at about the same latitude, at about 3 miles southeast of Wellersburg near the Allegheny Front.

The Deer Valley limestone is absent from exposures at Friendsville, Maryland and at the Savage River Dam. Most likely, the southern extent of the Deer Valley bed lies somewhere between Addison, Pennsylvania, and Friendsville, Maryland.

The Deer Valley limestone is absent from the PNG marker well drilled on Negro Mountain; it also does not appear in exposures on either the northern or southern side of the Casselman River 2 miles northeast of the marker well. Deer Valley limestone has not been identified either north of southern Somerset County, or in Fayette County, lying to the west.

A full-scale petrographic study of the Deer Valley limestone has not been performed, but some petrographical data does exist as per McQuillin (1960). Samples were taken from seventeen different locales, the majority of which are in southern Somerset County. Visual estimates of petrographic components were made, and the results of six outcrops is as follows:

Sample Locality	Calcite			Quartz	Hematite	Other
	Clastic	Detrital Fossils	Microcrystalline Cement			
Main bench of Deer Valley Limestone						
Sample 1 (1 ½ feet above base)	55	15	30	1		
Sample 2 (5 ½ feet above base)	33	30	32	2		
Sample 3 (6 feet above bed)	10	64	25	1		
Bidwell – Sample 4	46	19	35	Trace		
Unamis – Sample 5	42	35	15	8		Trace
Zehner Hill - Sample 6 (Garrett County, Maryland)	32	45	23	Trace	Trace	
Hoblitzell - Sample 7 (Bedford County, Pennsylvania)	35	20	22	20	3	
Cap Rock (upper 2 ½ feet) of Deer Valley Limestone						
Ringer Hill - Sample 8	35	Trace	40	25	Trace	Trace

(figures are in percentage)

Deer Valley limestone is a calcarenite, with the exception of the upper 2 to 3 feet of the bed, which is classified as a quartzose calcarenite. The main part of the bed is high grade calcite, exceeding 90 percent. About 36 percent of the calcite fraction of this part of the bed is clastic granular calcite, about 33 percent detrital microfossils, and about 26 percent microcrystalline cement. The average quartz content ranges from 7 to 8 percent. One outcrop in Bedford Count, Pennsylvania, near Hoblitzell contains a much higher quartz content, on the order of 20 percent. About 10 to 15 percent of McQuillin's samples contains oolites (usually comprising less than 5 percent of the samples in which they appear). Some of the clastic calcite is noted to have a dark, "foggy" appearance ascribed to significant clay content. No estimate on the clay content is available.

Some Deer Valley limestone samples contain trace amounts of hematite. Both coated grains and interstitial hematite have been observed. The hematite produces a reddish cast to the rock. Some heavy minerals occur in the samples having higher quartz contents, but these were not identified by McQuillin.

The upper 2 to 3 feet of the Deer Valley limestone is considered to be an impure cap rock due to its high siliceous content. Its quartz content is usually about 25 percent, with minor amounts of plagioclase and chert. This rock has no commercial value and is discarded during quarrying.

Deer Valley limestone is mostly detrital calcite sand, with approximately 25 percent microcrystalline calcite cement. Thin section samples show that the cement tends to surround the grains; unlike the Loyalhanna limestone, Deer Valley limestone has less grain-to-grain contact. Most grains are sub-rounded to well-rounded.

Wymps Gap Limestone

Wymps Gap limestone is the upper of two limestone beds of commercial interest in the Mauch Chunk Formation in southern Somerset County. In the past, this bed has been referred to as a member of the Greenbrier Series of West Virginia, but the author of the Pennsylvania Geological Survey report proposed renaming the bed after its most prevalent local exposure on Chestnut Ridge near Uniontown between Fayette and Somerset Counties in Pennsylvania. In this area, the Greenbrier Series is only a minor component and the author felt that such a renaming would serve to clarify, not confuse the stratigraphy on a local basis.

The type locality for Wymps Gap limestone occurs about 12 miles south of Uniontown, Pennsylvania on the crest of Chestnut Ridge. A quarry existing in this area exposes a 40 foot thick bed, the upper part being interbedded limestone and calcareous shale, and the lower half being massive limestone.

In southern Somerset County, near Negro Mountain, the Wymps Gap limestone lies about 175 feet above the base of the Mauch Chunk Formation. At the Youghiogheny River cut in Laurel Hill, the interval thins to about 30 feet; in the type locality area of Wymps Gap, the interval thins evens more to around 5 feet.

Throughout southern Somerset County, Wymps Gap limestone averages 15 to 20 feet in thickness. Generally, however, only about 10 feet of the bed is commercially workable limestone. Several thin layers of limestone occur both above and below the massive portion of the bed and are interbedded with calcareous shale and shaly limestone.

Petrographic data on Wymps Gap limestone is not available. In general appearance the rock is bluish-gray in color and grain size ranges from microcrystalline to fine crystalline. The bed is fossiliferous, with widespread occurrence of both micro- and macrofossils. Brachiopoda are most abundantly observed, but other species present include crinoid stem fragments, pelecypoda, gastropoda, corals, bryozoans, and trilobites. Haney (1963) produced a listing of fossils identified in the "Pennsylvania Greenbrier" limestone:

Phylum	**Species**
Mollusca	1. Allorisma terminale
Brachiopoda	2. Composita subquadrata
	3. Derbya crassa
	4. Dictyoclostus scitulas
	5. Dictyoclostus parvus
	6. Dielasma illinoisens
	7. Eumetria vera
	8. Girtyella brevilobata
	9. Girtyella indianensis
	10. Linoproductus ovatus
	11. Martinia contracta
	12. Productus semireticulatus
	13. Sprifier pellaensis
	14. Spirifer breckenridgensis
Crinoid	Agassizocrinus
Mollusk	Dentalium
Cephalopod	Orthoceras
Blastoid	Pentremites
Trilobite	Phillpsia
Gastropod	Straparollus
Coral	Zaphrentis

Age and Correlation of Mississippian Limestones

Incomplete age and correlation exists for three important limestone beds in the Mississippian System: the Wymps Gap limestone, Deer Valley Limestone, and the Loyalhanna Limestone. Establishment of exact correlation would involve a very large-scale stratigraphic and paleontologic project spanning Pennsylvania, West Virginia, and Maryland. Such work is obviously beyond the scope of this report, but some inferred correlations may be made with respect to the aforementioned limestone beds. As defined, the Mauch Chunk Formation of West Virginia and Maryland lies above the Greenbrier Series. In Pennsylvania, however, the Mauch Chunk slopes downward to the Loyalhanna Limestone, and therefore includes the "Greenbrier" (Wymps Gap) limestone. Most likely, the section referred to as the Lower Mauch Chunk formation is probably equivalent in a stratigraphic sense to the upper Greenbrier Formation found in western Maryland and northern West Virginia. Further extensive stratigraphic and paleontologic work is needed to clarify the correlation of these features that is applicable to the region encompassing southern Pennsylvania, West Virginia, and Maryland.

Upper Mauch Chunk

The Mauch Chunk Formation is completely clastic above the level of the Wymps Gap limestone. The layers there consist of interbedded red shales and gray sandstones. No tracing of these beds has been done, but about 100 feet below the top of the Mauch Chunk Formation, a thin-bedded, platy, cross-bedded sandstone exists. This layer ranges from 20 to 30 feet thick, and is resistant enough to probably be a ridge-former in some locales.

Pennsylvanian System

Introduction

In southern Somerset County, the Pennsylvanian System strata are subdivided into four groups. From the system base upward, these groups are:

1.) Pottsville Group
2.) Allegheny Group
3.) Conemaugh Group
4.) Monongehela Group (NOTE: This group only has partial representation.)

Approximately half the Monongehela Group rocks have succumbed to erosion.

The Pennsylvanian rocks are members of the coal Measure. On average, a coal seam can be found at intervals of every 30 to 35 feet in some 1,500 feet of Pennsylvanian rock strata. Coal comprises about 10% of the total Pennsylvanian System. Shale, sandstone ,clay and limestone are also present. Bed thickness generally is about 10 feet, but ranges from less than an inch to more than 40 feet.

The Pennsylvanian possesses a very complex stratigraphy. Some locales cannot be accurately characterized because of lack of key beds, and exposures are rare and generally poor when present. There is some repetition lithologically, but no mapping of specific sequences or cycles has occurred.

In the Pottsville Group, the rocks are dominated by sandstone, with minor shales; limestone is absent altogether. Coal beds are present, but their quality and thickness is somewhat irregular. Pottsville sandstones are highly resistant to erosional forces and often form ridges.

Several commercially viable coal beds are present in the Allegheny Group. The upper part of the group also contains some freshwater limestones; marine limestones are absent. The Allegheny Group contains commercial clay beds, with the better of these usually situated near the basal region of the group. No red beds occur in either the Pottsville or Allegheny group rocks.

The thickness of the Conemaugh Group in southern Somerset County reaches 900 feet. This group is noted for its content of marine limestones. The Ames limestone, the upper most of four marine beds, occurs at the highest occurrence of a widespread marine unit in the Pennsylvanian strata in the Appalachian Plateau province. Above this layer, limestones are predominantly freshwater throughout the Conemaugh and Allegheny Groups.

The Conemaugh Group contains many coal deposits, but with the exception of the lower Bakerstown coal, which is commercially mined, they are usually thin and of poor quality.

The lower and middle Conemaugh Group contains some red beds, which are absent in the Allegheny or Monongehela Groups. Some use may be made of these red beds as stratigraphic guideposts. The Conemaugh contains few good key beds.

Four commercially mined coal beds occur in the Monongehela Group, the most well-known being the Pittsburgh coal. The Pittsburgh changes suddenly in thickness in the vicinity of the Berlin-Meyersdale area. Most limestones in the Mongahela Group are of freshwater origin; marine limestones are absent.

The Pennsylvanian rocks in southern Somerset county are very widely distributed, more so than those of any other system. The Conemaugh Group covers the largest area. The most prevalent outcrops areas of Pennsylvanian rocks are in the Lower Youghiogheny and Johnstown synclines, the Berlin syncline, and the Wellersburg syncline. The Centerville dome and the northern end of Negro Mountain are other areas of extensive Pennsylvanian outcropping.

Pottsville Group

Introduction

The Pottsville rocks overlie the Mauch chunk Formation of the Mississippian System and extend upward to the clays underlying the Brookville coal or to the coal itself in some areas. The Pottsville Group is subdivided into four formations, the Sharon, the Connoquenessing, the Mercer, and the Homewood Formations. All four formations can be found in southern Somerset County, but no mapping has been performed. Pottsville rocks are usually found at the crests and upper flanks of ridges in wooded areas where the bedrock is obscured by rubble. Unfortunately, this provides a relative rarity of good exposures, preventing accurate tracing of beds without great difficulty.

Waagé (1950) studied the Pottsville Group rocks in nearby Garrett County, Maryland in an extensive drilling program to evaluate clay resources. He identified the following units in the Pottsville Group:

1.) Homewood sandstone
2.) Mercer coal group
3.) Upper Connoquenessing sandstone
4.) Quakertown coal group
5.) Lower Connoquenessing sandstone
6.) Sharon coal group
7.) Sharon sandstone

Similarly, Poth(1963) subdivided the Pottsville in Pennsylvania as :

1.) Homewood sandstone (Homewood Formation)
2.) Mercer coal group (Mercer Formation)
3.) Quakertown coal group, lower and upper Connoquenessing sandstones (Connoquenessing Formation)
4.) Sharon coal group and sandstones (Sharon Formation)

Detailed correlations have not been extended from type localities in Mercer County and Garrett, County Maryland; however, the above subdivision is generally considered applicable to both Garrett County, Maryland, and Somerset County, Pennsylvania. Hickok and Moyer (1940) did not recognize the Sharon strata in Fayette County, nor did Richardson (1934) identify it in northern Somerset County; the Pottsville in these areas, however, is similar in thickness to the Pottsville of southern Somerset County. These writers identified the Pottsville in these areas with the lower Connoquenessing sandstones. Waagé identified the most persistent members of the Pottsville group as the Homewood sandstone, the Mercer coal group, the Connoquenessing sandstones, and the Sharon sandstone. Abundant irregularity is found between the Sharon sandstone and the upper Connoquenessing sandstone, but sometimes may contain a few feet of the lower Connoquenessing sandstones.

The Pottsville group in most areas of southern Somerset County is around 200 feet thick; at Williams Station on the B & O Railroad, near the northern end of the Wellersburg syncline, Stevenson (1882) found a Pottsville thickness of only about 80 feet. Just south of the Pennsylvania state line, about one mile southwest of Wellersburg, a bore hole revealed only 60 feet of Pottsville rocks. Thickening southwestward, the Pottsville reaches over 300 feet thick in the Upper Potomac syncline, about 30 miles southwest of Wellersburg. Throughout the Casselman and Lower Youghiogheny synclines the Pottsville averages about 200 feet in thickness, but ranging from 180 to 250 feet thick. Continuing west into the Appalachian Mountains of Alabama, the Pottsville rocks reach a thickness of some 8,000 to 9,000 feet.

Coal appears in the Pottsville Group near the horizons of the Sharon, Quakertown, and Mercer units. These coals are irregular, ranging from a few inches thick to over 5 feet, or even completely absent over very small distances (hundreds of feet). It is not uncommon to observe that the seams appear as benches of coal that are separated by shaly partings, or the seams may occur in a single bench. When a single bench is encountered, the thickness is generally about one foot.

The Pottsville rocks in southern Somerset County do not contain high quality underclays, but some silty clays / claystones do tend to occur underlying the region's coal beds. Some doubt occurs as to the exact stratigraphic position of the clays mined at Fort Hill and Williams Station; these clays are usually considered to be identified as Clarion clay. The Clarion clay is the equivalent of the Mount savage clay of Maryland, and is considered to be a member of the lower Allegheny Clarion Formation. The Mercer clay that is found in southern Somerset County occurs about 70 to 75 feet lower; this clay is not usually of high quality.

In the lower part of the Pottsville section between the Sharon sandstone and the upper Connoquenessing sandstone, the rocks are very irregular and difficult to identify. Waagé, however, recognized seven subdivisions of the Pottsville Group in Garrett County, Maryland, as mentioned above. Generally, it is accepted that probably all of these units are present in southern Somerset County.

Little surface evidence of Sharon sandstone is available. A possible exposure is though to exist on the Casselman River near the west edge of Garrett. Some poorly exposed areas also occur on the eastern slopes of Laurel Hill.

The thickness of the Sharon sandstones in southern Somerset county is poorly known, but estimates place it at about 30 feet. The sandstone lies on the Mississippian Mauch Chunk Formation, but the layers are nonconforming; evidence can of this can be seen in the lower Pottsville beds as they thin and thicken. In the Wellersburg-Georges Creek syncline, only about 60 feet of Pottsville strata are present, but the basin thickens southwesterly to over 300 feet. The thickening is produced by addition of new basal beds, and intercalation of new units within the Pottsville. Basal addition occurs as the Pottsville basin deepens where the underlying Mississippian rocks have been eroded. The Casselman and lower Youghiogheny synclines show less relief on the nonconformity between the Pennsylvanian and Mississippian rocks than at Wellersburg. In the areas where only 60 feet of Pottsville rocks are present, it is assumed that these are the upper 60 feet of the group, the lower members being absent.

The Sharon coal lies between the Sharon sandstone and the upper Connoquenessing sandstone, and about 35 to 45 feet below the Quakertown coal. In Somerset County, the seam is identified as being the lowest coal in the Pottsville Group where the Pottsville is at least 200 feet thick; this identification is somewhat open to ambiguity. Sharon coal does occur in a poor exposure on Sandy Run about one mile upstream from Nicklow Point near Kingwood. The coal there is only a few inches thick and bounded by shale and siltstone. At Laurel Hill near Bidwell Station, a one-foot thick layer of black, carbonaceous shale occurs at the expected Sharon coal horizon. No other exposures of Sharon coal were noted.

Lower Connoquenessing sandstone occurs in southern Somerset County, but it is irregular; in places the sandstone is replaced by a shale-siltstone sequence. When it is present, the sandstone is usually 10 to 20 feet thick.

The Quakertown coal group lies between the lower and upper Connoquenessing sandstones. This layer is usually obscured by rubble from the Connoquenessing and Homewood sandstones. The group is comprised of about 20 to 40 feet of shale, siltstone ,clay, claystone and coal. Waagé identified two beds of coal in this group in Maryland, but only one of these is present in Somerset County. This bed ranges from a few inches thick to 4 feet. It lies about 50 feet below the Mercer coal, 110 feet below the Brookville coal, 180 feet below the lower Kittanning coal, and usually about 90 feet above the Mauch Chunk horizon. In areas where the Quakertown coal is 3 to 4 feet thick (as in Sandy Run Valley) it contains abundant shaly partings, and is of low quality. In some areas the coal is absent and the group is replaced by clay, claystone, or shale. In some areas where the Connoquenessing sandstone is not present and the interval between the upper Connoquenessing sandstone and Sharon coal is filled by a shale-siltstone-coal sequence, it is sometimes impossible to distinguish the Quakertown and Sharon coals from one another.

Upper Connoquenessing sandstones are one of the most resistant units of the Pottsville group, but are not as massive or easily observed as the Homewood sandstones. The upper Connoquenessing lies between the Mercer and Quakertown coal groups. The average thickness of this layer is about 30 feet. In some locales it merges with the Homewood sandstone that overlies it, making one continuous layer 50 to 80 feet thick.

The upper Connoquenessing sandstone is fine-grained to conglomeratic, and quartzose. Grain size is generally larger toward the bottom of most observed exposures. The upper part of the bed grades upward into the Mercer coal's underclay. The base of the Connoquenessing sandstone generally lies unconformably on the Quakertown coal group beds. Some lenticular shale and siltstone are present within the Connoquenessing sandstone. The upper Connoquenessing sandstone is irregularly bedded, probably from pre-consolidation slumping. Some evidence of cross-bedding is present.

Typical exposures of the upper Connoquenessing sandstone are visible along the B&O and Western Maryland Railroad cuts 1 ½ miles east of Meyersdale and at the B & O Railroad cut at Garrett.

The Mercer coal group is defined as containing the coal, shale, and clay lying between the Homewood Sandstone and the upper Connoquenessing sandstone. The coal bed lies about 50 feet below the Brookville coal and about 120 feet below the lower Kittanning coal. The Mercer coal and Homewood sandstone are usually separated by a bed of gray to dark gray shale a few feet thick; this bed becomes sandy towards its top. In some places the Homewood sandstone does lie directly on top of the Mercer coal. The coal is underlain by clay or claystone beds several feet thick which grades downward into siltstone and sandstone. Some siliceous flint clay occurs in irregular deposits within the clay zone, but no high quality inclusions are known.

The Mercer coal contains both multiple and single bench coal. The single-bench thickness is about one foot. In areas where the coal is several feet thick it is usually found as multiple benches with clay or shale partings in between. The seam is irregular, with large variations in thickness over small distances of several hundred feet horizontally. The coal is absent in some areas, and is replaces by shale and sandstone. Mercer coal exposures may be seen in Laurel Run Valley, Garrett, and east of Meyersdale in Flaugherty Creek Gap. The Wellersburg syncline area does not have any observable exposures of Mercer coal.

The Homewood sandstone is the topmost named stratigraphic unit within the Pottsville Group. The sandstone is quite persistent. Some shale and siltstone separate the bed from the overlying Brookville coal or its underclay zone, which is the defined basal layer of the Allegheny Group. The Pottsville-Allegheny boundary has variously been placed at the base of the Homewood sandstone, or the top of the Homewood sandstone, as this layer is generally more easily observed in the field than the Mercer coal. The Homewood sandstone is noted for production of very large float blocks with weathering at its outcrops. It is, however, lithologically similar to the lower Allegheny Clarion and Kittanning sandstones, and is commonly confused with exposures of these. A lack of good key bed exposures in the field complicates the problem, so the Homewood is not always easily identified.

Homewood sandstone is quartzose, medium to coarse-grained, sometimes conglomeratic, and usually occurs in beds that are thick to massive. Cross-bedding is abundant. Some good exposures are on the Western Maryland Railroad about two mile north of Confluence, at the B&O Railroad cut near Garrett, on the Western Maryland Railroad cut east of Meyersdale, and at the Wellersburg syncline near Williams Station on Wills Creek.

Allegheny Group

Introduction

The Allegheny Group contains strata from the base of the Brookville coal or its underclay layer to the top of the Upper Freeport coal, with an average interval of about 280 feet. Coal-bearing strata are only about 10 percent of the Allegheny Group, but the group has considerable commercial value, as four of the seven seams occurring are persistent and of good quality.

In southern Somerset county there are no well-defined marine beds in the Allegheny group; one specimen of a marine fossil, likely *Marginifera,* has been found above the Clarion coal seam. Above the lower Freeport coal, a layer of estherid-bearing shale is sometimes present, possibly denoting a brackish water environment.

Shale, siltstone and sandstone are prevalent within the Allegheny Group. Unlike the overlying Conemaugh Group, no red beds are present. About 5 percent of the layers in the upper third of the group contain a freshwater limestone. For the most part, the Johnstown limestone lying under the upper Kittanning coal is the lowest limestone in the Allegheny Group. The Johnstown serves as an important stratigraphic key bed, as it is very persistent.

Various underclays are present in the Allegheny Group. The limestone beds present in the Allegheny all occur as beds or nodules contained in the underclay zones. These zones usually contain refractory clay with varying quality, with the basal clays such as the Clarion or Mount Savage beds being of the highest quality.

The Allegheny Group contains abundant sandstone; the units probably are not persistent throughout the whole area, but some sandstones show good local development. In some locations two or more of the sandstone beds meet to form layers with thicknesses in excess of 100 feet. These sandstones are most likely channel deposits as evidenced by their cross-sectional shape revealed in strip mines in the area. The sandstones are usually conglomeratic on a local scale, with conglomerate zones occurring most commonly in the Freeport sandstone (lying above the Kittanning coal) and the Kittanning sandstone (which lies above the Clarion coal). Kittanning sandstones are very well developed in Somerset County and are often confused with the Worthington sandstone that overlies the lower Kittanning coal, and the Homewood and Clarion sandstones as well. These beds all tend to look similar when exposed at an outcrop.

Shaffner (1963) and Williams (1960) proposed a subdivision of the Allegheny Group into three formations: the Clarion, the Kittanning, and the Freeport. The boundaries chosen for the formations are related more to the traceability of the formations, rather than to the actual genetic grouping of rock units. This practice places the boundary between the Clarion and the Kittanning Formations within the lower Kittanning coal group; the Kittanning-Freeport boundary similarly falls within the upper Kittanning coal group. In both of these cases, the major coal seam in each coal group is the only persistent mappable horizon.

The Brookville coal / underclay is the defined basal layer of the Allegheny Group. This layer was chosen by Rogers (1858) as it was presumed to be the lowest minable coal in the "Lower Productive Measures."

Brookville coal identification in Somerset county is sketchy at best; correlation has only been made with a similarly named coal in adjacent areas, and not specifically with the type locality in Somerset County. In Somerset County, the Brookville coal tends to be thin and nonpersistent, and thus tracing the layer is quite difficult. Waagé (1950) identified the Brookville coal with the lower Mount savage coal named by Swartz and Baker (1920). He stated that mount Savage is thin and discontinuous, and absent in many places in the Casselman basin, and recommended that the Pottsville and Allegheny Groups be mapped as a single unit.

Hickok and Moyer (1940) defined the boundary between the Allegheny and Pottsville Groups using the Homewood sandstone, as it was more prevalent than the Brookville coal. They reported that distinguishing between the Clarion and Brookville coals was difficult because they were usually separated by 10 to 20 feet, but that in some areas the beds were combined. In such cases the beds are collectively referred to as the Brookville-Clarion coal.

Clarion Formation

The Clarion Formation contains the layers from the Base of the Brookville underclay or the Brookville coal to the base of the Kittanning coal underclay. The Brookville coal lies about 20 feet below the Clarion coal, has few exposures, and is generally hard to trace. Most likely, the seam is less persistent than the Clarion. The Brookville coal rarely is more than 2 to 3 feet thick and is noted for having abundant shaly partings. In some areas, the seam widens to 6 to 7 feet, but even then, only about a third of the coal is actually marketable. The bed is overlain by shale a few feet thick, and then by the Clarion sandstone. In some areas the Clarion sandstone covers almost the entire interval between the Clarion and Brookville coals.

The Clarion coal in southern Somerset County is identified as lying about 50 to 60 feet below the lower Kittanning coal. The bed is usually 4 to 6 feet thick and contains shaly partings. The seam has been mined at Blackfield and Wilson Creek, as well as at other sites, where it has been known as the "A" coal or as Brookville coal. The seam is underlain at the Fort Hill clay mine by soft plastic and flint clay that are of commercial value. The Clarion seam is considered to correlate with the Mount Savage coal of Maryland, which overlies the noted Mount Savage clay.

At Fort Hill, a thin rider coal appears about 15 feet above the Clarion seam, possible equivalent to the Scrubgrass coal. This thin coal seam is overlain by a bed of dark gray shale containing fossils remains of *Marginifera*, a marine brachiopod. This layer appears to be similar to the one in Clearfield county where *Marginifera* was found by Williams (1958). The layer occupies a position approximately equal to that of the horizon of the marine Vanport limestone of Butler and Armstrong Counties in Pennsylvania, and of eastern Ohio, and may correlate with that bed. This layer is overlain by coarse-grained to conglomeratic Kittanning sandstone, which at times forms channels down through the Clarion coal seam.

The Kittanning sandstone overlies the Clarion coal seam and lies below the lower Kittanning coal. The Kittanning is quite well-developed in Southern Somerset County. It is a typically massive, medium to coarse-grained, conglomeratic quartzose sandstone about 20 feet thick. In some locations it combines with the Clarion sandstone and occupies most of the entire interval between the lower Kittanning and Brookville coals. The beds may also combine with the overlying Worthington sandstones, producing an even thicker bed.

A well-developed deposit of Kittanning sandstone is quarried at Murdock, south of Somerset. Kittanning sandstone rubble is abundant throughout the landscape in the Somerset area. Other notable exposures are at Fort Hill Station and Metzler, about 2 ½ miles southwest of New Lexington. Generally identification in these areas has been by stratigraphic position and not by petrography. The Kittanning sandstone is quite similar to the Worthington, Clarion, and Homewood sandstones, and may be confused with these if only one sandstone is exposed.

Two coal beds are normally present at the lower Kittanning horizon. These beds and there associated shales and clays are known as the lower Kittanning coal group. The upper bed may be what is known as the "B" (lower Kittanning) coal in Somerset County, but it is uncertain whether or not the bed is persistent throughout the area. This bed has a well-developed underclay which is usually used as the delineation of the top of the Clarion Formation.

Kittanning Formation

The strata spanning the interval from the underclay of the upper bed of the lower Kittanning coal to the top of the lower bench of the upper Kittanning coal is know as the Kittanning Formation. Total thickness averages about 100 feet, generally following the interval between the lower and upper Kittanning coals.

The lower Kittanning coal bed mined in Somerset County is generally thought to be the upper of two beds, and has a well-developed underclay. It is possible, however, that some mines extract a thickened portion of the lower bench, or a coalesced version of the two beds. A rider coal generally appears 15 to 20 feet above the mined bench. This may actually represent a third coal of the group, or if the mined coal occurs in an area where the mining actually extracts a thickened portion of the lower bed, it may simply be a thinned portion of the upper bench. The rider coal could also represent the lowest of the three middle Kittanning coal beds.

The lower Kittanning coal is overlain by Worthington sandstone in some areas, but a shale sequence has also been observed. The Worthington sandstone is in turn overlain by the beds of the middle Kittanning coal group. Three coal beds are recognized within the middle Kittanning group, one of which is known as the Pennsylvania "C" coal, although this coal may not be continuous. Each of the three beds is usually about 1 to 3 feet thick, but at one location near Metzler, the upper bed reaches a thickness of almost 4 feet. The middle Kittanning coals occur in an interval of about 40 to 50 feet, with the uppermost coal being about 25 to 35 feet below the upper Kittanning coal seam and the lowest about 30 feet above the lower Kittanning coal. The interval between the middle Kittanning coal beds is filled with an interbedded sequence of shale, siltstone, and shaly sandstone. Underclays that contain semiflint and plastic layers tend to occur beneath each of the coal beds.

The upper Kittanning coal is referred to as the "C prime" coal of Pennsylvania. It has considerable commercial importance. The bed lies about 95 feet below the upper Freeport and about 100 feet above the topmost bed of the lower Kittanning coal group. Waagé reported that at this horizon in Maryland, five coal beds commonly occur. Only two beds have been observed in Somerset County; and possible three if the upper Kittanning is assumed to be a double bench seam with a parting of 3 to 4 feet in thickness.

The Johnstown limestone closely underlies the upper Kittanning coal. The Johnstown is one of the most persistent freshwater limestones of the Allegheny Group present in the area. A few inches of clay or shale usually separate if from the upper Kittanning coal, but sometimes it contacts the seam. The Johnstown limestone is generally about 8 feet thick, and is a dark gray argillaceous, buff-weathering rock similar to the other freshwater limestones in the Pennsylvanian System. This limestone is persistent and is a good stratigraphic guide. A bed of clay about 4 to 5 feet thick underlies the Johnstown limestone. This clay zone may be either flint and plastic, or just flit clay. Flint clay is common near this horizon, but the distribution is discontinuous. The top of the Kittanning Formation is denoted by the top of the minable upper Kittanning coal bed. If the Johnstown limestone is used as a stratigraphic guide, the lowest coal bed of the upper Kittanning group can be identified as the minable seam of the upper Kittanning group in Somerset County. This seam usually lies either in contact with or a few inches above the Johnstown limestone.

Freeport Formation

The Freeport Formation contains the strata between the top of the Kittanning Formation and the top of the upper Freeport coal. Its thickness is generally about 100 feet.

Above the upper Kittanning coal, shale and one or two rider coal beds may occur. This sequence is overlain by the Freeport sandstone. The Freeport sandstone is typically one of the more massive formations in southern Somerset County. This bed is usually conglomeratic and its thickness ranges from under 10 feet to 30 to 40 feet. In some places, as in the Casselman River valley between Rockwood and Harnedsville, the sandstone lies directly on top of the upper Kittanning coal bed.

Immediately above the Freeport sandstone and below the lower Freeport coal is a complex underclay-limestone sequence having a thickness of about 10 feet. The limestone in the bed may be bedded, nodular or shaly. It occurs below, within, or above the clay layer. The limestone thickness is usually less than 5 feet. The clay layer mainly consists of soft, plastic clay, but some flint clay does occur.

The lower Freeport coal overlies the lower Freeport clay and contains two seams in southern Somerset County. One of these is mined as the "D coal" of Pennsylvania. The second seam is a thin rider usually about 6 inches thick that lies 10 to 15 feet above the main seam. This bed is 18 inches thick in the vicinity of Garrett, but in many locales it is absent due to replacement by Butler sandstone, a channel-type deposit. In other places the coal seems simply to have never been deposited.

The lower bed of the lower Freeport coal group is persistent and minable. It is typically overlain by a layer of black, carbonaceous shale about 1 to 2 feet thick, grading up into gray, coal-measure type shale. Estherid fossils have been found in this layer, possibly suggestive of deposition in a brackish environment. The shale layer is covered by the Butler sandstone, a locally well-developed unit. It is, in some places, a massive bed with a thickness of 20 to 30 feet, and is generally composed of interbedded sandstone and shale. It occasionally combines with the Freeport sandstone to form a layer between the upper Kittanning and the upper Freeport coal seams. The Butler sandstone is overlain by a small layer of shale which grades upward into the Bolivar Clay.

The Bolivar clay bed (type locality Bolivar, Westmoreland County) has also been known as the upper Freeport clay. The Bolivar clay bed in some areas contains enough good quality refractory material to be extracted, but in Somerset County the bed is generally not persistent. Some isolated deposits of good quality flint clay do exist, however. Thickness of the bed is generally 10 feet, with a range of 4 feet to 20 feet. The Bolivar clay is overlain by the upper Freeport limestone, and in turn, the upper Freeport coal.

The upper Freeport coal is mined as the Pennsylvania "E" coal, and denotes the topmost layer of the Freeport Formation. This coal is fairly thick and persistent and is mined in most of the area covered by the Allegheny Group in southern Somerset County. Along the west flank of Allegheny Mountain, and the Wellersburg syncline, however, the Allegheny Group coal beds occur on steep slopes covered with rubble and are rarely seen. In these areas, the coal referred to as the upper Freeport is actually the upper Bakerstown coal, which lies about 270 feet above the upper Freeport coal. The upper Freeport is usually 3 ½ to 5 feet thick in mined areas. It typically occurs as a multiple-bench bed. In the lower Youghiogheny syncline the seam has gained the name "Fireclay Coal" due to a persistent clay parting several feet thick that separates the two coal benches.

Conemaugh Group

Introduction

The Conemaugh strata were named for exposures along the Conemaugh River in the Allegheny Plateau in western Pennsylvania. The group is bounded by the Pittsburgh coal on the top, and by the upper Freeport coal on the bottom. These upper and lower limits match those proposed by Rogers (1858) for the "Lower Barren Measures", named because of the scarcity of economic mineral or coal beds.

The stratigraphic ranking of Conemaugh rocks has been fairly indiscriminate. The Conemaugh has been classed as a series, a formation, and a group. The present knowledge of Conemaugh stratigraphy makes the assignment of group status the seemingly most appropriate, and to apply a subdivision into two formations, the Glenshaw and the Casselman.

The Conemaugh Group is about 900 feet thick in southern Somerset County. Most likely, the thickness of the beds in this area represents the maximum in Pennsylvania. Repeating sequences of sandstone, shale, limestone, clay, and coal make up the
Conemaugh, similarly to the other parts of the Coal Measures. Beds are usually thin, from a few inches to about 20 feet in thickness. Some beds ranging from a few inches to a few feet thick can be traced for some distances, many beds are difficult to trace because of irregularity in lithology and thickness.

The upper Conemaugh contains no known marine units, which helped to make identification and correlation of beds quite difficult. The lower Conemaugh contains some thin marine limestones and shales which do tend to make good stratigraphic guides. Widely known are the Brush Creek and Ames limestones. These beds are highly persistent. Cambridge (Pine Creek) and Woods Run (Friendsville) limestones are somewhat less persistent than other limestones, but both of these beds can be traced over a wide area. No widely recognized well-developed marine units occur above the position of the Ames limestone in the Appalachian Basin, but the Skelley limestone in Ohio, which lies about 50 feet above the Ames, does contain some sparse fossil remains. In western Pennsylvania, the Birmingham shale occupies approximately the same position as the Skelley limestone. These marine units are poorly developed, however, and the Ames limestone can acceptably be considered the highest marine member of the Pennsylvania Conemaugh Group.

Conemaugh Subdivisions

The upper and lower parts of the Conemaugh Group are lithologically dissimilar and are traceable over a wide area of Pennsylvania. The Pennsylvania Geological Survey authors propose that it is appropriate to subdivide the Conemaugh Group into two formations, the Glenshaw and the Casselman. The persistent and easily traceable Ames limestone serves as the boundary between the two layers. The lower limit of the Glenshaw Formation is marked by the top of the upper Freeport coal bed, which is usually taken as the demarcation between the Allegheny and Conemaugh Groups. The upper boundary of the Casselman formation is denoted by the base of the Pittsburgh coal bed, used commonly to delineate the Conemaugh strata from the overlying rocks of the Monongahela Group. The Casselman Formation is named for its various exposures occurring along the Casselman River valley in the Berlin syncline, in Somerset County, Pennsylvania, and in Garrett County Maryland. As the Conemaugh group nears its maximum thickness there, a name from the area was deemed to be appropriate.

The lower formation of the Conemaugh Group was not named for a type locality in Somerset County, because the defining limestone beds of the formation are mostly shaly, rather than being well-developed limestone such as that which occurs further to the west. Therefore, a name from the Pittsburgh area was chosen; the four marine limestones are very well developed in the are of Glenshaw, Shaler Township. All four marine limestone beds are exposed in the general vicinity of Glenshaw. A specific locality is not defined as the entire unit is not exposed at any one location.

Condit (1912) preferred to avoid the use of the Ames or other marine beds as a formation boundary, but did acknowledge that it was an important geologic horizon and a valuable stratigraphic key. He also noted that it was very well-developed nearly everywhere along its outcrops in Ohio. Waagé recognized that marked lithologic differences occurred between the upper and lower parts of the Conemaugh Formation. He still chose, though to call the Conemaugh a formation and to refer to the upper and lower parts as members of the same formation. He preferred to place the boundary between the upper and lower Conemaugh at the top of the Barton coal bed. This bed lies about 125 to 150 feet above the Ames limestone in western Maryland. Waagé noted in a study of drilling cores that the lower units of the group contain a number of marine shale beds and persistent coal beds, and that the layers as a whole retained similarity over broad geographical areas. He found that in the upper layers, the stratigraphic sequence was much more irregular, lacks any marine beds, and contains coal beds that are less persistent. These contrasts not only are applicable for western Maryland but apparently may be extended to adjacent areas in bordering states as well.

Glenshaw Formation

The Glenshaw Formation incorporates an interval of about 375 feet containing strata lying between the top of the primary bench of the upper Freeport coal to the top of the Ames limestone or its associated shale. In contrast to the Casselman Formation, the Glenshaw contains units which are generally more persistent. It contains marine shale and limestone layers. The Glenshaw contains more red beds and less freshwater limestones than does the Casselman. In the interests of clarity, the Glenshaw Formation is divided into several stratigraphic units:

Upper Freeport coal – Brush Creek coal interval

An interval of about 110 to 115 feet separates the upper Freeport and Brush Creek coal beds; nine stratigraphic units are recognized within this interval:

a.) Upper Freeport coal bed
b.) Lower Mahoning sandstone
c.) Mahoning coal
d.) Upper Mahoning sandstone
e.) Mahoning red bed
f.) Humbert coal
g.) Corinth sandstone
h.) Irondale limestone
i.) Brush Creek clay

With the exception of the Uffington shale (a fossiliferous shale that lies just above the upper Freeport coal, but is absent in southern Somerset County), none of the shale beds associated with these units have been named.

Just overlying the upper Freeport coal is a sequence of shales and interbedded thin sandstones. A thin rider coal occurs in the sequence, at about 15 feet above the upper Freeport coal. This rider coal in some places (such as in the Berlin syncline) may be 12 to 20 inches thick and at times has been co-mined with the upper Freeport coal bed. The rider seam is poorly developed in the lower Youghiogheny syncline. It is not known if the seam occurs in the vicinity of the Wellersburg syncline.

The Mahoning coal bed lies at an average of about 35 feet above the upper Freeport coal. In southern Somerset County the Mahoning coal is generally not well developed, having a thickness usually less than 6 inches. Waagé (1950) relates that the Thornton clay, which underlies the Mahoning coal, is the most important key stratigraphic bed in the upper Freeport – Brush Creek interval in Garrett County, Maryland due to its persistence and distinct lithology. In southern Somerset County, this has not proven to be the case, although Mahoning underclay is present at some places in the county.

Southern Somerset County Mahoning sandstone is divided into an upper and a lower part by the Mahoning coal bed. The lower Mahoning sandstone is medium to coarse grained, fairly massive, and partially conglomeratic. It is known to change laterally from a thick or massive sandstone to a shaly layer with a small percentage of sandstone present. The upper Mahoning sandstone is fine to medium-grained and contains interbedded shale and siltstone. At some points where the Mahoning coal seam is absent, the upper and lower Mahoning sandstone combine to form a single layer of sandstone 30 to 40 feet thick. Irregular contacting between the lower Mahoning sandstone and its underlying shale has been observed, suggesting a channel-type deposit. Kuhn (1952) noted that in the Berlin quadrangle, the lower Mahoning sandstone at points cuts down though the upper Freeport coal and even reaches the lower Freeport coal seam at some locations, producing a total sandstone layer thickness of some 70 feet. This serves as a partial explanation of the upper Freeport coal's lack of persistence in southern Somerset County.

The interval between the Mahoning coal and the Brush Creek coal is occupied by the Mahoning red bed. It most likely represents the upper part of a dual Mahoning red bed seen in other areas. The Humbert coal is thought to lie a t about the same stratigraphic position as the Mahoning red bed. In his work in Garrett County, Maryland, Waagé (1950) noted that at this position, no coal seam was present in Maryland, but that one would likely appear if the bed were traced over a large enough area. The Humber coal in Somerset County is considered to be just such a coal bed.

Waagé did note a coal occurring at the stratigraphic position of the lower part of the Mahoning red bed in Garrett County Maryland, and theorized that the two were laterally equivalent. He also observed that coal is associated with the sandy phase of the Mahoning rocks and is absent where red beds occur. In southern Somerset County, the lower Mahoning red bed has not been observed.

The Humbert coal's type locality occurs about four miles northeast of Confluence in the town of Humbert. The bed was mined in this locale for a short period of time in the 1800's. The seam thickness reaches seven feet in some areas, but widely varies over relatively short lateral distances. The coal sometimes occurs as one bench; in other places it is interbedded with irregular lenticular bone coal, carbonaceous shale, and shaly coal. The variation of the thickness and quality of the seam is such that its commercial viability was soon exhausted.

The Humbert coal seam is likely correlated with the Galitzin coal of Cambria County, Pennsylvania, and the Mason coal of Ohio as well. The Mason and Galitzin beds lie at approximately the same stratigraphic position with respect to the Brush Creek and upper Freeport coal beds.

The Mahoning red bed replaces the Humbert coal in some locations. A calcareous zone is contained in the Mahoning red medications in some places in the lower Youghiogheny syncline. This zone is sometimes comprised of 3 to 4 feet of freshwater limestone, but more commonly the red bed contains lime pellets or is non-calcareous.

Considerable lithological variability exists within the 10 to 30 foot interval between the Mahoning red bed and the Brush Creek coal. Rock type occurring are: sandstone (some calcareous), siltstone, limestone, claystone (with or without lime pellets / nodules), and clay. The clay occurring in this interval is known as Bruch Creek clay. Bedded limestone is least common in the interval; where it does occur it is known as the Irondale limestone. A notable occurrence of the Irondale limestone is on the slopes of Fort Hill, where it lies in a bed 3 to 4 feet thick and at one time was mined for use as agricultural lime. Similar to other freshwater limestones occurring in the Coal Measures, it is colored bluish-gray and is finely crystalline. At the bottom of the interval some inclusion of siltstone and sandstone is observed. This sandstone layer ranges from a few inches to over 10 feet thick, and becomes calcareous in some places. Swartz (1920) named this bed the Corinth sandstone, after an exposure in a railroad cut near Corinth, West Virginia.

Brush Creek coal – lower Bakerstown coal interval

The thickness of this interval is usually about 110 feet. It contains the Brush Creek coal, the Brush Creek limestone and its associated marine shale, the Buffalo sandstone, the upper and lower Meyersdale red beds, the Albright limestone, and the Thomas clay, which underlies the lower Bakerstown coal.

The Brush Creek coal seam is a persistent, single-bench layer underlying the Brush Creek limestone. The average thickness of the coal is about 15 inches, with the maximum known thickness of about 2 feet occurring at Ursina. In the Conemaugh outcrop area of the Lower Youghiogheny syncline where this coal layer reaches a thickness of 18 inches it is referred to as the "18-inch" coal. The coal in this area is extracted on a small scale for local use. In the area of the Wellersburg syncline, the Brush Creek coal is of about the same thickness and is also mined for use in the area. This coal is sometimes incorrectly referred to as the upper Kittanning coal in this area.

Overlying the Brush Creek coal is the persistent, marine Brush Creek limestone. The Brush Creek limestone bed is a limestone at its type locality in Cranberry Township, Butler County, Pennsylvania; this lithology, however, represents only a small portion of the total marine bed at this horizon in southern Somerset County. The overall thickness of the marine layer is in the range of 25 to 30 feet. It is comprised mainly of dark bluish-gray to black shale. Near the middle of the bed lies a fossiliferous layer of impure limestone that is about one foot thick, and the basal layers of the unit usually contain calcareous shale or impure limestone. In the vicinity of Wellersburg the upper 8 feet of a 14 foot marine bed is largely calcareous. This layer includes bedded limestone,. shaly limestone, and nodular limestone. Widespread marine fossil remains are found in this layer, and tend to concentrate in the middle limestone bed and the basal layers. The following tables detail the marine fossils found at various exposures of the Brush Creek limestone:

Brush Creek fauna from the B&O Railroad exposure about 2,000 feet east-northeast of Ursina:	
Brachiopoda	
	Rosemerella patula
	Cleiothyridina orbicularis
	Chonetes granulifera armatus
	Neospirifer cameratus
Pelecypoda	
	Edmondia ovata
	Schizodus affinis
	Schizodus alpinus
	Nuculana bellistriata attenuatta
	Allorisma subcuneatum
	Acanthopecten carbonarius
	Lima retifera
Gastropoda	
	Pharkidonotus percarinatus
	Bellerophon creassus
	Schizostoma catilloides
	Bulimorpha inoronata
Scaphopoda	
	Plagiogylpta meekiana
Cephalopoda	
	Michelinoceras sp. undet.
	Pseudothoceras knoxene
Trilobita	
	Ameura sangomonensis

Brush Creek fauna from a roadside exposure about 0.95 mile northwest of Ursina on Jersey Church road	
Bryozoa	
	Polypora cf. P. submarginata
Brachiopoda	
	Derbyia crassa
	Juresania nebrascensis

Pelecypoda	
	Edmondia ovata
	Edmondia gibbosa
	Nucula anodontoides
	Schizodus cuneatus
	Nuculana bellistriata
	Allorisma subcuneatum
	Dunbarella sp. undet.
Gastropoda	
	Phanerotrema grayvillense
	Pharkidonotus percarinatus
	Euphemites carbonarius
	Schizostoma sp. undet.
	Meekospira peracuta
	Bulimorpha inoronata
	Strobeus primogenius
Scaphopoda	
	Plagioglypta annulistriata

Brush Creek fauna from an exposure at a coal mine site on a south-facing slope 1.1 miles north-northeast of New Lexington	
Brachipoda	
	Conetes granulifera
	Juresania nebrascensis
	Neospirifer cameratus
Pelecypoda	
	Edmondia ovata
	Edmondia gibbosa
	Nucula anodontoides
	Nuculopsis ventricosa
	Nuculana bellistriata
	Aviculopecten occidentalis
Gastropoda	
	Worthenia speciosa
	Orestes nodusus
	Pharkidonotus percarinatus
	Bellerophon crassus
	Bellerohon sp. undet.
	Schizostoma Catilloides
	Zygopleura plebia
	Zygopleura multicostata
	Cylindrotopsis cf C. Vaningeni
	Meekospira sp. undet.
	Strobeus medialis
	Strobeus sp. undet.
Scaphopoda	
	Plagioglypta annulistriata

Cephalopoda	
	Metacoceras perelegans
	Orthoceras sp. undet.

Brush Creek fauna from strip mine exposure one mile northwest of Kennells Mill. Coal bed incorrectly named upper Kittanning	
Anthozoa	
	Lophophllidium cf L. profundum
Brachiopoda	
	Derbyia cymbulas
	Chonetes granulifera
	Marginifera cf. M. muricatina
Pelecypoda	
	Edmondia ovata
	Edmondia gibbosa
	Nucula anadontoides
	Nucula wewokana
	Schizodus alpinis
	Nuculana bellistriata
	Astartella concentrica
	Lima retifera
Gastropoda	
	Trepospira depressa
	Pharkidonotus percarinatus
	Bucanopsis meekiana
	Meekospira minuta
	Strobeus ventricosa
Cephalopoda	
	Metacoercas cornutum
	Gastrioceras cf. G. Listeri
	Pseudorthoceras sp. undet.
	Protocycloceras sp. undet.

Brush Creek fauna from a Western Marylan Railroad exposure about 1 ½ miles east of Meyersdale	
Pelecypoda	
	Nucula beyrichi
	Nuculopsis ventricosa
	Nuculana bellistriata
Gastropoda	
	Worthenia sp.
	Shansiella carbonaria
	Pharkidonotus percarinatus
	Euphemites carbonarius
	Schizostoma catilloides
	Schizostoma sp.
	Meekospira peracuta

Scaphopoda	
	Plagioglypta annulistriata
Cephalopoda	
	Gastriceras
	Orthoceras

The Brush Creek limestone is the lowest occurring stratigraphic unit in southern Somerset County which contains distinct marine fauna fossils; it is the lowest of four similar beds in the Glenshaw Formation. This bed is a useful stratigraphic key, as it is present in all of the Conemaugh outcrop areas that were examined. The shaly part of the Brush Creek limestone is easily confused with the shaly part of the Ames limestone and the Friendsville shale; the Friendsville shale, however, is usually less fossiliferous. The remaining marine bed in the Glenshaw Formation, the Cambridge limestone, occurs in the lower part of the Meyersdale red bed, and thus is easily distinguished from the other three.

A one foot thick rider coal appears at about 20 feet above the base of the Brush Creek limestone in the vicinity of Springs, but generally is not seen anywhere else in southern Somerset County.

The Buffalo sandstone occurs between the lower Meyersdale red bed and the Brush Creek limestone. This bed is generally found throughout the Conemaugh Group in southern Somerset County, but is absent at some locations. It is a platy, fine to medium-grained sandstone that occurs in a layer 10 to 15 feet thick; in some places the thickness of the bed has been known to reach 30 feet. The Buffalo sandstone is generally not a cliff-former. Where the Buffalo is absent its position is occupied by interbedded shale and siltstone.

Overlying the Buffalo sandstone is the Meyersdale red bed. The bed's type locality occurs about 1.35 miles east of the Meyersdale railroad station, on the north side of the tracks. The red beds occur in an interval encompassing some 50 feet. The upper red bed is no longer exposed at the type locality. The lower bed is still present and contains a 16 inch thick layer of impure marine limestone, the Cambridge.

The Cambridge limestone is less persistent than the other marine beds in the Glenshaw Formation. It is a bedded limestone layer about one foot thick in some places, but more commonly occurring as limestone nodules in a red and green claystone base. In the Lower Youghiogheny syncline, the Cambridge is underlain by a black shale layer and a clay layer. These probably correlate to the Wilgus coal and clay of the Ohio Conemaugh Formation.

The upper Meyersdale red bed is generally about 10 feet thick, and is pale red, green, or a variegated mix of the two. The bed has no apparent bedding structure, and weathers to small irregular fragments. Waagé stated that the red color is more persistent in the upper than in the lower layer in Western Maryland, but in southern Somerset County this relationship does not appear to hold true. The two sections of the Meyersdale red bed are usually separated by 10 to 15 feet of interbedded siltstone and fine-grained sandstone. The thickness of the lower bed is usually about 20 to 25 feet, making the total interval covered about 50 feet. The Meyersdale red bed is persistent enough in southern Somerset County to make a good stratigraphic guide, but may on occasion be confused with other red beds occurring in the Conemaugh Group.

The upper Meyersdale red bed underlies the lower Bakerstown coal and its associated underclay, the Thomas clay. This zone contains several feet of bedded or nodular limestone, but in places carbonates are rare and a layer of gray plastic clay several feet thick is present. One such location is at Comptons Mill just west of Salisbury, where this clay was used in making buff building bricks. Limestone was observed in about half of the studied exposures. The limestone underlying the Bakerstown coal is the Albright, named by Hennen and Reger (1914). The beds in this underclay zone grade downward into the upper part of the Meyersdale red bed in most places but on some occasions a few feet of siltstone or sandstone occurs in between the underclay and the upper red bed.

Lower Bakerstown coal – Ames marine bed interval

This interval covers approximately 150 feet of beds and extends to the top of the Glenshaw Formation; it includes the Friendsville shale, Ewing limestone, upper Bakerstown coal, Saltsburg sandstone, Pittsburgh red bed, Lavansville limestone, and the Ames coal and limestone and marine shales. A majority of the strata in this section can be seen in an exposure of a rock cut made to construct the Youghiogheny River reservoir spillway.

The lower Bakerstown coal lies about 225 feet above the upper Freeport Coal and about 135 feet below the Ames limestone. Sisler (1929) stated that Somerset County is the only county in the state which has Conemaugh coal beds of minable thickness. The lower Bakerstown coal is one of these. The lower Bakerstown usually occurs as a single-bench seam. In terms of persistence, thickness, and quality it is the best coal in the Conemaugh Group of southern Somerset County. It occurs in menial thickness in the Berlin-Salisbury syncline, where it is commonly about 30 inches thick. In that area, the bed is incorrectly known to some as the Brush Creek coal. Near Garrett, the seam is also known as the "Silver Valley". In the Springs area, the coal is known as the "Honeycomb" coal, and in the Confluence and Centerville areas it is known as the "18-inch" coal. The lower Bakerstown coal is correlated with the Thomas coal of Maryland and West Virginia and with the Anderson coal of Ohio.

The Friendsville shale is one of the four marine units in the Conemaugh Group observed in southern Somerset County. It directly overlies the lower Bakerstown coal bed. The Friendsville shale is similar to the shaly portions of the Ames and Brush Creek marine beds, but is less fossiliferous than either of these other beds. The Friendsville shale is dark bluish-gray to black, brittle, and evenly bedded. Its thickness ranges from 10 to 35 feet with an average of about 20 feet. It was named by Swartz (1919) for an exposure near Friendsville, Maryland in the Lower Youghiogheny syncline about 10 miles southwest of Confluence, Pennsylvania. In southern Somerset County this unit contains marine fossil remains in all Conemaugh outcrop areas except those in the Wellersburg basin where exposures are so few that a thorough check of the fossil content could not be obtained. In the Berlin syncline basin, the amount of marine fossils available in the Friendsville shale becomes less abundant as one moves southward.

Some exposures of the Friendsville shale in southern Somerset County contain a very fossiliferous zone in the lower few inches of the bed. In the Confluence area, it is common to find a very fossiliferous thin limestone or calcareous shale unit from 15 to 25 feet above the base of the Friendsville shale. Most exposures of this unit contain brackish-water fossils at varying stratigraphic positions.

The Friendsville shale grades upward into gray, non-fossiliferous, sandy shale which in turn grades upward into an underclay zone containing various amounts of limestone in various forms. The calcareous part of the zone is the Ewing limestone. The Ewing limestone is considered to be the calcareous zone directly underlying the upper Bakerstown coal. In southern Somerset County this bed is usually about 15 feet thick and tends to have a variable lithology. Argillaceous limestone or calcareous claystone is common but locally there are distinct beds of hard, dense, limestone in the zone. Nodular limestone is also present in places. No quarries in this limestone unit were found in the study area. The Friendsville shale and Ewing limestone are usually separated by a few feet of shaly sandstone. The Ewing limestone and the upper Bakerstown coal are generally separated by a few inches of impure clay.

The upper Bakerstown coal bed lies about 45 feet above the lower Bakerstown coal bed. In southern Somerset County the upper Bakerstown coal is much less persistent than the lower coal, however, in the Wellersburg syncline area the upper seam tends to be quite persistent. In many places, the upper seam has been eroded and its stratigraphic position is occupied by the Saltsburg sandstone, a channel-type sandstone with an irregular, disconformable base.

The upper Bakerstown coal is mined in the Wellersburg syncline area, where it is about 3 to 4 feet thick. It is a fairly low-quality coal; it contains considerable shaly material. In the Wellersburg area, this coal has been incorrectly named the upper Freeport coal. In other areas, the seam is usually represented by one to two feet of shaly coal.

The Saltsburg sandstone lies between the Pittsburgh red beds and the upper Bakerstown coal. The layer usually is about 30 feet thick but in places where it fills relatively deep channels it can be as thick as 60 feet. In these places, the sandstone may cut down through the upper Bakerstown coal. It may even extend through the Ewing limestone and part of the Friendsville shale, almost to the level of the lower Bakerstown coal. One example of this channel-filling may be seen two miles northwest of Berlin in the highwall of a lower Bakerstown coal strip mine. The Saltsburg is a persistent sandstone, but its thickness and lithology change considerably. It is usually medium-grained and quite irregularly bedded, with various amounts of interbedded shale. It is well developed and massive in the Kingwood area where it is partly responsible for the development of the flattish upland terrain between Laurel Hill Creek Valley and Casselman Valley. The sandstone crops out around the rim of this upland area. Beyond its outcrop, slopes leading down to nearby streams are rather abrupt. It is common to find large blocks of sandstone rubble along the outcrop of the Saltsburg sandstone.

Overlying the Saltsburg sandstone is the Pittsburgh red bed, the highest prominent red bed in the Coal Measures of southern Somerset County. The Birmingham bed lies 130 feet above this bed, however, it is not as well-developed as is the Pittsburgh red bed. The main part of the Pittsburgh red bed lies about 50 feet below the Ames limestone but in some places it extends to as much as 70 feet below it. The bed is composed of pale green and / or pale red claystone containing limestone pellets locally, and powdery, crumbly debris at the base of weathered exposures is typical of this unit. It is also common to find a network of intersecting calcite-filled veins within it.

A calcareous zone 10 to 20 feet in thickness overlies the Pittsburgh red bed. Bedded limestone several feet thick overlies this in some places; in other places it is entirely absent. This bedded limestone is well-developed in two localities, one in the higher hills north of Centerville, the other northeast of Confluence in the vicinity of the Jersey Church. The limestone has been quarried at several places in both localities. Richardson (1934) also noted a limestone at this stratigraphic position in the Somerset quadrangle. He tentatively identified it as the Ewing limestone, but the true position of the Ewing is below the upper Bakerstown coal. This unit has been named the Lavansville limestone, in reference to the quarry near Lavansville about 4 to 5 miles west of Somerset, where this bed of limestone was quarried and roasted to produce lime for neutralizing soils by local farmers. It is about 5 to 6 feet thick in that area.

The Lavansville limestone is a freshwater limestone. When freshly exposed, its color is dark gray but it weathers to a light gray to buff shade. It is finely crystalline and non-fossiliferous. Where the bedded limestone occurs, thin interbedded layers of shaly limestone are present.

Exposures of the interval between the Lavansville limestone and the Ames coal are not plentiful. Generally the interval contains a few inches of soft, plastic, rather impure clay, perhaps increasing to a foot or two in places.

The Ames coal and marine beds are the top most units in the Glenshaw formation. The Ames coal is a fairly persistent seam and ranges in thickness between one and two feet. It has not been mined except in the Berlin syncline southeast of Salisbury and in the Wellersburg syncline in the vicinity of Wellersburg. In both places it has been mined on only a small scale and is known as the rock vein because the Ames limestone forms its roof.

The coal bed described her as the Ames coal has been referred to in the past as the Harlem coal. Sturgeon (1958), has however, found evidence in Athens County, Ohio, indicating that the coal lying directly below the Ames limestone is not the Harlem limestone. At an exposure of the type locality of the Ames limestone in Ames Township, Athens County, Ohio, a thin coal occurs about twelve feet below the seam which directly underlies the Ames limestone. Sturgeon suggests that the lower of these two coal beds is the Harlem and that the upper bed should be known as the Ames in preference to other names such as Crinoidal coal or Friendsville coal (Martin 1902). The term Crinoidal has no geographic significance and the term Friendsville is used both for a marine shale above the lower Bakers coal in Maryland and for coal in Illinois. It is only where both coals are found in the same section, such as at the Ohio locality, that one can make the correlations described above. Thus, where only one coal bed occurs and is directly below the Ames limestone it appears that it should be called the Ames coal.

The Ames limestone is one of the most persistent stratigraphic units in the coal measures of the Northern Appalachian area. It lies approximately 500 feet below the Pittsburgh coal and 350 feet above the upper Freeport coal in Southern Somerset County. It is the highest occurring distinctly marine unit in the area and is a valuable stratigraphic guide. The limestone directly overlies the Ames coal and is so shaly in this area that it does not generally weather out as a distinct ledge as in counties to the west. In some places there is no distinct bed of limestone, but instead fossiliferous limestone nodules in the dark shale matrix are present. The nodules also may be absent in some sections, but fossiliferous shale is almost invariably found at this position. The total thickness of the zone ranges from 15 to 35 feet. Above the limestone the lithology changes to dark-gray to black shale which becomes lighter in color and sandy moving upward. The shale is brittle and readily weathers into small platy fragments forming talus at the base of the Ames exposures. This talus debris is obtained at several localities for use in surfacing secondary roads and driveways.

Casselman Formation

The Casselman Formation overlies the Glenshaw Formation and contains about 500 feet of beds extending up to the base of the Pittsburgh coal bed. Unlike the beds in the Glenshaw Formation, those of the Casselman are quite variable and difficult to trace and correlate. The formation lacks good key beds such as marine beds. Drill data to aid in characterizing the formation are not available and good exposures are scarce.

As many as fifteen, thin, non-persistent coals and eight freshwater limestones or calcareous zones have been noted in the Casselman Formation. These beds are similar in appearance, and discontinuous. The coal beds and underlying limestone in the interval are tentatively correlated with beds in western Maryland and West Virginia, but these correlations are made with some uncertainly. A very detailed regional stratigraphic study of this formation is needed to establish accurate correlations from state to state and to clarify the presently confused terminology.

Many of the type localities of strata in this part of the column are in the George's Creek, Wellersburg syncline of western Maryland and Pennsylvania. The villages of Hoffman and Clarysville, for which coal beds are named, are just east of Frostburg, Maryland, and the villages of Lonaconing and Franklin (also type localities of coal beds) lies south of Frostburg in Georges Creek Valley. Several freshwater limestone zones are named for areas in West Virginia, Maryland and Pennsylvania. The Clarksburg limestones (lower and upper) are named for Clarksburg, West Virginia; the Barton limestones for Barton, Maryland; the Wellersburg limestone for Wellersburg in the southeast corner of Somerset County, Pennsylvania; and the lower Pittsburgh limestone for Pittsburgh, Pennsylvania. All of these calcareous beds are locally missing, and Clarysville claystone is found in their place. The limestones comprise approximately 15% of the Casselman Formation in which shale, siltstone, and shaly sandstone are predominant. Prominent sandstone units are generally lacking in the formation, except in the 30-foot zone above the Wellersburg coal in which the Morgantown sandstone occurs.

Lower Grafton Sandstone – Wellersburg Coal Interval

Seven main stratigraphic units are recognized in this 160 foot interval. These are the lower Grafton sandstone, the Federal Hill coal, the upper Grafton sandstone, Birmingham red bed, the Barton limestone, the Barton coal, and the Wellersburg limestone. As mentioned before, most of these units are exposed in the cut for the Youghiogheny River reservoir spillway.

The lower Grafton sandstone overlies the Ames limestone and is exposed at very few places in southern Somerset County. At its exposures it is seen as a fine or medium-grained sandstone with occasional interbedded shale totalling 10 to 25 feet. This sandstone grades upwards into an unnamed calcareous zone on the order of 15 feet thick. No bedded limestone has been found at this horizon but nodular limestone pellets and a pale greenish-gray claystone matrix are common. A few inches to a few feet of gray claystone lies between this calcareous zone and the Federal Hill coal.

The Federal Hill coal lies about 450 feet below the Pittsburgh coal seam and about 65 feet above the Ames limestone. It is a fairly persistent coal bed with a thickness of about one foot. In one exposure on Route 219 between Garrett and Meyersdale, large brachiopods (perhaps *orthotetes*) occur sparingly in the shale above the Federal Hill coal indicating a restricted marine environment of deposition for the shale. This shale probably correlates with the Birmingham shale and the Federal Hill coal with the Duquesne coal, of the Pittsburgh area. Possibly the shale above the Federal Hill coal is the equivalent of the marine Skelley limestone which is in a similar stratigraphic position in the Ohio Conemaugh area.

The upper Grafton sandstone overlies the Federal Hill coal. This sandstone occurs in beds about five to ten feet thick. Where this sandstone is absent, a thin "rider" coal occurs about ten feet above the Federal Hill coal. Overlying the upper Grafton sandstone is the Birmingham red bed, the highest red bed in the Conemaugh Group in the area. The red bed is comprised of a ten to twenty foot thick zone of pale-red and/or green mudstone which in some places contains interbedded gray shales and siltstones. The red bed is of good value as a stratigraphic key bed, particularly if found in the same section as the Ames limestone.

The Birmingham red bed is overlain by one of the thicker freshwater limestone zones of the Conemaugh Group, the Barton limestone, which is locally as much as twenty feet thick. A few inches of non-calcareous clay generally separate this layer from its overlying layer, the Barton coal. Bedded and freshwater limestone commonly comprises one-third to one-half of the zone. Other rock types in the zone are clay, limestone and calcareous claystone with lime pellets and nodules. The bedded limestone portion of this unit has been quarried on a small scale at numerous places in the Berlin and lower Youghiogheny synclines.

The Barton coal lies nearly 400 feet below the Pittsburgh coal, approximately 70 feet below the Wellersburg and about 130 feet above the Ames coal. The seam is about one to two feet thick but in some places is represented by only a black smut, or is completely absent. Some small extractions are present, but it is only mined on a very small scale. In an exposure along Route 219 just northeast of Boynton in the Berlin syncline the coal is overlain by about 3 ½ feet of black shale containing ostracodes. This fossiliferous shale was not found at any other locality.

A thin, unnamed, discontinuous coal bed occurs locally about 30 feet above the Barton coal within a shale sequence in the interval between the Barton coal and the Wellersburg limestone.

The Wellersburg limestone is a calcareous unit, presumably of freshwater origin, 12 to 15 feet thick underlying the Wellersburg coal bed. Only about one-third to one-half of the calcareous zone is compromised of hard-bedded limestone; the remainder is composed of calcareous claystone or nodular limestone in a claystone matrix. In some places only calcareous claystone is present and in other places there is no calcareous unit at all below the Wellersburg coal, but it is common to find some type of calcareous material in that stratigraphic position.

Wellersburg Coal – Lonaconing Coal Interval

This interval's stratigraphy is poorly known. The following represents the best description possible in an area with few surface exposures and virtually no subsurface information. In this interval, seven main stratigraphic units are recognized: Wellersburg coal, Morgantown sandstone, lower Clarksburg limestone, lower Clarysville coal, Niverton shale, upper Clarksburg limestone, and upper Clarysville coal. As in other parts of the Coal Measures, shale beds lying between those units are not named.

The Wellersburg coal is named for the village of Wellersburg in the southeast corner of Somerset County where the coal bed has been mined for domestic consumption for many years. In that area the coal occurs in two benches. The two three-foot benches of coal are separated by a four-foot layer of clay and shale. The lower bench contains the better quality coal and is the part of the total bed which is mined. Elsewhere on the mapped area, the Wellersburg coal is a one-bench seam, usually one or two feet thick and it has not been mined.

Overlying the Wellersburg coal is the Morgantown sandstone. The Morgantown sandstone is generally a gray, fine to medium-grained sandstone in beds ranging from a few inches to a few feet thick, but locally the sandstone is coarse-grained and massive. It is on the order of twenty to thirty feet thick. Numerous outcrops of the Morgantown sandstone occur in the hills a few miles from northwestern Meyersdale. They are sandstones dipping southeasterly away from the crest of Negro Mountain anticline and nearly the same angle as the surface slope. A very good exposure of the Morgantown sandstone can be seen in a road cut on 219 at Boynton (near Salisbury where it is at least twenty feet thick). At this locality it is medium to coarse-grained, and abundantly cross-bedded. At the Youghiogheny Dam site near Confluence, a drill hole revealed thirty feet of Morgantown sandstone ranging from coarse-grained in the basal five feet to medium and fine-grained in the upper twenty-five feet. It is likely that the Morgantown sandstone cuts down through and occupies the position of the Wellersburg coal in places, but no exposures of this occurrence were seen.

About twenty to thirty feet of shale separates the Morgantown sandstone from the overlying Clarksburg limestone. This limestone is one of two beds (the other is the upper Clarksburg limestone) lying about forty feet apart that appear to be fairly persistent, at least in the Berlin syncline where they have been observed in more places than in other areas containing upper Conemaugh strata. The beds between these limestone units are comprised of mostly shale with minor interbedded sandstone. Like other freshwater limestone zones in the Conemaugh, both the upper and lower Clarksburg limestones contain either bedded limestone or nodular limestone in a clay matrix, or both. The total thickness of each of these two limestones is generally about five to six feet. They are directly overlain by thin coal beds; the lower Clarksburg limestone by the lower Clarysville coal, the upper Clarksburg by the upper Clarysville coal. These coal beds are discontinuous and generally less than a foot in thickness but are as thick as two feet in places. They contain numerous paper-thin, shaly layers.

The lower Clarysville coal is overlain by a bed of dark-gray shale, the Niverton shale, which contains a profusion of ostracodes which, according to Swartz (1922) who named the bed, belonged to the genus *Pleurophorus*. The shale is named for the village of Niverton which is in Somerset County less than a mile north of the Pennsylvania / Maryland boundary and between two and three miles southwest of Salisbury and the Berlin syncline. The coverage area of the Niverton shale bed is not well known. It has, however, been traced from Garrett County, Maryland northward into the vicinity of Meyersdale, Pennsylvania where four different exposures were seen. Schwartz reports a thickness of eight feet for this fossiliferous shale with a type locality 1.3 miles south of Niverton on the west bank of the Casselman River, an exposure not seen on the present study. This shale is only three to four feet thick in the vicinity of Meyersdale. Within this local area the Niverton shale is a helpful stratigraphic guide.

The Hoffman coal group contains the interval between the upper Clarysville coal and the Lonaconing coal. It contains two thin, discontinuous coal beds separated by about ten feet of shale in southern Somerset County. The lower Hoffman coal lies about 180 feet below the Pittsburgh seam. A third Hoffman coal has been reported by Swartz (Swartz and Baker, 1922) in the George's Creek basin in Maryland but is not present in southern Somerset County. In contrast to most of the coal beds in the upper Conemaugh, no freshwater limestone was found below the Hoffman coals, nor do they have typical underclays. Hoffman coal beds are generally less than two feet in thickness and are separated by about eight feet of mostly shaly material. Their lenticularity is evidenced by the fact that they do not appear in all stratigraphic sections which include the horizon of these coals. In at least one locality, a channel sandstone which cuts out the overlying Lonaconing coal and associated beds lies directly on the upper Hoffman coal. Where the two Hoffman coals do not occur in the same section there is uncertainty about the identify of the coal which is present.

An unnamed calcareous zone, a freshwater limestone belonging to the Lonaconing coal sequence, occurs a few feet above the upper Hoffman coal. Bedded limestone is rare in this position; more commonly lime pellets or nodular limestone occurs in the claystone matrix. The thickness of this calcareous zone ranges from five feet to fifteen feet.

Lonaconing Coal – Pittsburgh Coal Interval

This interval contains the Lonaconing coal, the Franklin coal, an unnamed coal bed between the two, an unnamed freshwater limestone above the Franklin coal, the Franklin "rider" coal, another unnamed coal above it, the lower Pittsburgh limestone, the overlying Little Pittsburgh coal and the Morantown coal. These coal seams are all economically unimportant. The Lonaconing coal lies about 155 feet below the Pittsburgh coal, is generally close to one foot in thickness, but in places is twice as thick. About 25 feet above the Lonaconing coal lies a non-persistent unnamed coal seam having a thickness of less than one foot. This unnamed bed occurs in an interbedded sequence of shale, siltstone and claystone which shows considerable lateral variation. Locally, a channel sandstone occurring in the lower third of the interval extends downward to cut out the Lonaconing coal and associated beds. This is probably the Lonaconing sandstone named by Swartz (1922). The total thickness of such sandstone channel fillings is about forty feet.

The Franklin coal lies about 10 to 15 feet above the unnamed seam and about 110 feet below the Pittsburgh coal. The thickness of the Franklin coal ranges between 1 and 2 feet. It has been strip mined for local consumption at St. Paul, west of Salisbury.

The interval between the main Franklin coal and its "rider" seam is largely calcareous. Both bedded limestones of the freshwater type and nodular limestone in a claystone matrix occur in this 15 foot interval. Ironstone concretions are also abundant. It is not common to have such a calcareous zone occupying essentially the complete interval between two coal seams. Although this limestone lies directly above the Franklin coal in a position where marine limestone is normally expected, the limestone in question is not a marine type. It contains an abundance of ostrocodes, but such fossils are found in freshwater limestones in the coal matrix and are not particularly diagnostic. The unit resembles freshwater limestone such as the Barton limestone, the Wellersburg limestone and the Albright limestone, all of which underlie coal seams. It appears, though, that this unnamed limestone is genetically related to the Franklin "rider" coal, not the Franklin coal and that between the time of deposition of the Franklin coal and the limestone there was no opportunity for the deposition of the usual non-calcareous shale beds which commonly overlie the upper coal seams in the upper Conemaugh group. This calcareous zone is thought to be persistent enough to be of some use as a key bed.

An unnamed coal bed about six inches thick and its underclay lie about ten feet above the Franklin "rider" coal. This is most likely a very discontinuous coal but too few sections have been seen to confirm this. The next overlying coal seam, the Little Pittsburgh, is much more easily traceable. It lies about 50 feet below the Pittsburgh coal. Between the little Pittsburgh coal and the Franklin "rider" coal, an average interval of nearly 40 feet, shale predominates but claystone, siltstone and sandstone are also present in places. Clay-ironstone concretions are scattered throughout the interval. The unnamed coal mentioned above lies in about the middle of the interval.

The Little Pittsburgh coal is a persistent coal seam with a thickness generally between 20 and 24 inches. The seam has been mined on a small scale in the Berlin area. It is underlain by freshwater limestone, the lower Pittsburgh limestone, a fairly persistent bed commonly measuring from 3 to 4 feet in thickness.

An unnamed coal seam having a freshwater limestone lying below it lies about 15 feet above the little Pittsburgh coal. This coal is about 12 to 18 inches thick. Both it and its underlying calcareous zone are discontinuous.

About 20 feet above this unnamed seam of coal lies another relatively thick, but low-quality coal. This seam lies about 5 to 15 feet below the Pittsburgh coal. This coal band has been named the Morantown coal (after the village north of Frostburg, Maryland). In the Berlin area the coal is named as the "dirty six" because is it commonly six or so feet thick and has many layers of interbedded shale and shaly coal. Locally, there is as much as 13 feet of interbedded shale and coal at this horizon. This seam has been prospected many times in areas where it was mistaken for the Pittsburgh coal. A few feet of shaly beds which grade upward into a clayey zone separate the Morantown coal from the overlying Pittsburgh coal.

Monongahela Group

Introduction

Due to erosion, in southern Somerset County only about 200 feet of the lower Monongahela beds are present. The remaining section contains beds from the base of the Pittsburgh coal to the Sewickley sandstone. The Monongahela is divided into two formations, the Pittsburgh formation (the lower part) and the Uniontown formation (the upper part). The Somerset County Monongahela is contained entirely in the Pittsburgh formation.

The Monongahela outcrop belt is restricted to two areas, one in the Berlin syncline, the other in the Wellersburg syncline. In the Confluence area of the lower Youghiogheny syncline, the hilltops are about 250 feet below the level of the lowest Monongahela bed, the Pittsburgh coal.

Four coal beds exist in the Monongahela group in Somerset County which have been commercially worked. These are the Pittsburgh, the Blue Lick, the Redstone, and the lower Sewickley. Lying between these coal beds are shales, sandstones, limestones, and clays, all thought to be continental type deposits. Two relatively thick freshwater limestones occur in the Pittsburgh formation of the Monongahela group. These are the Fishpot and Redstone limestones. No red beds or marine shales occur in the Monongahela group. More conspicuous and traceable units of the Pittsburgh formation such as certain sandstones, limestones, and coal beds have been named but shales and clays for the most part remain unnamed.

Pittsburgh Formation

The Pittsburgh Formation contains five members: The lowest unnamed member, the Redstone, Fishpot and Sewickley members, and an upper unnamed member. In southern Somerset County, the upper two members and most of the next member below have been removed by erosion. The three members remaining in southern Somerset County contain approximately 200 feet or more of beds. In adjacent Fayette County, the units total 120 to 150 feet in thickness. The same three units in Washington County where they were named contain only about 130 feet of strata.

Lower (Unnammed) Member

The lower member of the Pittsburgh formation contains the well-known Pittsburgh coal, the Blue Lick coal, the Redstone limestone, and shales and sandstone which intervene between these units. This unit is thicker in Somerset County and contains more units than it does in Fayette County. This has produced some problems in identifying coal beds and associated strata. For example, the coal which has been known as Redstone in the Berlin syncline is not considered that by the writer who identifies it as the seam lying between the Pittsburgh coal and the true Redstone and applies a local name "Blue Lick coal" to it. The seam has been incorrectly called Redstone in Somerset County because it lies at about the same distance above the Pittsburgh coal (40 feet) as does the Redstone coal in its type area in Fayette County. The Blue Lick coal does not occur as a minable seam, if at all, in Fayette County where the whole Monongahela sequence is thinner than in Somerset County.

The Pittsburgh coal seam occurs in three different areas of Somerset County. Two are in the Berlin syncline and the third is in the Wellersburg syncline in the extreme southeastern part of the county. An area of so-called big vein coal (thick Pittsburgh) where thickness of about ten feet is common occurs southwest of Meyersdale from the Shaw Mines area through Coal Run through Niverton. Northeast of Meyersdale a second Pittsburgh coal area occurs. There the coal is generally three to four feet thick and is known as the Pine Hill #2 coal. The relative thinness for the Pittsburgh coal in the Pine Hill area is attributed to the disappearance of an upper bench which is present southwest of Meyersdale but not at Pine Hill. It is known that the upper bench is the part of the seam which appears northeastward because the lower two benches are separated by a diagnostic parting which can be recognized both northeast of Meyersdale in the thin Pittsburgh coal area and southwest of Meyersdale in the thick Pittsburgh coal area.

The third occurrence of Pittsburgh coal is in the vicinity of Wellersburg near the north end of the Georges Creek syncline of Maryland. The seam there is also known as the "Big Vein" because of its relative thickness. The Pittsburgh coal occurrence in the Wellersburg / Georges Creek syncline marks the eastern most occurrence of this seam in the northern Appalachian area. East of there it has been eroded, even in the Broad Top area, where the highest hills do not reach the level of the Pittsburgh coal bed.

Big Vein coal in southern Somerset County has been essentially exhausted by mining which was at its peak during World War I. Although, reportedly, there is abundant coal left in pillars and as "bottom coal" which was wastefully left in the ground and cannot now be profitably mined nor will it be minable in the foreseeable future. In recent years there has been some recovering of outcropped coal by strip mining but coal of this type is now practically depleted. The Pine Hill #2 coal is still being actively mined, however.

In the Berkley's Mill and Good Town areas northeast of Meyersdale, a "rider" coal lies about 17 feet above the Pittsburgh seam. Shale and some interbedded sandstone generally occur in intervals between these two seams. Ironstone nodules are also common in these beds. In a few places, the interval contains mostly sandstone whose identity is uncertain. The thickness of the "rider" coal ranges from a few inches thick to over twenty inches thick; and lies about halfway between the Pittsburgh coal and the base of the Blue Lick coal. The Blue Lick coal is a multi-benched coal with interbedded shale and coaly shale, totalling as much as twenty feet thick in some places. The minable portion of the Blue Lick coal is about four feet thick and occurs at the base. The minable thickness is so persistently close to four feet in the Berlin area that the bed is known there as the "four-foot seam." The overlying minor benches above the main bench lack sufficient thickness and persistence to be commercially mined.

The Blue Lick coal is incorrectly known to coal operators in the Berlin and Meyersdale areas as the Redstone coal. The most likely reason for this is the identification of this bed as the first minable coal seam above the Pittsburgh. In neighboring Fayette County, this bed happens to be the Redstone coal. In Somerset County, however, this is not the case. The Blue Lick coal in Somerset County represents an extra seam in a thicker Monongahela section, and probably is not represented in Fayette County. The seam locally known as Pine Hill #1 is the seam that is generally identified as the true Redstone Coal, one which is underlain by a bed of limestone known as the Redstone limestone. The name Blue Lick is selected for the minable seam lying between the Pittsburgh and the Redstone coals because the seam has been mined along the valley of that name which heads in the Pine Hill area between Berlin and Meyersdale and joins the Casselman River Valley between Meyersdale and Garrett.

The Blue Lick seam has also been mined in the Coal Run, Shaw Mines, and Niverton areas. The interval between this coal bed and the top of the Pittsburgh coal increases northeasterly in the Berlin syncline. It is a minimum of five feet at Niverton, increases to 25 to 30 feet in the Coal Run area and to 40 or 50 feet at Shaw Mines. The latter interval is maintained in the vicinity of Pine Hill which is as far north eastward as the Blue Lick coal can be traced.

The interval between the uppermost bench of the Blue Lick coal and the lower most bench of the Redstone limestone is usually filled with a few feet of shaly strata but in the Coal Run / Shaw Mines area it is common to find a sandstone bed in this position. This may be the equivalent of the Pittsburgh sandstone. The sandstone in places cuts down through part of the Blue Lick coal and presumably cuts through the entire coal bed somewhere, although no exposure of this has been seen. The sandstone is coarse-grained to conglomeratic and is speckled with yellowish to brownish spots which probably represent weathered feldspar fragments. The distinctive appearance of this sandstone makes it useful as a stratigraphic guide in the vicinity of Coal Run.

The Redstone limestone underlies the Redstone Coal and occurs 30 or 40 feet above the Blue Lick Coal. The limestone is exposed in the upper highwall of several strip mines in the Blue Lick Coal in the Berlin syncline northeast of Meyersdale. The limestone is approximately 10 feet thick, is bluish-gray and is dense to finally crystalline. It weathers to a buff or light-yellowish color. In the upper part of the unit, shaly limestone is interbedded with limestone. The lower part is composed primarily of bedded limestone. Ostracodes are fairly abundant in the Redstone limestone.

The interval between the Redstone limestone and the overlying Redstone coal is usually filled by a few feet of a very plastic clay. There is a suggestion in surface exposures that this clay may be a residual from a solution of argillaceous limestone in recent geologic time. It might, however, represent a typical underclay and not be related to the solution of the limestone.

Redstone Member

This is a 60-foot unit which includes the strata from the base of the Redstone coal to the top of the Fishpot limestone; these two units are the only named beds in the member. This member as well as the Fishpot member above occur only in the deeper parts of the Berlin syncline in the high terrain about three miles southwest of Meyersdale and/or five miles northeast of Meyersdale.

The Redstone coal is known locally as the Pine Hill #1 coal. It lies from 85 to 90 feet above the Pittsburgh coal, and an average of 30 feet above the Blue Lick coal. This Blue Lick coal - Redstone coal interval is shorter than average in the Pine Hill area and above average in the Coal Run area whereas the Pittsburgh coal - Redstone coal interval remains fairly constant throughout the Berlin syncline. The Redstone coal has been mined most extensively in the vicinity of Pine Hill and Good Town and north of Berkleys Mill where its minable thickness averages 44 inches. South and west of the Casselman River, the coal thins to about two feet thick and has not been mined to any great extent.

The units overlying the Redstone coal are not well exposed in southern Somerset County, but the section appears to be made up mostly of shale. In some exposures, a non-persistent six inch coal seam (Redstone "rider" coal) occurs from 25 to 35 feet above the Redstone coal. North of Berkleys Mill a few feet of sandstone overlies the Redstone coal. The sandstone cuts down into the shaly coal beds immediately above the Redstone coal in places, but does not cut into the minable part of the Redstone seam in the few exposures which were seen.

The Fishpot limestone, the top bed in the Redstone member, occurs in the deeper parts of the Berlin syncline in an elevation of approximately 2,300 feet. This is a bedded freshwater type of limestone. It has been quarried north of Boynton, west of Meyersdale, and in the Pine Hill - Good Town area. In all of these locations, the limestone is at least six feet thick. At one location nine feet of limestone was quarried. The limestone is dark bluish-gray and dense to finally crystalline. Calcite shards are fairly common. Thin, shaly limestone interbeds are generally present as are some silty limestone beds. It contains ostracodes and *Spirorbis*. Its yellowish and buff-weathering color is like that of other freshwater limestone of the Pennsylvanian system.

Fishpot Member

Due to erosion, only about 40 feet of the upper beds of this member remain. Only the lower Sewickley coal and the Sewickley sandstone have been recognized.

The lower Sewickley coal either lies directly on top of the Fishpot limestone or is separated from it by a few inches of clay. It is not known whether this clay represents true underclay or whether it is residual clay from a solution of the somewhat clayey limestone. The latter may be true. This clay appears to have the same properties as that found between the Redstone limestone and the overlying Redstone coal. Both clays are very plastic and free from sand and do not contain plant impressions as do typical underclays.

Five exposures of the lower Sewickley coal were found in the high terrain of the Berlin syncline southwest of Meyersdale and in the Pine Hill area. Stratigraphically, the coal lies about 150 feet above the Pittsburgh coal. It ranges between 1 ½ and 2 ½ feet in thickness and averages about 2 feet. The lower Sewickley coal is highly weathered in all exposures found. It appears to have no partings.

Hickok and Moyer (1940) described an upper Sewickley coal bed which lies above the Sewickley sandstone in Fayette County. It is not known whether the upper Sewickley coal is present in southern Somerset County. If so, the area of coverage is very small. According to Hickok and Moyer, it lies from 20 to 50 feet above the lower Sewickley coal in Fayette County, and the Sewickley sandstone lies between the two seams.

The Sewickley sandstone is the highest bed exposed in southern Somerset County. It is present on the hilltop three miles southwest of Meyersdale at a location which is structurally in the deepest part of the Berlin syncline. It crops out in the bed of a secondary road at elevation 2,300 feet and is also represented by fairly abundant float in adjacent fields. It is very commonly medium to coarse-grained, fairly quartzose sandstone which is quite friable in the weathered outcrops. The Sewickley sandstone also occurs in the high terrain in the vicinity of Pine Hill and Good Town at elevations between 2,300 and 2,400 feet, about 170 feet above the Pittsburgh (Pine Hill #2) coal. Good exposures are not common but considerable sandstone float at its stratigraphic position is present. The thickness of the sandstone is not accurately known, but probably ranges along the order of 15 to 20 feet.

Quaternary Alluvial Deposits

The larger stream valleys of southern Somerset County generally tend to contain unconsolidated alluvial deposits of geologically recent origin. These deposits cover the underlying bedrock on which they have been deposited. The volume of the alluvium is usually proportional to the size of the stream, except where streams flow through gorges. There, alluvium has not accumulated. Most of these deposits occur in flood plains near the level of present streams, but some occur as terraces several feet above present flood plains, having been deposited when streams were flowing at a higher elevation.

These alluvial deposits are common in patches in the Casselman Valley from West Salisbury to Meyersdale, in the vicinity of Confluence where the Casselman River, Youghiogheny River and Laurel Hill Creek join, and along Laurel Hill Creek in the vicinity of the lower Humbert and King bridges.

Paleocurrent Studies

Introduction

In order to aid in the interpretation of the area's sedimentary history, primary bedding structures were studied.

The east-west trending area of Pennsylvanian rocks between Laurel Hill and Allegheny Mountain were studied by Balsinger (1960), and the area east of Allegheny Mountain was worked by Leeper (1916).

The cross-stratification of approximately twelve sandstone members in the Pennsylvania system, and at least that many more in the Mississippian and Devonian strata, were investigated. These sandstones ranged stratigraphically from those of the upper Devonian Jennings Formation to those of the Pennsylvanian Monongahela Group. Observation stations were more closely spaced in the Devonian and Mississippian outcrop areas than in those of Pennsylvanian because exposures were better and more numerous in the former. The upper Devonian Catskill Formation provided a greater abundance of primary bedding structure information than any other formation on the mapped area.

Procedures

In the Jennings and Catskill strata, two cross-stratification azimuths per square mile were measured, but in the Mississippian and in the Pennsylvanian rocks this sampling density could not be maintained even though practically every suitable outcrop was used as an observation station. Two azimuth measurements per outcrop (actually 1.93) were made by Leeper in the eastern area and eight measurements per outcrop (actually 8.3) were made by Balsinger in the western area. At the completion of the study it was concluded that the main paleocurrent flow direction determined on the basis of two readings per outcrop is as accurate as that determined on the basis of eight readings per outcrop.

At each observation station, not only azimuths of cross-stratified sandstone beds were measured, but the sandstone was also sampled and later described using binocular microscope techniques. Color, grain size, and grain roundness were described, and a rough estimate of mineral percentages was made.

Tilt corrections were made for all strata having a regional dip of more than five degrees. This was necessary only in the area east of Allegheny Mountain where the Deer Park anticline and the Wellersburg syncline are present.

Statistical treatment of data included the preparation of circular histograms to show modes and mean cross-stratification directions of each formation (Jennings, Catskill, Pocono, etc.). Vector summation was used to calculate mean azimuths of readings from each outcrop. For calculating mean azimuths of cross-stratification in larger stratigraphic units of formational rank, the Tukey test which includes vector summation as well as Chi-square for testing the statistical significance of the resultant mean was used. The consistency ratio, a sensitive measure of azimuth's dispersion (Curray, 1956) was also determined for each formation.

Results of Cross-stratification Measurements

Cross-stratification directional studies of sandstones ranging in age from upper Devonian through Pennsylvanian show vector means ranging from 233° for the Mississippian Mauch Chunk sandstones to 58° for the Pennsylvanian Allegheny sandstones. Other vector means for the Devonian, Jennings and Catskill Formations, the Mississippian Pocono Formation, the Pennsylvanian Pottsville and Allegheny Groups, and the Pennsylvanian composite of Leeper (1960, 1963) all fall within the northwest quadrant suggesting that the direction of sediment transport from late Devonian time through Pennsylvanian time in southern Somerset County was northwesterly.

These results are in agreement with those of Rich (1951), Pelletier (1958), Nickelsen (1958), and Williams (1959), who have made either local or regional studies of variously Paleozoic stratigraphic units in the Pennsylvania-New York-Maryland area. Rich (1951) found that flow markings in the Chemung (probably equivalent to the Jennings in part) in northwestern Pennsylvania about 45 miles southwest of Ithaca, New York reveal a current flow towards the west. Pelletier (1958), in a regional study of the Pocono in Pennsylvania and Maryland found a vector mean of 290° for its crossbed dip azimuths. For the localized area in which Leeper worked, he found a vector of 292° for the same stratigraphic unit, indicating that a local cross-bedding study can have regional implications, at least for a wide spread unit like the Pocono. Nickelson (1958) calculated a grand vector mean of approximately 315° for Pennsylvanian sandstone (mostly Allegheny) in parts of Clearfield and Centre Counties, Pennsylvania. By comparison, Leeper found a vector mean of 321° for Pennsylvanian sandstones of the Wellersburg syncline in southern Somerset County. Williams (1959) who studied cross-stratification of Pottsville and Middle Allegheny sandstones on a regional basis in western West Virginia found vector means of 227° for the Pottsville and 341° for the middle Allegheny, whereas Balsinger obtained vector means of 296° and 58° for Pottsville and middle Allegheny sandstones respectively in southern Somerset County.

All of the above who have worked with stratigraphically complex Pennsylvanian rocks have found considerable dispersion of mean current directions in individual sandstone members. Such dispersion could be caused in part by measurements in sandstones of meandering channel type, and perhaps to some extent because of miscorrelation of sandstone beds. The sandstones which one must deal with are in the order of twenty to thirty feet thick, are generally less than fifty feet apart, are lithologically similar, and are difficult to identify. Generally, they are identified only after the coal seam with which they are associated with is identified. It is obvious that cross-stratification studies in these individual sandstone members are not meaningful unless one can be reasonably sure that he is dealing with the same sandstone from outcrop to outcrop, and such assurance is only possible where detailed stratigraphic work has either been done in advance or is done during the cross-stratification study itself. For most parts of western Pennsylvania, the requisite stratigraphic work has not been done. If the details of Pennsylvanian paleography are to be worked out for Pennsylvania and adjacent states of the northern Appalachian region, a great deal more stratigraphic work combined with primary bedding structure studies is needed.

In southern Somerset County and in Clearfield and Centre counties (Nickelsen, 1958) where the stratigraphic succession is fairly well known, cross-stratification studies indicate a shift in paleocurrent direction from westerly in late Pottsville to easterly in the early Allegheny time and back to northerly in late Allegheny-early Conemaugh time. Whether this holds true for other parts of the state and the northern Appalachian in general is not yet known. Further work to test these results should be done.

It seems clear from regional studies to date that a source area for late Paleozoic sediments lay to the southeast of Somerset County. Pelletier (1958) places the source area for the Pocono formation in the vicinity of Atlantic City, New Jersey, and indicates that this upland source had a northeast-southwest orientation. Localized studies including the present one also indicate a southeast source for late Paleozoic rocks although paleocurrent mean directions range from southwesterly to northeasterly. This range could result from heavily weighted local measurements of deposits such as meander sandbars of the delta distributary sands. In southern Somerset County the fact that no vector means in units of formational rank fall in the southeast quadrant indicates a northwesterly direction of transport in late Paleozoic time. This is in accord with the regional picture reported by other writers.

Structural Geology

Structural Features

Folding

Southern Somerset County lies within the Allegheny Mountain section of the Appalachian Plateaus Provence, the eastern edge of the mapped area being at the extreme eastern edge of the plateau. This part of the plateau contains flexures of moderate intensity having a dominant trend between north 30° east and north 35° east; although there are minor structures in the western part of southern Somerset County which have a more northerly trend. Folds become more accentuated eastward. No generalization can be made that in each fold one flank is steeper or more general than the other except that the Berlin and Wellersburg synclines have steeper east flanks than west flanks. Flank dips in the major structures of the western part of the mapped area are on the order of 4 or 5 degrees but in the eastern portion, dips into the 10 and 20 degree range are common, and on the east flank of the Wellersburg syncline and the adjacent Bedford County, vertical dips and some overturning are present.

From west to east across southern Somerset County, the major structural features are: 1.) Laurel Hill anticline (east flank only), 2.) Lower Youghiogheny-New Lexington synclines which are en echelon, 3.) Centerville Dome, 4.) Negro Mountain anticline, 5.) Berlin syncline, (Casselman syncline of Maryland), 6.) Deer Park anticline, and 7.) The Wellersburg syncline (Georges Creek syncline of Maryland). East of the Wellersburg syncline, a prominent anticlinal structure, the Wills Mountain anticline, occurs in Bedford County and in Maryland. This represents the structural front of the Appalachian Mountains.

Laurel Hill Anticline

Laurel Hill is an anticlinal ridge whose topographic and structural crests lie in Fayette County within a mile west of the Somerset County line. Strata on the east flank of Laurel Hill Anticline dip at an average rate of about four degrees toward the lower Youghiogheny and New Lexington synclines. This is steeper than the slope of the ground surface so that progressively younger rocks are encountered down the slope of the ridge. The Mississippian Mauch Chunk formation crops along the ridge top and extends down the east flank in fingerlike belts along the deeper valleys, with Pottsville rocks occurring along the inner valley spurs. The Pottsville itself extends from the spurs down into the valley of Laurel Hill Creek in several places, Laurel Hill Creek being the stream which flows southerly along the outer, east flank of the anticline. Allegheny rocks appear on the spurs along this outer flank, and even small patches of Conemaugh rocks occur on the higher knobs of these spurs.

The maximum structural relief on the east flank of Laurel Hill anticline is 1,900 feet and occurs between the crest of the structure in Youghiogheny River Gorge through Laurel Hill and Confluence. The minimum relief of about 1,200 feet occurs between the village of Kingwood and the anticlinal crest to the west.

Lower Youghiogheny Syncline

The lower Youghiogheny syncline occurs in the Confluence-Humbert area in the southwestern part of Somerset County. It is an extension of the structure of the same name from the Friendsville, Maryland area into Pennsylvania. The syncline is bordered on the west by Laurel Hill anticline and on the east by Negro Mountain anticline. At its northern end it is offset to the east in the Kingwood area and from there continues northeasterly in the form of the shallower New Lexington syncline.

From Confluence to the Pennsylvania-Maryland boundary the axis of the lower Youghiogheny syncline lies about one-half mile east of the Youghiogheny River except at Horseshoe Bend where the axis crosses the river. From there, it continues north-northeasterly between Confluence and Ursina, and passes west of Humbert to Laurel Hill Creek west of Kingwood where it terminates. The syncline is a rather broad-bottomed structure, the deepest part of which lies in the Klondike Ridge–Horseshoe bend area one mile south of Confluence. From there the synclinal axis rises at an average rate of eighty feet per mile to its termination west of Kingwood. In the offset area between the northern end of the lower Youghiogheny syncline west of Kingwood in the southern end of the New Lexington syncline, the structure is relatively high. This local high can be described as a structural terrace on the lower east flank of Laurel Hill anticline at the offset position between the two synclines. Topographically this feature is expressed by relatively high plateau-like terrain. A resistant sandstone in the Conemaugh Group, the Saltsburg sandstone is found either in outcrop or more commonly as sandstone rubble around the rim of this area.

The New Lexington syncline is offset to the east of the lower Youghiogheny syncline by a distance of about four miles. The New Lexington syncline continues northeasterly from the New Lexington area into the Somerset quadrangle where Richardson (1934) refers to it as the Johnstown syncline. Southward, the identity of the New Lexington syncline disappears at the Casselman River near the village of Fort Hill.

Centerville Dome

The so-called Centerville Dome is in reality an elliptical, doubly plunging anticline similar to the Boswell Dome in the Somerset quadrangle (Richardson, 1934) but with less structural relief. The Centerville dome is a local high developed on the broad west flank of Negro Mountain anticline. Richardson (1934) shows more than 400 feet of closure on the Boswell Dome, whereas there is between 100 and 200 feet of closure on the Centerville Dome. Accurate determination of the closure on the latter dome was made difficult by lack of information in certain places, particularly at the northeast end where outcrops are scarce and generally uninformative. The domal structure terminates on the south at the Casselman River about halfway between Rockwood and the village of Casselman. South Glade Run Valley is developed along the higher part of this domal structure. On both the east and west flanks of the structure, the beds dip at a rate of about 200 feet per mile, steeply enough so the dip measurements at individual outcrops as well as elevations on key beds can be used in mapping the structure.

An elongate belt of Allegheny Rocks occurs in the Centerville Dome along the shadow valley of South Glade Creek. The upper Freeport coal bed has a gentle dip and relatively thin overburden in this belt, and has therefore been rather extensively strip mined.

Negro Mountain Anticline

Negro Mountain is a prominent northeast trending anticline which divides southern Somerset County into two essentially equal parts. Structures east of the anticline are more intense than those to the west. This anticline is most prominent in the southwestern part of the area where both its structural high point and its topographic high point (Mt. Davis, the highest point in Pennsylvania at 3,213 feet) occur, although they do not exactly coincide. The topographic expression of the structure becomes less pronounced northeastward and flank dips become more gentle in that direction also. The anticline is fairly symmetrical in the southern part of the area but is quite asymmetrical in the northern part, with the east flank being steeper than the west. Flank dips on the order of 6 to 7 degrees are present on both the west and east flanks in the Listonburg and Springs areas, with the west having a slightly steeper dip. The greatest asymmetry of the fold occurs south and southeast of Somerset. There the strata on the east flank in the vicinity of Brotherton, for example, dip at a rate of about 4 degrees, whereas on the west flank around Route 219, they dip at a rate of less than one degree. It is in the Centerville area on the west flank of Negro Mountain anticline that the domal structure previously described has developed. Between Centerville and the crest of the anticline there is a broad belt of Allegheny rocks broken only here and there by patches of Conemaugh strata.

The maximum structural relief of Negro Mountain anticline is found in the southern part of the area. A relief of about 2,600 feet occurs between Confluence and the crest of the anticline near Mt. Davis, and essentially the same relief occurs between the anticlinal crest and Meyersdale on the opposite flank. The frontal structural high point at the southern edge of the mapped area and the anticlinal axis has a continuous northeast plunge. The total plunge is about 1,250 feet; the average plunge is slightly more than 50 feet per mile. In the Berlin-Blackfield area on the east flank of the anticline, the structural relief is about 1,400 feet, whereas in the Rockwood-Blackfield area on the east flank it is only about 700 feet.

A good cross section of Negro Mountain anticline may be seen along the Casselman River which has cut a deep gorge normal to the trend of the structure between Garrett and Rockwood. In this gorge, rocks at the Allegheny Group are exposed at the extremities, and in the center of the axis at the anticline, rocks as low as the upper Pocono formation are exposed. There are excellent exposures on both sides of the Casselman River of the Mississippian Loyalhanna limestone in the axial area.

Negro Mountain anticline has been breached in several places, the most prominent ones being in the Casselman River Gorge described above, in the vicinity of Mt. Davis in the head water areas of Cove Run and Glade Run, and along Puzzley Run in Whites Creek Valley. In Whites Creek Valley, strata as low as the Devonian Catskill Formation are exposed. This is the only exposure of the Catskill Formation in southern Somerset County west of the Allegheny Mountain except for a small patch in the Youghiogheny Gorge through Laurel Hill. There is also a rather extensive arcuate outcrop belt of the Mississippian Pocono and Mauch Chunk Formations in the Mt. Davis area. It is there that the Wymps Gap (Greenbrier) and Deer Valley limestones of the Mauch Chunk Formation are exposed at several localities.

Several axial valleys are found along the crest of Negro Mountain anticline. The most prominent of these are: 1.) Lick Run Valley, a tributary to the Casselman River Valley, 2.) the head water portion of Iser's Run Valley northeast of Mt. Davis, and 3.) the valley of Shoemaker Run, a tributary of Whites Creek Valley. The first two of these streams flow northeasterly in the down-plunge direction of the anticlinal axis, but the third, Shoemaker Run, flows southwesterly in the up-plunge direction. All of these valleys coincide closely with the axis of the anticline.

The youngest strata exposed along the Negro Mountain anticline in southern Somerset County are strata of the lower Conemaugh Glenshaw Formation which cap a hill about four miles southeast of Somerset. Pottsville rocks are at the surface along the anticlinal trend from Blackfield southwestward. The most extensive Pottsville area is on the west flank of the anticline from the Fire Tower north of Mt. Davis westward to the Casselman River, but the group is also exposed on both the west and east flanks to the north and south. Along the Pottsville Belt it is common to find a litter of sandstone rubble. This is also true of the lower Allegheny outcrop belt because both the Pottsville and lower Allegheny contain massive sandstones which weather out into sizable blocks. In places, Pottsville sandstones like the Connoquenessing and Homewood, and Allegheny sandstones like the Clarion, Kittanning, and Worthington form long, even slopes which are essentially dip slopes in the wooded terrain on both flanks of the anticline. Mt. Davis, the highest point in Pennsylvania, occurs on a homoclinal Pottsville ridge on the east flank of Negro Mountain anticline. The Homewood sandstone of the upper Pottsville underlies the high point and other points of the ridge north and south of the high point.

Berlin Syncline

The Berlin syncline is an asymmetrical fold occurring between the Negro Mountain and Deer Park anticlines. It is a continuation of the Casselman syncline of western Maryland. The axis of the syncline passes through Bittinger and just east of Grantsville in Maryland, and in Pennsylvania just west of Salisbury and Meyersdale, past the east edge of the village of Berlin as far as Cairnbrook in the Windber quadrangle to the northeast where it dies out as does the Negro Mountain anticline. The southern termination of the synclinal structure is near McHenry on Deep Creek Lake in Maryland.

Strata on the east flank of the Berlin syncline in southern Somerset County dip about twice as steeply on the average as those on the west flank, that is at angles of about 8° and 4°, respectively. From Cairnbrook to the Pine Hill area in Brothersvalley Township where one of the deeper parts of the syncline occurs, there is a continual plunge of the axis at an average rate of about 70 feet per mile. There is a slight "hump" in the axis at Blue Lick Creek north of Meyersdale. From there southwestward the southwest plunge continues into the deepest part of the syncline at the position of the hill between Meyersdale and Summit Mills. From the steepest part of the syncline the axis rises gently southwestward into Maryland at a rate of about 40 to 45 feet per mile. This rate increases to more than 150 feet per mile at the nose of the structure near McHenry, Maryland.

The Monongahela Group, with the Pittsburgh coal at its base, is preserved in the central and deepest parts of the Berlin syncline. The largest area of Monongahela rocks lies between Meyersdale and Salisbury. Other Monongahela areas occur at Pine Hill and Berlin. Small patches are also found on hilltops north of Berlin and southwest of Salisbury. The patch of Pittsburgh coal at Niverton near the Maryland boundary represents the southernmost occurrence of this bed in the Berlin syncline. From there southward the northeast plunge of the structure causes older strata to appear at the surface from the state line to nose of the syncline east of McHenry, Maryland. The small outlier of Pittsburgh coal two miles north of Berlin similarly represents the northernmost occurrence of the bed in the Berlin Syncline. Conemaugh and Allegheny rocks are found along the axis of the syncline from there to Cairnbrook.

The highest stratigraphic unit in southern Somerset County, the Sewickley sandstone of the Pittsburgh Formation in the Monongahela Group, occurs in the deepest part of the Berlin syncline, 1 ½ miles southwest of Meyersdale, where the sandstone caps a hill at an elevation of about 2,350 feet. Conemaugh rocks are exposed over a wider area in the Berlin syncline than those of the Monongahela Group. The Conemaugh belt ranges between 4 ½ and 6 ½ miles in width, the widest part being south of Brotherton and the narrowest part in the Garrett-Meyersdale area. The belt is of course broken in places where the Monongahela rocks overlie the Conemaugh.

Deer Park Anticline

The Deer Park anticline is a major anticlinal structure in southern Somerset County. It lies between the Berlin syncline on the west and the Wellersburg syncline on the east. Topographically the anticline is bounded by two prominent homoclinal ridges controlled by Pottsville sandstones. Allegheny Mountain is the Pottsville ridge on the west flank and Big Savage is its counterpart on the east flank of the structure.

The Deer Park anticline extends southwestward through Garrett County, Maryland into Preston County, West Virginia where it terminates. In the vicinity of Oakland, Maryland the Mountain Lake Park gas field was developed on this structure. The crest of the anticline continues from the Mountain Lake Park area northeastward through Avilton, Maryland and in Pennsylvania through Pocahontas and Wittenberg. It crosses Wills Creek at Philson on the B&O Railroad, continues through Johnsburg and just west of Glen Savage. In Bedford County in the northwest corner of the Hyndman quadrangle the anticlinal crest assumes a more easterly trend. This is where the southern end of the Schellsburg dome, a doming on the Deer Park anticline, merges with the nose of the Wellersburg syncline. Farther to the northeast the Nittany arch is an anticlinal fold on the same structural trend.

Throughout most of southern Somerset County the Deer Park anticline is a fairly symmetrical structure. Dips on both flanks average close to 18° and range from 12 to 30°. Although none of the beds cropping out along the Deer Park anticline has been contoured, a conglomerate in the Jennings Formation has been mapped around the crestal area of the structure. The fact that the outcrop of this conglomerate follows rather closely the crestal zone from Pocahontas to Glen Savage indicates that there is little plunge to the structure. Northeast from Glen Savage, however, the conglomerate outcrop diverges from the crest, and continues northeasterly through New Baltimore on the west flank as the crest veers in a more easterly direction. On the east flank, the outcrop trends more easterly and extends around the nose of the Wellersburg syncline in the Hyndman quadrangle. This divergent outcrop pattern reveals a rise of the anticlinal axis to the northeast, a rise which continues to the crest of the Schellsburg dome about 13 miles to the northeast.

Along the central part of the Deer Park anticline, the Jennings Formation is exposed in a belt from 3 to 5 miles in width. Flanking the Jennings on both sides are two elongate belts of Catskill red beds. The belt on the east flank averages about 1 mile in width, the one on the west side about 1 ¼ miles in width. The Catskill belts are in turn flanked by the Pocono Formation which is a minor ridge-former. The Pocono ridge on the east flank is known as Little Savage Mountain; on the west flank, there is a less conspicuous unnamed ridge broken in several places by transverse stream valleys. Between the Pocono ridges and the bounding ridges of the Deer Park anticline (Allegheny Mountain on the west flank and Big Savage Mountain on the east flank), narrow strike valleys are developed in the Mauch Chunk and upper Pocono Formations. Red soil from the Mauch Chunk Formation is prevalent along these valleys and outcrops are scarce. Allegheny Mountain and Big Savage Mountain are both underlain be persistent Pottsville sandstones. The scarp slope of Allegheny Mountain is known as the Allegheny Front in central Pennsylvania. It lies at the east edge of a mountainous plateau containing several anticlinal ridges. In southern Somerset County, however, the "front" of the Alleghenies occurs some 10 miles east of Allegheny Mountain at the position of Little Allegheny Mountain on the east flank of the Wellersburg syncline, a syncline which exposes coal-bearing Pennsylvanian strata as do others farther west in the plateau.

Wellersburg Syncline

The Wellersburg syncline lies in the southeast corner of Somerset County. It is only a part of the syncline whose main occurrence is in Garrett and Allegheny Counties, Maryland where it is known as the Georges Creek syncline north of the Savage River and as the upper Potomac syncline south of the Savage River. These different names are applied to this feature for geographic, not structural, reasons. The upper Potomac syncline extends southwestward through the corner of Garrett County, Maryland into Grant and Tucker Counties, West Virginia where it splits into two parts, the North Potomac and Stony River synclines which are separated by the Blackwater anticline. The Wellersburg syncline terminates on the north in western Bedford County, Pennsylvania east of New Baltimore where the nose of the structure merges with the east flank of the Deer Park anticline.

The Wellersburg syncline is the most intensely folded structure in southern Somerset County. It is an asymmetric syncline whose eastern flank is considerably steeper than its western flank. Dips of 15 to 20° are common on the west flank. On the east flank along Gladdens Run the dip rapidly increases from 25° on the Somerset side of the county line to 80 to 85° on the Beford side. Down Gladdens Run through the Jennings outcrop belt some overturning of beds is also present.

The axis of the Wellersburg syncline extends southwestward from Wellersburg through Frostburg, Maryland. Northeastward the axis crosses Gladdens Run at Kennells Mill and passes just east of Comps Church. It crosses Wills Creek between Williams and Hoblitzell (Bedford County) and continues northeastward on a trend which causes it to intersect the axis of the Deer Park anticline about a mile south of New Buena Vista near the north edge of the Hyndman quadrangle. Structure contours on the upper Bakerstown coal in the Conemaugh Group show an axial plunge from the Somerset County-Bedford County line at Kennells Mill at a rate of 160 feet per mile. From there to the ridge ¾ of a mile northeast of Wellersburg there is a leveling of the axis, but the southwest plunge is resumed at Wellersburg and continues into Maryland. As the axis rises northeasterly, progressively older strata are exposed in the syncline. The youngest beds cropping out are those of the Pittsburgh Formation in the lower Monongahela

Group whose basal bed is the Pittsburgh coal seam. These strata are found ¾ of a mile northeast of Wellersburg on a ridge which is sufficiently high topographically and low structurally to be capped by these beds, whereas at Wellersburg, which is located in a valley, the overlying Conemaugh rocks are exposed.

Conemaugh rocks are more widespread than those of any other formation in the Wellersburg syncline. The Conemaugh belt is nearly 4 miles wide at Wellersburg but narrows to the northeast and disappears one mile south of Wills Creek where the rocks of the Allegheny Group appear at the surface. On the west flank of the syncline, the Allegheny belt ranges from ¼ to ¾ of a mile in width; on the east flank it is less than ¼ of a mile in width. The narrowness of this belt on both flanks of the syncline, is, of course, related to the thinness of the Allegheny Group, but also to the relatively steep dip of this syncline. Because the Allegheny Group occurs on the steep topographic slopes of Big Savage and Little Allegheny Mountains, and occurs downslope from the sandstone-bearing Pottsville Group, the Allegheny rocks are largely obscured by debris from the upper slopes. This condition has led to erroneous naming of coal beds in the Wellersburg syncline. Minable Conemaugh coals which crop near the center of the syncline and are therefore more accessible have been incorrectly identified as Allegheny coals by landowners and coal operators of the Wellersburg area.

The Allegheny outcrop belt is broken at Wills Creek where the stream has eroded through these rocks to the underlying Pottsville and Mauch Chunk strata. North of wills Creek there is a patch of Allegheny rock which extends into the valley of Gooseberry Run in Bedford County. The Pottsville outcrop occurs on the in-facing slopes of the crests of Big Savage and Little Allegheny Mountains. Sandstones of both the Pottsville and lower Allegheny Groups in places form dip slope type topography on the east slope of Big Savage Mountain. On the crest of Little Allegheny Mountain the sandstone bed in the lower Allegheny Group, dipping nearly vertically, forms old hogback-like outcrops. Where the Pottsville outcrop crosses Wills Creek, an hourglass outcrop pattern has developed as a result of a peculiar structural topographic situation. Wills Creek is deeply incised into the terrain and cuts transversely across the synclinal nose so that the Pottsville outcrop belts of both flanks converge from the northeast and southwest and merge at Wills Creek Valley.

As the Wellersburg syncline is traced farther northeastward into Bedford County, the Pottsville rocks at the nose of the structure form a topographic high known as Mount Nebo. Beyond the Pottsville outcrop there are successive arcuate belts of Mauch Chunk, Pocono, Catskill and Jennings appearing at the surface because of the continuing rise of the synclinal axis. There is a direct relation between drainage, structure, and stratigraphy in this area. For example two resistant conglomeratic zones in the Jennings Formation form arcuate ridges whereas the associated valleys are developed in less resistant shales, siltstones, and minor sandstones. Drainage control is well exemplified also by Wolf Camp Run, which flows in an arcuate belt of Catskill rocks around the nose of the Wellersburg syncline, the apex of the arc being close to the axis of the structure. Other stream valleys, such as that of Little Wills Creek, show a similar relation but less markedly.

Faulting

Surface evidence of major faulting in southern Somerset County is essentially absent. This does not necessarily mean, however, that major faults are not present. Exposures are so sparse and generally so poor that major faulting, particularly strike faulting can go unnoticed. The continuity of ridges like Allegheny Mountain, Little and Big Savage Mountain, and Little Allegheny Mountain suggests that, at least in the southeastern part of the area, there are no major displacements of transverse type.

Subsurface drilling for natural gas has proved that faulting of considerable magnitude occurs at depth. More and more evidence is accumulating from regional subsurface studies to indicate that major sole faults occur in incompetent shale or salt sequences, both in the Plateau and in the Valley and Ridge provinces. Both reverse faults and normal faults branch off from these sole faults to produce very complex local structural situations at depth in the incompetent sequences.

In southern Somerset County surface evidence of minor faulting on Negro Mountain anticline was noted at several places, mostly in the highwalls of open-pit coal mines. On the east flank of this structure, faults with small displacement were seen at two upper Freeport coal mines west and southwest of Brotherton. At a mine two miles west of Brotherton, the highwall reveals a normal fault with a vertical displacement of six inches. The fault planes dips westward at an angle of 50° to 60°. A mine four miles southwest of Brotherton, located about 1,000 feet east of the anticlinal axis shows a thrust fault with a displacement of a few inches. This fault plane dips southwesterly at a 40° angle. At the crest of the Negro Mountain anticline where the Pennsylvania Turnpike crosses the structure, a reverse fault cuts the upper Freeport coal. Kuhn (1952) describes this faults as having a strike of North 53° East and a dip of 23° Southeast. Its vertical displacement is 2 ½ feet and its horizontal displacement is 4 ½ feet.

Further south along Negro Mountain anticline along the hillside south of Garrett another thrust fault cuts a rider coal above the lower Freeport coal in a strip mine highwall. The fault plane dips easterly at a steep angle. Two mile north of Garrett at Althouse where the upper Freeport coal has been mined, a normal fault with a curved fault plane dipping westerly displaces the upper Freeport "rider" coal but not the upper Freeport coal itself. This fault dies out in sandy shale about four feet above the upper Freeport coal.

Minor faulting was also found on the west flank of Negro Mountain anticline at Rockwood where the dip flattens in a minor trough between Negro Mountain anticline and the Centerville Dome. There on the west-facing slope near track level of the B&O Railroad, a small outcrop reveals a normal fault which cuts the middle Kittanning coal and its associated strata. The coal is displaced a vertical distance of at least 20 feet along a fault plane which strikes North 68° West and dips 38° Southwest. It is not known whether this fault continues into the lower Kittanning coal below but it appears to decrease in displacement upward toward the top of the exposure.

At Metzler on the lower east flank of Laurel Hill anticline a minor thrust fault was seen in the highwall of an upper Freeport coal mine. Radisi (1954) found the strike of the fault plane to be North 30° East and the dip 25° Northwest. Displacement along the fault is approximately 2 ½ feet vertically.

Abnormally steep dips have been noted at several places in the crestal area of the Deer Park anticline between Pocahontas and the Somerset County-Bedford County line. These steep dips occur in the incompetent shales and siltstones of the Jennings Formation. It is possible if not probable that these are abnormally steep dips, or at least some of them, are surface expression of faulting at depth.

At New Baltimore on the west flank of the Deer Park anticline, a cut bank on the north side of the Raystown branch of the Juniata River exposes a disturbed section in the shales and fine-grained sandstones of the Jennings Formation. A tight synclinal fold is truncated on its west flank by what appears to be a bedding plane fault dipping 20° in a North 70° West direction. The east flank probably is truncated by a parallel fault about 15 feet away, but talus debris obscures this supposed fault. Bedding on either side of this minor synclinal structure appears "normal," that is it dips west-northwest at about a 20° angle as do other beds in the New Baltimore area.

Either faulting or folding, or both, occur on the east flank of the Deer Park anticline ¼ mile north of the village of West end on Route 31 in Bedford County. There is an abrupt reversal of dip and a change of strike on the east and west sides of Route 31. The general strike at this locality is about North 45° East and the dip, 15° to 20° Southeast as shown in an exposure in the east side of Route 31. But on the west side of the highway a gully exposure shows a strike of North 25° East and a dip of 60° Northwest.

Somerset County Mineral Resources

Coal

Southern Somerset County coal beds occur in the Pennsylvanian System. The strata column is about 1500 feet thick. The Pennsylvanian System rocks are subdivided into the Pottsville and Allegheny Groups in the lower part, and the Conemaugh and Monongahela Groups in the upper part. The section contains repeating sequences of shale, sandstone, limestone, clay, and coal. The relative amounts of each bed varies somewhat throughout the column. Coal beds only make up about 10% of the total thickness, but they do have considerable economic importance in the area.

The most economically important coal beds are those contained in the Allegheny (Lower Productive Measures) and the Monongahela (Upper Productive Measures) Groups. Five minable seams occur in the Allegheny Group, spread over an interval of about 280 feet; three seams of minable quantity and quality occur in a 100 foot interval in the Monongahela Group. The minable seams in the Allegheny Group generally have a wider geographic range, and have been less extensively mined; thus the coal beds of this group are those most likely to undergo future investigation and development. The Allegheny Group contains five minable seams with thicknesses greater than 28 inches. The seams are, in decreasing order of recoverable reserves: upper Kittanning (C'), Brookville (A), upper Freeport (E), lower Kittanning (B), and lower Freeport (D). The 3 minable Monongehela Group seams are: Pittsburgh (Big Vein, Pine Hill #2), Blue Lick (sometimes incorrectly identified as Redstone coal in Somerset County), and Redstone (Pine Hill #1) coals. Little future development importance is ascribed to these beds; they have a small geographic coverage relative to those of the Allegheny Group, and the Pittsburgh seam has largely been mined out (as has much of the Blue Lick seam).

Several other minor coal beds exist within the Pennsylvanian System, and some have been mined on a small scale. The most notable of these are the lower Bakerstown (Silver Valley, Honeycomb), the upper Bakerstown (in the Wellersburg area incorrectly called the upper Freeport coal), and the Wellersburg coal. All of these seams are located within the Conemaugh Group (sometimes referred to as the Lower Barren Measures.) The lower Bakerstown coal is considered to be the most important of these seams. Although it tends to be thin (less than or equal to 28 inches thick) it is generally of minable thickness and quality over a wider area than the other two. Sisler (1932) identified Somerset as being unique among the coal-producing counties of Pennsylvania, as it contains minable coal beds occurring within the Conemaugh Group. Generally, Somerset County coals are ranked as medium-to-low-volatile bituminous. The county's reserve of these coals is one of the largest in the state. The coals find use for steam production, for domestic heating, for kiln firing, and after preparation, as metallurgical coal. Synthetic fuels production from these coals has also been considered.

Southern Somerset County's coal beds are folded into a series of anticlines and synclines. While flat-lying coal seams are unusual, most beds tend to have slight dips. Dip direction is usually northwesterly or southeasterly, lying on the flanks of folds that trend in a northeasterly direction. The axes of these folds plunge either to the northwest or southeast; this causes slight regional dips in these directions. Some coal beds in the area dip at inclinations of up to 20 degrees, but usually dips of only a few degrees are common.

In Southern Somerset County, the coal strata generally do not show evidence of dislocation or faulting; some exceptions have been noted, however, at highwalls of local mines. When they occur, the faulting is usually of the normal and thrust types. Some jointing and cleating occurs in all seams, but no measurements have been made to ascertain the strike directions of these joints. For the most part, coal seams in the area are jointed to such an extent that "block" coal (occurring when two widely spaced joint sets occur at right angles) is uncommon. Somerset County coals generally contain one or more diagonal cleats that is developed in addition to the two cleats normal to each other, producing coal that breaks up readily into small pieces when it is mined. These diagonal cleats are most prevalent in the area near the Wellersburg syncline, where the folding of the coal-bearing layers has been particularly intense.

Some coal seams contain discontinuities resulting from a lack of deposition or erosion of the coal bed and later filling of the channel. These discontinuities were found in all seams that were investigated in Southern Somerset County. These sandstone channel fillings tend to occur in a linear fashion, and can be predicted to some degree in undeveloped sections of a mining area. Sometimes core drilling can aid in locating these areas, but unless the drill spacing is very close, the technique may not be an optimal one. In most cases, the channel fillings are sandstone, but clay, shale, and siltstone have also been encountered.

Roof and floor conditions vary not only between different coal beds, but also from location to location within a given bed. In general, coals in Southern Somerset County are overlain by some sort of shale. This shale may range from a black, fissile slate, which tends to make a poor roof, to sandy shale or shaly sandstone, which makes for a much stronger roofing / flooring material. In some places, the coal bed is overlain by massive channel-type sandstone deposits. In deep mines, these sandstones make for a strong roof, but in strip mining these deposits considerably increase the cost of removing the overburden. Limestone roof rocks are uncommon, but on occasion are seen in some highwalls of strip mines exposing the Blue Lick coal.

Floor rocks are usually clays, ranging from relatively pure fireclays to sandy, impure clays. Many of the coal seams are underlain by sandstones; these may be either separated from the coal bed by a few inches of clay, or they may lie immediately below it. A good example of this is the upper Kittanning coal, which is directly underlain by the Johnstown limestone, a persistent freshwater deposit. If a coal seam contains poor quality coal in its lower layers, the lower portion may be left in place as flooring. This procedure is generally used in deep mines, but occurs in some strip mining operations as well.

Coal reserves of Southern Somerset County are presented as calculated by French (1959). A description of calculation methods and of the reserve figures in several categories according to reliability of data and coal thickness is presented in a later section of this paper. And estimate of county-wide coal reserves was made by Wallace, et al. (1953), but was based upon less geological information than those made by French.

Allegheny Coal Group Beds

The majority of Southern Somerset County's coal reserves occur within the Allegheny Group strata, covering an interval about 280 feet thick. The Allegheny Group contains thirteen seams; five of contain coal of minable thickness and quality over large areas. The remaining seams are generally thin and discontinuous, and have little commercial value. Overall, the Allegheny strata coals have been less extensively mined than the Pittsburgh seam coal, which occurs with the Monongahela Group strata. Interest in the development of the Freeport and Kittanning seams is growing, however, as both the total and easily accessible reserves of the Pittsburgh seam are extracted. The Allegheny Group coals of Southern Somerset County are also somewhat important, as they are one of the largest resources of low-and-medium volatile bituminous coal in Pennsylvania.

The Allgheny Group coal belts crop out along four northeast-southwest trending areas. The largest of these extends from Somerset to the Casselman River along the Negro Mountain anticline; the belt splits into two smaller ones that extend to the Pennsylvania-Maryland boundary. The widest extent of this main belt is about 10 miles, along a line running from Centerville, through Wilson Creek, to Beachdale. The width of the belt at this point is due to an abnormally gentle dip on the west flank of the Negro Mountain anticline, along with some arching of the strata lying in the Centerville Dome area. Narrow belts are present on the eastern flank of the Berlin syncline, as well as on both flanks of the Wellersburg syncline. A medium-width outcrop occurs where the eastern flank of Laurel Hill meets the western flanks of the Youghiogheny and New Lexington synclines.

The Allegheny coal seams are considered to be continuous from the outcrop belts on the synclinal flanks underneath the Conemaugh strata, near the axial areas of these synclines. These seams have been mostly eroded along anticlinal structures where Pottsville and older rocks appear at the surface.

Brookville Coal

The major mining area of Brookville coal in Southern Somerset County occurs near the crest of the Negro Mountain anticline at Blackfield and Wilson Creek in Black and Brothersvalley townships. Mining on a smaller scale of this seam has occurred on the eastern flank of the Laurel Hill anticline near Draketown, Scullton, and King Bridge, and along the Casselman River valley on the western flank of the Negro Mountain anticline near Fort Hill. Brookville coal mining is unimportant in the Lower Youghiogheny, Berlin, and Wellersburg synclines.

The Brookville coal is noted for being somewhat irregular in both thickness and quality. It can be difficult to distinguish this layer from the Clarion, and sometimes from the Mercer coal. Over most of the western part of Southern Somerset County, the Brookville coal has notable thickness, usually between 60 and 72 inches, and as much as 132 inches at Wilson Creek. Where the seam is thick, however, one-half of it or more is composed of non-coal-bearing material. Generally, one bench of good-quality coal exists, with a thickness of 30 to 48 inches; this particular bench is the one that is mined.

Brookville coal also contains frequent intrusions of sandstone from above. This sandstone partially replaces the coal in some places, and completely in others. These sandstone intrusions tend to be more common in the Brookville coal bed than the other seams occurring within the Allegheny Group.

Analyses of the Brookville coal may produce deceptive results. At one location, testing may reveal high-quality coal, but the bench may be impossible to selectively extract in deep mining operations. Testing may also be biased to show low-quality coal due to inclusion of the non-coal-bearing material.

The aforementioned variability of quality in the Brookville coal most likely renders the estimates of its reserves the least reliable. Large areas exist which have been excluded from the estimated reserves because of a lack of information. The area near Blackfield-Wilson Creek has been identified as the most promising for future development.

Brookville coal in the Laurel Mountain- New Lexington syncline

Brookville coal mining, from World War I to the present, has taken place at several places along Laurel Hill Creek west and north of Kingwood. The seam's thickness in this area ranges from 49 to 81 inches, with an average of about 60 inches. At the abandoned Mary Ann mine across Laurel Hill Creek near Schweibinz, the seam is about 49 inches thick. An experimental mine north of Schweibinz exists where an attempt was made in the past to neutralize the acid mine drainage present. The total thickness at the mine of the seam is 62 inches; about 30 inches of this seam was extracted during mining.

In a small abandoned mine between Barronvale and Metzler on the east side of Laurel Hill Creek, the Brookville coal seam is about 81 inches thick. Only about 29 inches of this total thickness is coal of economic quality; the rest contains high percentages of ash or noncoaly material such as shale. Some Brookville coal has been mined on a small scale for domestic usage near Scullton, where the seam thickness is about 59 inches.

In the Draketown area the thickness of the Brookville coal seam ranges from about 62 to 67 inches. One exposure is visible at Huston on the Baltimore and Ohio Railroad about 2 miles south of Draketown. The quality of the seam at this location is generally poor. Local drilling information from areas south of Huston and west of Confluence reveals a 12 to 36 inch Brookville seam. Four miles southeast of Confluence, the seam generally has a thickness of about 24 inches.

Some suggestion is present that the Brookville coal seam may extend from Draketown northeastward to the Laurel Hill Creek – Scullton area with a thickness that reaches 60 inches. The seam rises northwestward from Laurel Hill Creek toward the crest of the Laurel Mountain Anticline and crops out on the mountain's eastern slopes. This may provide several good sites for strip mining. Some locales are known to have a thin overburden, but little information is available on the occurrence, thickness, and quality of the coal, or of overburden types present. Generally, the sandstone bed overlying the Brookville coal is irregular both in occurrence and in thickness; by inference, then it is likely that some locations exist on the eastern slopes of Laurel Mountain where the Brookville coal having minable thickness and quality may be overlain by a thin overburden that may be successfully removed in a stripping operation.

Potential Brookville Coal Mining Areas

No areas of the Brookville coal occurring in southern Somerset County appear to have great importance for future development; the seam is quite irregular, it contains large amounts of noncoaly material and low-grade coal, and massive channel sandstones that occur locally extend into the seam. Some areas do exist, however, where the total bed thickness is such that one bench of minable quality and thickness probably does exist. One probable area is the locale around Blackfield and Wilson Creek, where the Brookville seam has been most extensively mined. Likely occurrences of the Brookville probably extend west toward Rockwood, eastward toward Berlin, northward to Somerset, and southward to Garrett. Traveling southwestward, this seam has been largely eroded from the crest of the Negro Mountain anticline.

At least one bench of the Brookville coal is minable in the Scullton-Metzler areaa (where the total thickness is 60 to 80 inches). Brookville coal has also been extracted at Blackfield and Wilson Creek (where the total thickness ranges from 50 to 130 inches). Isopach lines for the bed run on a north-northeasterly – south-southwesterly trend between these areas; it is probably minable in the New Lexington syncline and the Centerville Dome. Seam depth at the former area is about 200 to 250 feet, and 400 to 500 feet in the latter along Middle Creek.

In most places the Brookville shows little promise; Negro Mountain, however, contains another probable development area, on the east flank at the crest from Blackfield to Buffalo Creek valley. The upper Freeport coal is near stream level in this area, and the Brookville seam is predicted to lie about 275 feet lower. On the anticline's flank west of Buffalo Creek, and also west of the "Ridge Road" running from Garrett to Somerset, the seam may lie 75 feet or less below the surface.

Lower Kittanning Coal

The lower Kittanning coal is one of the seams that have been extracted in southern Somerset County. Its total reserves places it at fourth rank among these seams. Occurrences are noted in the Berlin, lower Youghiogheny, and New Lexington synclines, and on the flanks of the Negro Mountain anticline. The most extensive mining of this seam has occurred in the Berlin syncline at MacDonaldton, and on the outer flank of the Negro Mountain anticline along Coxes Creek at Rockwood. This coal bed has little importance in the western part of southern Somerset County. It is also relatively unimportant in the southern part of the Berlin syncline and the Wellersburg syncline.

In the area of the most extensive mining, which occurs in an area that is approximately bounded by Somerset, Rockwood, Garrett, and MacDonaldton, the lower Kittanning coal is usually a two-bench seam that has a total thickness ranging from 30 to 60 inches. The cleanest coal in the seam is contained in an upper bench of about 30 to 32 inches thick. The lower bench, with a thickness of about 12 inches, contains the dirtiest coal in the seam. These two benches are usually separated by about 12 inches of clay or shale. In most mines, only the upper bench of coal has been extracted, but in other locations where the parting is either very thin or entirely absent (as at Rockwood and MacDonaldton), the total seam has been extracted.

In some locations in southern Somerset County, two distinct coal seams (both referred to as the lower Kittanning) occur in what is commonly known as the lower Kittanning group. The largest reserve of lower Kittanning coal occurs in the northern two-thirds of the Berlin syncline and on the Negro Mountain anticline southeast of Somerset.

Lower Kittanning Coal in the Lower Youghiogheny Syncline – Laurel Hill Anticline Area

This coal occurs in the vicinity of Listonburg, Draketown, Fort Hill, Metzler, and Scullton. The seam is thin in all of these locations, however, and the coal is economically unimportant. The lower Kittanning coal group is usually composed of two seams that are usually separated by 15 to 30 feet of strata. The thickness of each seam ranges from 18 to 30 inches, but does not commonly have a thickness greater than 24 inches.

About a mile west of Metzler on Green King Run, the lower of the two Kittanning seams has a thickness of 24 inches, and it has been mined. Some small domestic mines existed on White's Creek about 1.4 miles north of Listonburg. Thicknesses in this area have been reported from 24 to 30 inches. At the Benford and Brooks tunnels on the Baltimore and Ohio Railroad in the Casselman Valley, similar thicknesses are noted. Most likely, by inference, from these outcrop thicknesses, where the lower Kittanning coal seams are under considerable cover, such as in Kingwood and Confluence, the seams have similar thicknesses, and this is of relatively little economic interest.

The lower Kittanning coal appears to be absent at Fort Hill Station. About 600 feet north of the station, an exposure of massive sandstone about 60 feet thick occurs along the Baltimore and Ohio Railroad. This is a local example of Worthington sandstone which occupies the stratigraphic position of the middle Kittanning coal group. It as well overlies a 20 foot sequence of interbedded sandy shale and sandstone (some parts conglomeratic) which is thought to replace the lower Kittanning coal group. Waagé reported a similar occurrence of sandstone occupies the same stratigraphic position in the Allegheny Group about 25 miles away (1950). Core drilling studies in the Casselman Basin 2 miles northeast of Bittinger, MD show a narrow, linear shape for the sandstone deposit, following a north-northwesterly trend. In MD, the sandstone's extent is from the top of the middle Kittanning coal group upward; In Pennsylvania, its extent is somewhat lower. The sandstone at Fort Hill may have continuity with that reported upon by Waagé. A north-northwesterly trend extending from Fort Hill Station would carry the deposit through the Scullton area, but it has not been positively identified in the outcrops in this area. Extension in a south – southwesterly trend would carry the deposit to the western flank of the Negro Mountain anticline in the vicinity of Winding Ridge; abundant float blocks of sandstone in this area are a possible marker. By inference, it is most likely that the lower Kittanning coal would also be rear or absent in the area from Scullton to Winding Ridge. The middle Kittanning coal as well is also sparse in the area.Waage (1950) estimated that the sandstone probably continues to the northern part of the upper Potomac basin. In his opinion, the deposit was probably laid in a drainage channel that was more or less continually occupied by strains during the depositional phase of the Allegheny Formation. Balsinger (1960) reported that cross-bedding studies suggest a northwesterly stream flow in the Metzler-Scullton area during this time period.

Lower Kittanning coal in the new Lexington syncline-Centerville Dome Area

Scant information is available regarding the lower Kittanning coal in the area of the new Lexington syncline and the Centerville Dome, but interpolation estimates place the seam in the area at about 30 inches thick. At the Northeastern and of the Centerville Dome, the seam is about 300 to 400 feet below the surface and may be as much as 42 inches thick.

Lower Kittanning coal between the Centerville Dome and the Negro Mountain anticline

Extensive mining of the lower Kittanning coal has taken place in the area between the Centerville Dome and the Negro Mountain anticline, most notably on the eastern side of Coxes Creek at McGregor mines and Shamrock, and also on the southern side of the Casselman River at Rockwood. In the Shamrock and McGregor mines, the 32 in. upper bench of coal has been extracted; an additional 12 inch bench of lower quality coal separated from the upper bench by 12 inches of clay parting has been left in place.

In the Rockwood area, the whole seam has been mined to fuel power plants; the total bed thickness in the area is about 30 inches, with the clay parting layer being usually an inch thick or less.

Lower Kittanning coal mining has also taken place on both sides of the western branch of Coxes

Creek about 2.5 miles southwest of Somerset. The bed thickness there's 51 inches, including a parting layer that is generally about 12 inches thick

Lower Kittanning coal in the Negro Mountain anticline area

The lower Kittanning coal crosses the Negro Mountain anticline in the area between Somerset and Berlin. To the southwest, the bed has been eroded from the crest of the anticline, but crops out on the upper eastern flank, extending into the Berlin syncline. One such area occurs at Beachdale Hollow, about 3.5 miles northwest of Berlin. The lower containing seam in this area has been extracted in small-scale operations. The total bed is about 62 inches thick, with the low-ash upper bench having a thickness of about 32 inches. The seam is also exposed on the western flank of the anticline on the mud Pike about one mile west of the anticlinal crest. The seam's structure and thickness is similar to that of the eastern flank exposure. In the area on the western flank between the mud Pike and the Plank Road, large coverage areas exist with estimated coverage of about 50 feet, providing good possibility for strip mining. Further possibilities exist also on the eastern flank of the anticline south from Mud Pike to the area near along school, about 2-3 miles the way.

Southwest from Garrett, lower Kittanning coal crops out an average distance of 1 1/2 miles east of the axis of the Negro Mountain anticline. Several small underground and open pit mines also exist in the area. Bed thickness ranges from 30 to 58 inches, with the thickest part about 3 to 4 miles southwest of Garrett. In most cases only the upper bench has been mined. This bench tends to be persistent in having a thickness of 30 to 32 inches and contains coal that is usually of good quality. The lower bench contains coal that is high in ash and generally was left undisturbed.

In the area west of Springs, only moderate data on the lower Kittanning seam is available, but a consistent minable seam thickness of about 30 inches appears to exist in the area. Some surface to indications of thick to massive lower Worthington sandstone overlying the lower Kittanning coal are present, but the extent of the sandstone is somewhat difficult to assess because exposures are scarce.

Lower Kittanning coal in the Berlin syncline area

Minable thicknesses of lower Kittanning coal most likely occur throughout most of the Berlin syncline area. More focus has been placed on the northern part rather the southern part, in reference to the well-known for systems of the seam in the outcrop areas where it has already been extracted, as well as based upon information from subsurface drilling studies taking place in the deeper parts of the syncline.

The most extensively mined area of the lower Kittanning coal seam occurs at MacDonaldton, east of Berlin at the shaft mined. The seam was extracted in a up -dip direction on the eastern flank of the syncline, and was mined up nearly to the outcrop. Near MacDonaldton, the lower Kittanning seam is about 50 inches thick, and tends to contain smaller amounts of non-coal material than in other areas. The 12 inch parting layer normally present in the seam in most areas appears to be either very thin or completely absent at MacDonaldton. Despite a lack of information, it is likely that the lower most several inches of the bed contain a higher percentage of ash than the upper part of the seam. This inference is made from a strip mining southeast of MacDonaldton, where the lower 6 inches of the seam was not utilized due to high ash content.

At Pine Hill Station, the lower Kittanning's thickness is about 52 inches and is. About 900 feet deep. The coal is known to be of minable quality and extent in several locales within the two to three mile radius of Pine Hill Station.

Lower Kittanning coal in the Wellersburg syncline

Little information is available regarding the lower Kittanning coal in the Wellersburg syncline. The seam thought to be the lower Kittanning was mined about 2 1/4 miles northeast of Fairhope and about one mile north of Hoblitzell in western Bedford County. Although not currently exposed, the coal in this area has been reported to have a thickness of about 48 inches.

Lower Kittanning coal is known to be present at Kennels Mill at a depth of about 500 feet at the axis of the Wellersburg syncline; the seam was encountered during the drilling of a 1200 foot wll in the area, but the thickness is not accurately known.

On the little Allegheny Mountain west of Ellerslie, MD, the lower Kittanning seam is 24 inches thick. Lower Kittanning clay has been mined in the area, and Hall (1922) measured the lower containing coal seam at about 1.9 feet thick. Waage (1950) found a thickness of 24 inches in a drilling site 2 and 1/2 miles west of Ellerslie. Sandstone is also known to overlie the coal at both locations.

Potential mining areas of lower Kittanning coal

An area along the Mud Pike west of MacDonaldton about four miles north and 2 miles south of the Mud Pike holds considerable promise for development. Estimates place the total seam thickness across the area at 48 to 62 inches, lying on any east-west trend. At Berlin, this seam lies at a depth of about 1200 feet. Moving to be northwest, the seam rises at about 40 feet per mile (7%) to the surface. Be seam crosses the axis of the Negro Mountain anticline near the Plank Road; at this location, estimated seam thickness is about 50 inches.

The lower Kittanning coal may also have good potential near Brotherton, where seam thickness is estimated to be 48 inches including partings. The seam here is 450 feet below the surface. The depth decreases to the outcrop to be northwest, and dips to be southeast, reaching about 1000 feet at the synclinal axis.

Another promising area lies to the west of Coxes Creek, near the Centerville Dome. Along Coxes Creek, the seam thickness ranges from 50 to 56 inches. Upper bench thickness in the are is usually 32 inches. The seam likely thins westward, but a major coal area with a thickness of 36-50 inches is suggested.

In the Youghiogheny Syncline, the lower Kittanning seam reaches the unusual thickness of 30 inches. A similar thickness is inferred for the New Lexington syncline, but very little data has been obtained.

Upper Kittanning Coal

Minable coal occurs in the upper Kittanning bid in the Berlin in Lower Youghiogheny synclines. The the seam is probably also minable in the New Lexington and Wellersburg synclines, but very little information is available. Mining has also occurred on the Negro Mountain anticline east of Somerset.

The upper Kittanning coal commonly occurs as two, three, or even four benches separated by clay or shale partings, but the seam usually appears in two benches. In many locales it is underlain by a bench of bony coal. This part of the seam is well-known in the Harnedsville-Listonburg area, where it referred to as "blackjack".

The thickest part of the upper Kittanning occurs in the vicinity of Metzler and Markleton. An exposure west of Metzler the total thickness of the seam and partings is 78 inches, and at an exposure along the Baltimore and Ohio Railroad about one mile north of Markleton, the total thickness is 90 inches. In these areas, pure coal only makes up about one-third to one-half of the total bed.

The upper Kittanning coal is thinnest in the southern part of the Berlin syncline, where it ranges between 24 and 34 inches thick. Most of the upper Kittanning coal bed in general has a thickness of 36 to 42 inches.

The upper Kittanning coal bed is usually overlain by shale or interbedded sandstone and shale. Some occurrences of massive sandstone a few feet above the coal or lying directly upon at are also known. This is common in the Humbert/Harnedsville/Listonburg area in the Lower Youghiogheny Syncline. This sandstone is more prevalent to the west of the Negro Mountain anticline. It is likely that the sandstone cuts into or replaces the upper Kittanning coal, but this has not been definitely noted. The coal overlies a persistent limestone (Johnstown) that ranges from 8 to 12 feet thick; either direct contact or separation by a few inches of clay or clayey shale is noted.

Upper Kittanning coal in the Lower Youghiogheny Syncline

Small-scale mining of upper Kittanning coal has taken place at numerous places on both the eastern and western flanks of the Lower Youghiogheny Syncline. Considerable mining has occurred at Casselman and near Listonburg, where the coal appears as a two-bench seam with an upper bench thickness between 36 and 42 inches. A massive sandstone (Freeport) also occurs either immediately above the coal or a few feet above it. The seam has thus been named the "Sandrock coal" in the Listonburg area. Near Casselman the upper Kittanning is known as the "Twin seam".

At Fairoaks the upper Kittanning is reported to have thicknesses between 30 to 47 inches. It is likely that the former main only account for the upper bench of the seam, while the latter probably includes the total seam.

The thickest known occurrence of upper Kittanning coal is in a northwest-southeast belt extending from Scullton through Metzler to Markleton. To the west of Markleton, a total thickness of 80 inches has been observed, including partings and high-ash coal. At a Baltimore and Ohio Railroad exposure one mile north of Markleton a total bed thickness of 94 inches has been reported. By inference, similar thicknesses probably occur between Metzler and Markleton where the coal bed is as much an is 500 feet below the surface. No subsurface information regarding this is available. The coal seam in this area probably contains considerable non-coal material.

Upper Kittanning coal has also been mined south of Somerset in Garrett County, MD, along Chub Run Valley and Mill Run Valley, near Mineral Spring. Both open-pit and deep mines have been employed.

Upper Kittanning coal in the New Lexington syncline-Centerville Dome area

Little information is available on the upper Kittanning coal in this area, but the bed has well-known continuity in other areas, and therefore the seam is predicted to occur here as well. Most likely, the seam thickness probably averages about 36 inches in the syncline and on the dome as well.

Upper Kittanning coal in the Negro Mountain anticline and Berlin syncline areas

To the west and northwest of Brotherton where the outcrop of the upper Kittanning coal occurs in the axial area of the Negro Mountain anticline, the seam is favorably situated for strip-mining. Deep mining has also taken place here. Bed thickness in an area ranges from 36 to 62 inches. Minable coal in this anticline apparently extends eastward under Brotherton in the Berlin syncline to its outcrop on the west flank of Allegheny Mountain east of Brotherton. At the axis of the syncline the coal bed is about 800 feet below the surface; at Brotherton on the west flank it is about 350 feet deep.

The upper Kittanning coal has been mined on the eastern flank of the Berlin syncline in a belt extending from about 1 mile south of Garrett for a distance of about 3.5 miles north and northeast of it. The seam is present on the eastern slopes leading down to Buffalo Creek between Garrett and Beachdale. Except for one site about ½ mile upstream from Garrett, the seam is generally below the level of Buffalo Creek. In the deeper valley and the western tributary to Buffalo Creek, upper Kittanning coal either crops out at or is close enough to the surface that extraction by strip-mining would be feasible. The thickness of the bed near Garrett ranges from 42-52 inches. The seam thins both to the north and to the south to about 36 inches. The thicker coal appears to trend eastward under the Pine Hill area to an outcrop on the eastern side of the Berlin syncline, on the western slope of Allegheny Mountain southeast of the former Salco mines. A Core sample obtained at the synclinal axis 4.5 miles east-northeast of Garrett and ¾ mile southeast of Pine Hill revealed an upper Kittanning coal thickness of 44 inches. At this site, the upper

Kittanning coal lies 1,150 feet below the surface. The bed rises on the flanks of the syncline and therefore is shallower to the east and west.

Upper Kittanning coal has been mined on the eastern flank of the Berlin syncline, in the valley north of Glade City and southeast of Berkeley's Mill. Bed thickness here is between 36 and 42 inches. To the southwest of Meyersdale, the coal thins to the 24 to 36 inch range.

Upper Kittanning Coal in the Wellersburg Syncline Area

Information on the upper Kittanning coal in the Wellersburg syncline is not sufficient to include it in the reserve estimates for the area. The seam usually identified in the area as the upper Kittanning is actually the Brush Creek coal. The upper Kittanning coal horizon outcrops tend to occur on the wooded slopes of Big Savage Mountain on the west and Little Allegheny Mountain on the east; these areas are frequently covered with rubble of overlying rocks, generally obscuring the seam, and consequently the seam in this area has received little attention. Drilling studies are necessary to evaluate the mining potential of upper Kittanning coal in the Wellersburg syncline area.

Waagé (1950) noted that the upper Kittanning coal is a persistent bed in the Maryland Allegheny Formation. In the northern Georges Creek Basin (which represents the southward continuation of the Wellersburg syncline), Waagé detailed three corings penetrating the upper Kittanning bed. Two of the cores revealed a single bench of coal 24 inches thick or less, and in the third a 40-inch thick two-bed system separated by 18 inches of shale is seen. As noted above, only extensive drilling studies will be able to evaluate the upper Kittanning coal in the area; if it is similar to the aforementioned corings, it offers little potential for development.

Analysis of Upper Kittanning Coal

An analysis of 27 upper Kittanning coal samples from the Casselman Basin in Garrett County, Maryland, (Toenges, et. al., 1952) shows an average ash content of 14.37%. The average sulfur content is 3.64%, ranging from 1.4% to 5.7% (seam basis). On moisture and ash-free basis the average sulfur content is 4.0%, ranging from 1.3% to 6.6%.

Float-sink testing of one sample revealed 83% recovery in the 1.55 specific gravity float, with an ash content of 8.3%. Float coal was comprised of 86% anthraxylon and bright attrital coal, with 7.1% ash. The remaining 14% was dull attrital coal and fusain with 17.5% ash.

The sinkage product contained 48.3% ash. Ten percent of the sink material was mineralized fusain, almost exclusively pyrite. Over 89% of the sink material was bone coal and shale, with 44.8% ash. In relative quality ranking of float-and-sink testing and percent ash, the upper Kittanning sample was the dirtiest of the five coals tested (Harlem, lower Bakerstown, Brush Creek, upper Freeport, and upper Kittanning). Separation at 1.55 specific gravity reduced ash content from 14.7% to 8.3%. An additional reduction of ash content from 8.3% to 7.1% could have been attained with gravity separation, incurring a 13.7% loss of coal.

Potential Mining Areas of Upper Kittanning Coal

The upper Kittanning coal has good development potential throughout nearly all sections of the coal basins in southern Somerset County in which its horizon is present, except for the Wellersburg syncline. Lesser development potential is also present in the southern part of the Berlin syncline from Meyersdale southwestward; bed thicknesses in the range of 24 to 36 inches are inferred here. In the lower Youghiogheny syncline east of Confluence, the coal thickness is estimated to be greater than 36 inches; these areas represent the least favorable areas in southern Somerset County.

Two areas occurring in southern Somerset County hold good potential for future upper Kittanning coal development. The first is a northwest-southeast trending belt that runs from Metzler to Markleton, extending under Kingwood and then northeast toward New Centerville for about 2 miles. The other is a west-northwest-east-southeast belt running normal to the synclinal trend and passing beneath Brotherton. Bed thickness in this area is inferred to be between 42 and 60 inches, but proof or denial by drilling data is unreliable. These inferred thicknesses are for the total bed, which likely includes some noncoal material, possibly as much as 50 percent. It is likely, though, that at least one bench of the upper Kittanning seam here contains coal having economically important thickness and quality.

In both of the aforementioned areas, the major block of coal is overlain by several hundred feet of cover. This overburden reaches its maximum thickness of 1,000 feet southeast of Brotherton. Some locations exist, however, where the seam could be entered at much shallower depths by utilizing up-dip sites in some of the terrain's deeper valley systems.

The Baltimore and Ohio Railroad is accessible to the Kingwood block of coal along the Casselman River at places such as Casselman, Markleton, and Fort Hill Station, and is about 4 to 5 miles from the Brotherton block of coal at Pine Hill Station.

Lower Freeport Coal

The most extensive mining of the lower Freeport coal bed has been north of Rockwood in the vicinity of Garrett, southeast of Somerset, and east of Meyersdale and Salisbury. Some mining on a lesser scale has taken place near Draketown, between Scullton and Kingwood.

Lower Freeport coal thickness tends to run at about 3 feet, ranging from 2.5 feet to 4 feet. The thicker occurrences are in the Berlin syncline in the Garrett-Meyersdale area and on the eastern flank of the Negro Mountain anticline north of Brotherton. The seam generally contains some noncoal material, but is considered to be one of the cleaner coal beds in the eastern part of southern Somerset County. The seam is frequently overlain by several feet of shaly beds, but in the local area is usually either covered or replaced by the Butler sandstone.

The Draketown area, in the Lower Youghiogheny syncline, contains numerous small mines where the lower Freeport coal has been extracted. The seam in this area, however, tends to be of somewhat poorer quality than in the vicinity of Rockwood and of the Berlin syncline.

To the north of Rockwood, extensive mining of lower Freeport coal has taken place on the eastern slope of the Centerville dome. The typical bed thickness there ranges from 3 to 3.5 feet. No information on seam quality is available.

Extensive mining of the lower Freeport coal has taken place on the western slope of Allegheny Mountain to the east of Meyersdale and Salisbury. The bed dips to the northwest and has usually been entered by adits or drift-type openings whose mouths area located stratigraphically above the coal bed. The adits are driven into the hill to intersect the seam which is then mined along the strike, moving in both up-dip and down-dip directions. The coal seam thickness ranges from 2 to 3.5 feet and is usually of good quality.

At and near the crest of the Negro Mountain anticline southeast of Somerset and north and west of Brotherton, the lower Freeport coal has been strip-mined to a notable extent. A bed thickness of about 30 inches is common in the area. Bed dip near the crest is usually gentle, with thin overburdens.

Potential Mining Areas of Lower Freeport Coal

The largest minable reserve of lower Freeport coal is contained within the Berlin syncline. The Garrett- Meyersdale – Salisbury area contains large amounts of coal measures at 28 inches thick or greater, and possibly as much as 36 to 48 inches thick. Almost all of the easily extracted coal in the area has already been mined; that which remains will be more expensive to mine.

Present data indicates that the lower Freeport bed is likely continuous and of minable thickness from the outcrop on the western slope of Allegheny Mountain, under Meyersdale to the outcrop in Garrett on the western flank of the Berlin syncline. At Meyersdale, the lower Freeport bed lies about 750 feet below the surface; at Salisbury, the depth increases to about 800 feet deep. The seam rises towards the surface both northwestward and southeastward as it approaches its outcrops on Negro Mountain and Allegheny Mountain.

Good potential for mining appears in the Brotherton area. Another area that exists with notable mining potential lies between the northern end of the Lower Youghiogheny syncline and the New Lexington syncline near Kingwood. The lower Freeport coal bed in the area is about 36 inches thick, and the thickness may be persistent throughout the Kingwood – Casselman area. Outcrops occur along the Casselman River valley on the eastern slopes of the Lower Youghiogheny syncline, and along Laurel Hill Creek on its western flank. Depth below surface at Kingwood is about 400 feet.

Lower Freeport coal has little importance in the Lower Youghiogheny syncline; in the Berlin syncline south of Salisbury, and in the Wellersburg syncline.

Upper Freeport Coal

Upper Freeport coal occurs in minable thickness and quality in the Centerville Dome area, in the Kingwood area, on the Negro Mountain anticline west of Brotherton, and in the Lower Youghiogheny, New Lexington, and Berlin synclines. The seams' thickest occurrence is near Confluence and Ursina, where it reaches 54 inches, and its thinnest is in the Meyersdale, Salisbury, and Trent areas where it is only about 12 to 14 inches thick. In southern Somerset County, the seam usually occurs in two benches. The lower bench tends to be less than 12 inches thick, with low-quality coal containing large amounts of ash. Shale and clay partings separate the benches. In most of the area, the parting is 1 to 2 inches thick, but near Ursina, Harnedsville, and Fort Hill, is thickens to 12 to 15 inches, and is comprised of clay. This thick parting layer has given the upper Freeport coal the local name of "Fireclay Coal."

Few partings exist in the upper bench of the upper Freeport coal, but in some places is contains a thin layer of shaly coal. The upper bench tends to be of good quality. In some area strip mines, the upper and lower benches were selectively extracted separately to produce two different grades of coal.

The upper Freeport coal is assumed to be a continuous seam in southern Somerset County, but it is probable that on a local scale that the coal is either absent or reduced in thickness by channel-type sandstone which cuts into it. One occurrence of this is known to exist about 2.5 miles west of Berlin where this has been observed in drilling and mining. Another instance appears about ¾ mile northwest of Confluence, where the lower Mahoning sandstone lies directly upon the upper Freeport limestone and the coal bed is absent. A third example of upper Freeport coal "faulting" is found just north of Ursina. Other examples likely exist, but little information from outcrops or drilling is available to allow mapping of these types of areas. Thus, these areas have been excluded from reserve calculations.

Upper Freeport Coal in the Centerville Dome Area

Small-scale deep-mining and larger-scale strip-mining of upper Freeport coal has taken place near New Centerville. Most of the strip-mining has been done in the headwater area of South Glade Creek. In this area the combination of low relief and a structural high that makes up the Centerville Dome makes the bed easily accessible over a large area with relatively thin overburden. Seam thickness in the area ranges from 30 to 40 inches, averaging about 36 inches.

Upper Freeport Coal in the New Lexington Syncline Area

The thickness of the upper Freeport coal thins from about 36 inches in the Centerville Dome area to about 30 inches in the New Lexington syncline. Near Trent, the seam is only about 24 inches thick and has been mined for local use. Near Metzler, some upper Freeport coal mining on a small scale has been undertaken. The total bed thickness there is 58 inches. This includes a 13 inch lower bench and a 6 inch clay parting, another clay parting that occurs to 16 inches thick, and a 26 inch thick upper bench split by a 6 inch clay parting. The best coal in the seam lies above the upper parting. The upper bench has a thickness of about 26 inches and this may represent the thin upper Freeport seam common to the Trent area.

Upper Freeport Coal in the Lower Youghiogheny Syncline Area

The upper Freeport coal crops out along the western side of the Casselman River valley from Fort Hill to Harnedsville. It occurs to the east of the Casselman River in several isolated locations; one of these underlies Fort Hill. In Ursina, where the seam is known as the "Fireclay" coal, only the upper bench is pure enough to be mined.

At Listonburg, the clay parting is 3 inches thick, and the total bed thickness is 38 inches. Between Confluence and the state line, the seam thickness ranges from 30 to 36 inches.

Upper Freeport Coal in the Berlin Syncline Area

Upper Freeport coal in the Berlin syncline has mainly been mined along Buffalo Creek from Beachdale to just south of Garrett. Total coal thickness runs from 27 to 42 inches, with an average of 33 to 34 inches. The seam thins moving from Beachdale to Garrett. Moving south to the state line from Garrett, the seam has a maximum thickness of 36 inches and a minimum thickness of 15 inches.

Jost south of Pennsylvania in Garrett County, Maryland, west of Grantsville, the upper Freeport (locally, the "Beachy") coal is about 40 to 48 inches thick. Not much is known about the seam on the east flank of the Berlin syncline, where it crops out on the forested western slope of Allegheny Mountain. East of Berlin and Brotherton, thickness of the seam ranges from 36 to 42 inches. East of Garrett, Meyersdale, and Salisbury, the indicated thickness is less than 36 inches, and in some places is less than 18 inches.

Upper Freeport Coal in the Negro Mountain Anticline

Upper Freeport coal mining has taken place in the axial area of the Negro Mountain anticline west and southwest of Brotherton. The seam thickness ranges from 30 to 45 inches. The bed structure is similar to that near Garrett and in the Centerville dome area. At the Pennsylvania Turnpike crossing of the Negro Mountain anticline, a 26 inch upper Freeport bed is exposed. The bed thickens to the north and south, reaching about 42 inches.

Analysis of Upper Freeport Coal

Toenges, et. al. (1952) reported that upper Freeport coal in the Castleman Basin (Garrett County, Maryland) contains less non-coal material than the other 4 beds tested (upper Kittanning, Brush Creek, lower Bakerstown, and Harlem). Recovery of –8 mesh crushed coal at 1.55 specific gravity was 97%. Float coal ash was 6.7%. Eighty-nine percent of the sink was bone coal and shale, having 30.6% ash. Petrography showed no significant float-and-sink ash reduction.

The upper Freeport seam is likely similar in southern Somerset County, at least in the Berlin syncline, which is the northward extension of the Maryland Castleman syncline.

Potential Mining Areas of Upper Freeport Coal

The best mining potential for upper Freeport coal in southern Somerset County occurs in the Berlin syncline from Berlin northward to the county border.

Near Pine Hill station about 1 ¾ miles southwest of Berlin data infers a large block of upper Freeport coal with a thickness between 36 and 46 inches with an average of 30". The seam dips N60°W with at 4-5° (7.5%) with a maximum dip of 9°(16%).

Both up- and down-dip mining of the bed are possible, as well as along the strike if a horizontal drift were driven to intersect the westerly-dipping bed on the western slope of Allegheny Mountain. Up-dip workings would have the advantage of natural drainage to the surface, but down-dip workings would require pumping. This operation could as well possible extract the lower Freeport, upper Kittanning, lower Kittanning, and Brookville coal seams. Upper Kittanning coal has been mined in a similar operation at MacDonaldton.

On the west flank of the Berlin syncline the upper Freeport coal be could be entered by a shaft near the synclinal axis where the coal lies 400 to 1000 feet below the surface. The seam could also be entered at the outcrop on the Negro Mountain anticline, or any location just north of the plank Road near the Wills mine. Entry on the west side of the syncline would place most of the coal, lying to the east, in the down-dip direction.

The next most promising area for upper Freeport coal mining lies in the Lower Youghiogheny Syncline in an area bounded by Confluence, Ursina, Humbert, Draketown, and the Youghiogheny River. Some mining of the bed has already occurred at Ursina at outcrops along Laurel Hill Creek, where the bed he is 45 to 55 inches thick. This bed is expected to be persistent in thickness westward to the Youghiogheny River. The upper Freeport bed is known to be absent at and outcrop 3/4 mile north of Confluence near the Baltimore and Ohio Railroad. In this area, the upper Freeport coal is replaced by the massive Lower Mahoning sandstone.

The overburden in this area ranges from a few feet to 650 feet. Bed dip is about 100 feet per mile (2%) to the south-southeast.

In most other parts of southern Somerset County, the upper Freeport coal tends to be thin; west of the Casselman River in Kingwood and Casselman, the seam the is 36 to 40 inches thick. Near New Centerville and Trent the seam is 24 to 38 inches thick. Just southwest of Somerset the seam is about 42 inches thick.

The area near Meyersdale and Salisbury (in the southern Berlin syncline) holds the least promise for upper Freeport coal mining. The average upper Freeport thickness in the area is about 24 inches. West of Grantsville, Maryland, the bed does taken to 46 inches.

Conemaugh Group Coal Beds

The Conemaugh Group does not contain significant amounts of minable coal. Twenty-four Conemaugh coal seams occur in Somerset County, but most of them are either too thin or too impure to be mined. Three seams of notes, however, have been mined in the county -- the lower and upper Bakerstown coal beds, and the Wellersburg coal bed.

Lower Bakerstown Coal

Lower Bakerstown coal in minable quality and quantity is only found in the Berlin syncline. The seam may also be thick enough for mining in the Wellersburg syncline, but it occurs on the flanks of a structure where the strata dips steeply and where topographic slopes are also steep, so neither strip or in deep-mining have taken place to any significant extent. In the upper Youghiogheny and New Lexington synclines the seam is about 18 inches thick and is too thin to be mined.

Most underground mining of lower Bakerstown coal has been done about 1.5 miles south of Garrett in a valley locally known as "Silver Valley". The seam thickness there ranges from 24 to 31 inches, averaging about 27 or 28 inches. Some strip-mining of the lower Bakerstown bed has taken place in the recent past. The bed is thin, but is persistent, tends to be free from partings, and is overlain by only about 20 to 30 feet of friable shale, the Friendsville shale. The bed is strip-mined from the Springs area at the south (in also into Garrett County, Maryland, as well) to the area of Berlin at the north. In the Springs-Grantsville area to the the bed is known as the "Honeycomb coal"; if in some parts of the Berlin area it is incorrectly known as the "Brush Creek coal." The actual brush Creek coal lies about 105 feet below the Lower Bakerstown coal and about 110 feet above the upper Freeport coal, the most likely is to thin to be mined (usually 12 to 18 inches thick) to any extent in southern Somerset County.

A U.S. Bureau of Mines drilling study (Toenges, et. al., 1952) documented the persistence of the lower Bakerstown coal seam in the Maryland Castleman Basin; the seam was penetrated by all of the 34 test holes drilled.

The lower Bakerstown coal usually occurs as a one-bench seam. In some areas, however, a parting is present that is one inch or less in thickness, occurring about six inches above the base of the seam. At Cover Hill, 3.5 miles northwest of Berlin, an unusually thick occurrence of this seam was noted. The structure are of the bed is as follows:

	Feet	Inches
Coal, bright (mined)	2	4
Shale, carbonaceous (rejected)	0	4
Coal, bony (rejected)	2	1
	--	--
	4	9

The shale parting and the lower bench of coal were not extracted at this mine because of high ash content. This lower bench of coal may be more expensive than indicated by field data, most of which were made in strip-mines. Enough data does exist, however, to indicate general thickness of less than 32 inches.

In the Lower Youghiogheny Syncline both north and south of Confluence the maximum thickness of the lower Bakerstown seam is 24 inches and the average thickness is 18 inches or less. The seam is completely absent in some locations, such as the "Hogback Road" between Ursina and Harnedsville. The seam is known to be only about nine inches thick on Route 40 west of the Youghiogheny reservoir in Fayette. County.

At the Youghiogheny dam in Confluence drilling by the U.S. Army Corps of Engineers indicates a seam thickness of less than a foot, and the lower Bakerstown coal is completely absent in some places.

The seam generally has a thickness of about 18 inches in the New Lexington syncline in the vicinity of New Lexington. This coal is locally known as the "18-inch seam."

Analysis of the Lower Bakerstown Coal

Thirty-four analyses were performed on the lower Bakerstown coal in the Castleman Basin of Maryland. The average ash content was 12.2 percent, ranging from 8.6 to 16.5 percent. The average sulfur content of the thirty-four samples was 3.96 percent on an as-received basis; it was 4.59 percent on the ash-free, moisture-free basis. Float-sink testing of the lower Bakerstown coal from a core sample taken about 2 miles south of Grantsville, Maryland showed 92.4 percent of the coal floating at a specific gravity of 1.55. Ash content of the float fraction was 7.5 percent.

Upper Bakerstown Coal

Minable upper Bakerstown coal is restricted to the Wellersburg syncline where the coal is erroneously known as "upper Freeport". Although several localities where upper Bakerstown coal was formerly mined were found, the seam was actually seen in only one place within its minable area. At that locality one mile north of Kennells Mill the coal is 56 inches thick and includes one three-inch clay parting.

The upper Bakerstown bed appears to be continuous throughout the Wellersburg syncline. Its thickness, however, decreases from about four and one-half feet in the Kennells Mill area to three feet or less in the vicinity of Wellersburg. This seam appears erratically in the Berlin and Lower Youghiogheny synclines, where it is usually too thin to be mined. The bed is commonly replaced by Saltsburg sandstone in those areas.

Wellersburg Coal

For the most part, the Wellersburg seam the is only minable in the southeastern part of Somerset County. In other places, it is usually too thin or to impure to be mined. The bed has been mined on a small scale near Wellersburg for local consumption for many years. Due to its small area of coverage, its relative lack of thickness, and its poor quality, the Wellersburg seam is not regarded to be one of the important coal beds of the county. An estimate of the reserve present is included, however, for the sake of completeness and because the seam represents a local source of domestic fuel.

The Wellersburg seam is known locally as the "twin seam" or "split six" seam, because of its tendency to occur as two 3-foot thick benches of coal separated by a 3-to-4-foot thick clay parting. It has also been known as the "Weller bed." The lower bench of the seam is the one that is usually mined. This bench has a 3-inch-thick shale parting, but it tends to contain a much cleaner coal than the upper bench, which has large amounts of shaly material interbedded with the coal. Listed reserves for the Wellersburg only account for the lower bench of the seam.

Other Notable Conemaugh Coal Beds

Several other coal beds in the Conemaugh group exist in southern Somerset County that have been mined on a small scale for domestic fuel use. These beds include the Morantown ("Dirty Six" coal of the Berlin area), Franklin, Lonaconing, Hoffman, Upper and Lower Clarysville, Barton, Federal Hill, Harlem, and Humbert, and numerous "upper Freeport rider" coals. These seams are usually less than 18 inches thick, and have little economic value.

Some operations exist where the upper Freeport rider coal has been feasibly extracted along with the upper Freeport bed. One such mine of this type exists about one mile north of Garrett, where the rider coal is about 2 feet thick, and lies about 15 feet above the upper Freeport main bed.

Although the Morantown coal in some places has a total thickness of up to 13 feet, it has little economic value because it contains so much interbedded shaly material. It lies about 10 to 15 feet below the Pittsburgh seam and has often been mistaken for this seam.

The Humbert coal bed is a good example of the sporadic nature of the Conemaugh Group coal beds in Somerset County. The seam was mined at Humbert before the turn of the century by the Pittsburgh and Baltimore Coal, Coke and Iron Company in an operation that was originally envisioned to be quite extensive. The operation was rapidly abandoned, however; the seam is 6 to 7 feet thick at its outcrop, but is prone to appearance of irregular lenticular areas of shaly material and bone coal. The seam also thins rapidly moving away from the Humbert area. The seam was not found to exist in minable quantity and quality in any other location in southern Somerset County. For a time, however, the coal was used to produce metallurgical coke at ovens in Brown's run valley east of Humbert.

Coal Beds of the Monongehela Group

The Monogehela Group coal beds in southern Somerset County have often been incorrectly identified by many investigators, with the exception of the Pittsburgh seam, which marks the base of the formation. The Pittsburgh seam has many local names, including Big Vein, and Pine Hill #2. The Pittsburgh seam is generally known as the Big Vein from Meyersdale southwest to Niverton where it is usually 9 to 10 feet thick, and as the Pine Hill #2 coal from Meyersdale northeast to Berlin, where the seam is usually about 3 to 4 feet thick.

The Blue Lick coal is the next minable seam above the Pittsburgh. Near Berlin, this seam has been incorrectly called the Redstone coal.

The seam known locally as the Pine Hill #1 is generally correlated with the true Redstone coal of Fayette County. The Sewickley seam is correlated with the lower Sewickley coal, also occurring in Fayette County.

Pittsburgh Coal (Big Vein, Pine Hill #2)

The Pittsburgh seam is most prevalent within the Berlin syncline. The seam also appears in the Wellersburg syncline in the southeastern part of Somerset County. The occurrence in the Wellersburg syncline is the easternmost limit of Pittsburgh coal in the Appalachian basin (with the exception of a small area southwest of Wilmore in Cambria County, where the seam is about 2 1/2 feet thick).

Two distinct facies of the Pittsburgh coal seam appear in southern Somerset County. The first is a 6 to 10.5 foot thick facies known as the "Big Vein" and a second facies about 4 feet thick known as the "Pine Hill #2" coal. The Big Vein facies runs throughout the Berlin syncline from Meyersdale southwest to Niverton near the Pennsylvania-Maryland state line; the Pine Hill #2 facies runs from Meyersdale northeastward to Berlin. The transition from one facies to the other occurs roughly at the Casselman River, which cuts through the Pittsburgh coal horizon into the underlying Conemaugh strata at Meyersdale. The seam thins, probably because of the gradual lensing out of the upper 5 to 6 feet of the Big Vein between its most northeastern occurrence west of Meyersdale and the most southeastern occurrence of the Pine Hill #2 facies about one mile north of Meyersdale. The seam similarly thins in the Wellersburg syncline at the eastern end of the Pittsburgh seam occurrence.

The thinning of the Pittsburgh coal from southwest to northeast by lensing out of its upper part can be recognized on the basis of a distinctive parting in the lower part of the seam, both in the Big Vein area and in the Pine Hill #2 area. This parting separates the lower portion of the seam into two benches, the lower bench being about 15 inches thick on the average and the upper bench about 30 inches thick. The parting itself is about 2 ½ inches thick, for a total thickness of about 48 inches for the lower part of the Big Vein. This is the thickness of the Pine Hill #2 seam in the Pine Hill-Berlin area. This parting is usually composed of light and dark gray mottled clay or shale in a dark gray matrix material. The parting also contains pod-shaped light gray inclusions of clay. Plant fragments are also common inclusions in the parting. This parting is lithologically distinct, and combined with the relatively persistent thickness of the two surrounding benches of coal makes correlation of the lower part of the Big Vein with the total Pine Hill #2 seam quite straightforward.

Cross (1952) found in a regional study of the Pittsburgh coal bed that the lower part of the Pittsburgh seam occupies a little more than half the total thickness, even in the central part of the bed; to the east, where the seam thickens, however, it makes up as little as ¼ of the total thickness due to excessive development of the upper benches. Where the total seam is thin, however, the lower bench is predominant, and at times makes up almost all of the minable coal. In Somerset County, the Pine Hill #2, though it occurs in the eastern area of usually thick Pittsburgh coal, is one local occurrence of where all of the minable coal represents only the lower part of the seam.

The thickness of the Pittsburgh seam ranges from 6 to 10 feet thick in the Wellersburg syncline, but only about half of the seam contains economically recoverable coal. Several benches of coal exist, separated by clay or shale partings with thicknesses from 1 to 4 inches. The lower and upper benches are fairly easily identified by their uniformity. The lower bench is usually about 2 feet thick, and is comprised of marketable coal; the upper bench ranges from 3 to 5 feet in thickness and has scant value because it contains large amounts of interbedded coaly shale. The upper bench is generally discarded during stripping and is left in place as roof material in deep mines. The middle of the seam is quite irregular, being in some places composed of one bench of coal free of partings, and in others one or more thin partings may occur. The lower 4 or 5 feet of the Pittsburgh coal seam in the Wellersburg area appears to be equivalent to the Pine Hill #2 coal of the Berlin area and to the lower 3 to 4 feet of the Big Vein coal in the Meyersdale-Salisbury area. The upper portion of the seam at Wellersburg is likely the stratigraphic equivalent of the upper part of the seam in the Meyersdale-Salisbury area; it differs, however, in that it tends to contain a greater amount of interbedded clastic sediment, primarily shale. The eastern trend toward poor quality coal in the Pittsburgh seam is notable about three-quarters of a mile southwest of Meyersdale where considerable shaly material begins to appear.

There is good quality coal present in the upper bench of the Pittsburgh seam to the southwest of

Wellersburg in the Georges Creek basin in Maryland. The quality of the coal in the top bench progressively improves from Wellersburg southwestward to Ocean, Maryland, a distance of about 12 miles.

Data infer that the Pine Hill #2 coal was once present to the northeast of Wellersburg, but this can neither be proven or disproved, as all evidence of Pittsburgh coal deposition in that area has long since been eroded away. If the upper bench of the Pittsburgh coal seam was deposited only in the deeper parts of a coal swamp, it may be true that a change from deeper to shallower swamp conditions is represented at Meyersdale and Wellersburg. To the east of Somerset, the Pittsburgh coal may have continued to thin out towards the edge of its depositional basin as it does on the western side in southeastern Ohio. Some support for this theory surfaced in 1905 when an occurrence of very thin (2.5 feet) Pittsburgh coal was found in southeastern Cambria County. Given the observed rate of thinning, if the Pittsburgh coal's eastern layers had not been eroded, the eastern margin of this coal field could be expected to be somewhere between Bedford and Blair Counties.

The Somerset County occurrences of Big Vein coal have previously been mined out. The most prevalent activity was in the years surrounding World War I in the Shaw-Mines-Coal Run area. Ruins of some of the old beehive-type coke ovens used then are still visible today.

Blue Lick Coal ("Redstone","Dirty Five", and "Pittsburgh Rider")

The names "Redstone","Dirty Five", and "Pittsburgh Rider" are commonly applied to the Blue Lick coal in the Berlin-Pine Hill, and Meyersdale-Niverton areas, respectively.

The Blue Lick coal occurs within the Berlin syncline. It has been mined from Berlin to Niverton, but most extensively between Meyersdale and Niverton. The coal overlies the Pittsburgh seam by about 40 to 50 feet running from Meyersdale northeastward. From Meyersdale southwestward, the interval decreases to about 25 to 30 feet in the area of Coal Run (where the Pittsburgh seam is referred to as the Big Vein) and then to a separation of only about 5 feet at Niverton near the Maryland state line.

The Blue Lick coal, unlike the true Redstone, lacks an underlying limestone layer. The Blue Lick bed is underlain by 2 to 3 feet of impure clay grading downward into the interbedded shale, siltstone, and shaly sandstone overlying the Pittsburgh seam. A thin rider coal that is up to 18 inches thick sometimes occurs about half way between the Blue Lick and Pittsburgh coals. The rider seam is not minable in southern Somerset County.

The total Blue Lick coal bed consists of a series of several benches of coal and shale, shaly coal, and coaly shale that is up to 23 feet thick, but more commonly ranges from 8 to 12 feet thick. The portion of the bed that is mined is the 3.5 to 4.5 foot thick bench occurring at the base of the seam. This lower bench is the one referred to as the "Redstone" or "Pittsburgh rider" coal in the Berlin syncline. In the vicinity of Berlin, the lower bench contains considerable shaly material and is about 5 feet thick; hence the local name "Dirty Five coal."

Immediately upon the Blue Lick bed lies from 5 to 15 feet of shale. This shale is overlain by the Redstone limestone, which is an 8 to 10 foot thick sequence of massive limestone beds and interbedded thin layers of shaly limestone or calcareous shale. This limestone is commonly found in the highwalls of strip mines in the Blue Lick coal north of Meyersdale and west of Berkeley's Mill.

Between Meyersdale and Niverton, the Blue Lick coal was essentially mined out during World War I, when it was concurrently extracted with the Pittsburgh seam coal. Some of the crop coal left by deep-mining operations has recently been recovered by stripping. A large amount of Blue Lick coal has remained as Pillar coal, but is not considered economically valuable enough for current extraction. The main reserve area of Blue Lick coal exists between Berkeley's Mill and Berlin. The coal does not have the quality in this area that it did in the southwest, however.

Redstone Coal

The Redstone coal exists within the Berlin syncline. The most extensive mining of this seam is in the Pine Hill area about 3 miles southwest of Berlin; in this area the seam is known as the Pine Hill #1. The minable portion of the bed is about 44 inches thick. The coal is usually overlain by a dark grey to black shale that sometimes contains one or two impure coaly beds less than a foot thick. In two strip mines north of Berkeleys Mill, sandstone extends down to within a few feet of the top of the Redstone coal.

The Redstone coal is underlain by 8 to 10 feet of limestone (Redstone). A one to three foot thick parting of clay or clayey shale is often present between the coal and the limestone. A rider coal lies about 25 feet above the Redstone coal. This irregular rider averages about 8 inches in thickness, but in some places it is up to 18 inches thick.

The Redstone coal thins southwestward to a 1 to 2 foot thickness in the Meyersdale-Salisbury part of the Berlin syncline. The bed is not of any great economic value in the area, and has not been mined to any significant extent there.

Lower Sewickley Coal

The lower Sewickley coal bed has no economic value in southern Somerset County. The bed is only about 1 to 1 ½ feet thick and underlies small areas near the top of a few high hills near Pine Hill and Shaw Mines.

Coal Reserves

Introduction

French (1959) made reserve estimates of eleven coal beds in southern Somerset County using PAGS data. The eleven seams are, in stratigraphic order:

- Monogehela Group
  - Redstone coal
  - Blue Lick coal
  - Pittsburgh coal
- Conemaugh Group
  - Wellersburg coal
  - Upper Bakerstown coal
  - Lower Bakerstown coal
- Allegheny Group
  - Upper Freeport coal (E)
  - Lower Freeport coal (D)
  - Upper Kittanning coal (C')
  - Lower Kittanning coal (B)
  - Brookville coal (A)

Estimated reserves are reported by township in tonnage, and are based upon 1953 data (the latest which was readily available having a township-by-township breakdown).

Methods and Procedures

General procedures of the U.S. Geological Survey (Averitt and Berryhill, 1950) were used to calculate the coal reserves of southern Somerset County.

No overburden categories are shown, because most of the coal in southern Somerset County is less than 1,000 feet in depth.

Three classes of coal reserves are reported according to the reliability of data on which the estimates are based. These classes are: 1.) measured, 2.) indicated, and 3.) inferred. Tonnage reported as measured coal is considered to be within 20% of true tonnage. Observation stations are one-half mile or less apart. Where no data are available other than measurements along the outcrop, but where the continuity of the outcrop is measured in miles and suggests the presence of coal at considerable distance from the outcrop, a smooth line is drawn roughly one half mile in from the outcrop to mark the limit under cover of a block of measured coal.

Indicated coal is based upon observation stations of about one mile apart. Where no data are available other than outcrop measurements, but where continuity of the outcrop is measured in miles and suggests the presence of coal at considerable distances from the outcrop, two lines are drawn roughly parallel to the outcrop, one line one-half mile in from the outcrop; the other 2 miles in from the outcrop. Between these lines, the included coal is classified as indicated coal.

Inferred coal is reported where observation stations are more than two miles apart. It is based largely upon a broad knowledge of the continuity and uniformity of a coal bed, whereas indicated coal and measured coal are based more upon measurements at mines, natural outcrops, and from drill holes. Some coal which may be present has been excluded from the estimate because of insufficient information on the character of the bed in some places.

Reserves are reported in three different thickness categories, as follows:

14 to 28 inches
28 to 42 inches
more than 42 inches

Thicknesses used in calculating reserves are weighted averages. Where seams have top or bottom benches (or both) of inferior coal which can be avoided in the mining operation, those portions of the seam are not included in the thickness determination.

In calculating tonnage of coal, an average weight of 1,800 short tons per acre-foot was used.

Mined-out coal was determined from mine maps on file with the mine inspectors of the 21st and 32nd Bituminous Districts, respectively. For some areas where mining has been done, no maps were available for use, thus the amount of mined-out coal may be somewhat less than what had actually been mined up to 1953.

Original reserves before mining began were determined from the geologic map prepared in the current study and from a knowledge of the character of the coal beds obtained in the study. In calculating remaining reserves, mined-out coal was subtracted from the original reserve in each seam.

No recoverable reserve figures are herein reported. If such reserves are later calculated, a minimum thickness of about 30 inches should probably be used for deep-mine coal and about 24 inches for strip-mined coal. A reasonable percentage recovery which could be used is 50 percent, considering the ratio of coal mined and lost-in-mining to coal produced or marketed. Recovery at individual mines may be considerably higher than 50 percent, however.

Conclusions

The chief reserve of good quality coal in southern Somerset County lies in the upper Kittanning, upper Freeport, lower Kittanning, and lower Freeport beds, in that order of importance. Although a large reserve of Brookville coal is reported, this is misleading because of the structure of the bed. This seam generally contains as much noncoaly material as coal. In strip-mining operations certain desirable portions can be selectively mined, whereas in underground operations only a lower poor quality part of the total bed can ordinarily be left in the ground. Low quality coal lying above a minable bench does not generally make a good roof and therefore has to be removed. In the thickness estimates of the Brookville seam, most noncoal partings have been included because the seam is so changeable in character that no generalizations can be made on the minability of a certain bench (or benches) within the total bed.

Other seams which contain considerable noncoaly material are the upper Bakerstown, Wellersburg, and Blue Lick beds. It should be noted that there is an appreciable reserve of coal in the lower Bakerstown seam which is commonly a one-bench seam on the order of 28 inches thick. The thick Pittsburgh seam (Big Vein) is essentially mined out in southern Somerset County. The reserve of coal remaining in that bed is in its Pine Hill #2 facies in which the bed is between 3 and 4 feet thick.

This reserve study shows a large abundance of unmined coal in southern Somerset County. Most of this coal is considered to be of coking quality by the U.S. Bureau of Mines. Because it is low-volatile and medium-volatile bituminous in rank, it is an excellent source of steam coal.

Estimated Brookville coal reserves, 1953 data

Township	Area of Township (acres)	Area Excluded from Reserve (acres)	Area of coal lost by erosion (acres)	Coal over 14" before mining (acres)	Mined out and lost (acres)	Coal over 14" remaining (acres)	Measured Indicated Inferred	Coal Reserves in tons of 2,000 pounds					
								14" to 28" Thick		28" to 42" Thick		Over 42" Thick	
								Acres	kTons	Acres	kTons	Acres	kTons
Addison	41203.2	17990.4	15296.0	7916.8		7916.8	Measured					1702.4	14300.2
							Indicated					3712.0	36192.0
							Inferred					2502.4	24398.4
							Total					7916.8	74980.6
Black	27097.6	8793.6	7692.8	10611.2	659.2	9952.0	Measured					3961.6	38625.6
							Indicated					5990.4	58406.4
							Inferred						
							Total					9952.0	97032.0
Brothers-valley	41235.2	33376.0	2067.2	5792.0	166.4	5625.6	Measured					1132.8	11044.8
							Indicated					4492.8	43804.8
							Inferred						
							Total					5625.6	54849.6
Elk Lick	37689.6	22790.4	10963.2	3936.0		3936.0	Measured					275.2	1733.8
							Indicated					3660.8	23063.0
							Inferred						
							Total					3936.0	24796.8
Jefferson	390.4	390.4					Measured						
							Indicated						
							Inferred						
							Total						
Lower T. Foot	25280.0	8140.8	9414.4	7724.8		7724.8	Measured					825.6	7485.1
							Indicated					6329.6	57300.0
							Inferred					569.6	5513.3
							Total					7724.8	70298.4
Middle Creek	18502.4	2976.0	6854.4	8672.0		8672.0	Measured					1625.6	15849.6
							Indicated					4531.2	44179.2
							Inferred					2515.2	24523.2
							Total					8672.0	84552.0
Milford	19340.8	16467.2		2873.6		2873.6	Measured					153.6	1497.6
							Indicated					2611.2	25459.2
							Inferred					108.8	1060.8
							Total					2873.6	28017.6

Estimated Brookville coal reserves, 1953 data													
Somerset	12083.2	12083.2					Measured Indicated Inferred Total						
Stony Crk	14912.0	12998.4	1913.6				Measured Indicated Inferred Total						
Summit	31276.8	22604.8	7827.2	844.8		844.8	Measured Indicated Inferred Total					128.0 716.8 844.8	1248.0 6988.8 8236.8
Upper T. Foot	24992.0	3718.4	2931.2	18342.4		18342.4	Measured Indicated Inferred Total					4409.6 7820.8 6112.0 18342.4	42233.3 72287.0 59592.0 174112.3
Total	294003.2	162329.6	64960	66713.6	825.6	65888.0	Measured Indicated Inferred Total					14214.4 39865.6 11808.0 65888.0	134018.0 367682.4 115087.7 616786.1

Estimated lower Kittanning coal reserves, 1953 data													
Township	Area of Township (acres)	Area Excluded from Reserve (acres)	Area of coal lost by erosion (acres)	Coal over 14" before mining (acres)	Mined out and lost (acres)	Coal over 14" remaining (acres)	Measured Indicated Inferred	Coal Reserves in tons of 2,000 pounds					
								14" to 28" Thick		28" to 42" Thick		Over 42" Thick	
								Acres	kTons	Acres	kTons	Acres	kTons
Addison	41203.2		19052.8	22150.4		22150.4	Measured	3852.8	20227.7	3667.2	19252.8		
							Indicated	3667.2	12651.8	3724.8	19555.2		
							Inferred	6592.0	22742.4	646.4	3393.6		
							Total	14112.0	55621.9	8038.4	42201.6		
Black	27097.6		13728.0	13369.6	134.4	13235.2	Measured	3372.8	11636.2	2681.6	14078.4	345.6	2384.6
							Indicated	3788.8	13071.4	1939.2	10180.8	1075.2	7418.9
							Inferred					32.0	216.0
							Total	7161.6	24707.6	4620.8	24259.2	1452.8	10019.5
Brothers-valley	41235.2		5075.2	36160.0	2092.8	34067.2	Measured			2476.8	13003.2	2835.2	19137.6
							Indicated			9996.8	52483.2	7200.0	48600.0
							Inferred			7219.2	37900.8	4339.2	29289.6
							Total			19692.8	103387.2	14374.4	97027.2
Elk Lick	37689.6		14316.8	23372.8		23372.8	Measured			896.0	4704.0	262.4	1771.2
							Indicated			6502.4	34137.6	2457.6	16588.8
							Inferred			9164.8	48115.2	4089.6	27604.8
							Total			16563.2	86956.8	6809.6	45964.8
Jefferson	390.4			390.4		390.4	Measured						
							Indicated						
							Inferred			390.4	2049.6		
							Total						
Lower T. Foot	25280.0		10950.4	14329.6		14329.6	Measured	1452.8	5012.2	38.4	201.6		
							Indicated	8825.6	30448.3				
							Inferred	4012.8	13844.2				
							Total	14291.2	49304.7	38.4	201.6		
Middle Creek	18502.4		8339.2	10163.2		10163.2	Measured	480.0	1656.0	819.2	4300.8		
							Indicated	518.4	1788.5	2950.4	15489.6		
							Inferred	409.6	1413.1	4985.6	26174.4		
							Total	1408.0	4857.6	8755.2	45964.8		
Estimated lower Kittanning coal reserves, 1953 data													
Milford	19340.8		435.2	18905.6		18905.6	Measured	416.0	1435.2	2099.2	11020.8	467.2	3223.7
							Indicated	448.0	1545.6	4992.0	26208.0	627.2	4327.7
							Inferred	6.4	22.1	9113.6	47846.4	736.0	5078.4
							Total	870.4	3002.9	16204.8	85075.2	1830.4	12629.8
Somerset	12083.2		1612.8	10470.4		10470.4	Measured					428.8	2958.7
							Indicated					3558.4	24502.1
							Inferred					6483.2	43761.6
							Total					10470.4	71222.4

Stony Crk	14912.0		2540.8	12371.2		12371.2	Measured					1472.0	9936.0
							Indicated						
							Inferred					10899.2	73569.2
							Total					17371.2	83505.2
Summit	31276.8		10009.6	21267.2	6.4	21260.8	Measured	83.2	287.0	2406.4	12633.6	108.8	734.4
							Indicated			9478.4	49761.6	691.2	4665.6
							Inferred			7289.6	38270.4	1203.2	8121.6
							Total	83.2	287.0	19174.4	100665.6	2003.2	13521.6
Upper T. Foot	24992.0		4972.8	20.019.2		20019.2	Measured	3353.6	11569.9				
							Indicated	10080.0	34776.0				
							Inferred	6585.6	22720.3				
							Total	20019.2	69066.2				
Total	294003.2		91033.6	202969.6	2233.6	200736.0	Measured	13011.2	51824.2	15084.8	79195.2	4448.0	30210.2
							Indicated	27328.0	94281.6	39584.0	207816.0	17081.6	116039.1
							Inferred	17606.4	60742.1	38809.6	203750.4	27782.4	187641.2
							Total	57945.6	206847.9	93478.4	490761.6	49312.0	333890.5

Estimated reserves of upper Kittanning coal, 1953 data

Township	Area of Township (acres)	Area Excluded from Reserve (acres)	Area of coal lost by erosion (acres)	Coal over 14" before mining (acres)	Mined out and lost (acres)	Coal over 14" remaining (acres)	Measured Indicated Inferred	Coal Reserves in tons of 2,000 pounds					
								14" to 28" Thick		28" to 42" Thick		Over 42" Thick	
								Acres	kTons	Acres	kTons	Acres	kTons
Addison	41203.2		22771.2	18432.0	83.2	18348.8	Measured	960.0	3600.0	1651.2	8668.8	3308.8	25696.3
							Indicated	332.8	1248.0	960.0	5040.0	5318.4	41065.9
							Inferred					5817.6	44504.6
							Total	1292.8	4848.0	2611.2	13708.8	14444.8	111266.8
Black	27097.6		20352.0	6745.6	38.4	6707.2	Measured			1158.4	6081.6	851.2	7022.4
							Indicated			1920.0	10080.0	2227.2	18374.4
							Inferred			364.8	1915.2	185.6	1531.2
							Total			3443.2	18076.8	3264.0	26928.0
Brothers-valley	41235.2		8857.6	32377.6	1094.4	31283.2	Measured			1766.4	9273.6	1331.2	8985.6
							Indicated			8601.6	45158.4	5836.8	39398.4
							Inferred			8934.4	46905.6	4812.8	32486.4
							Total			19302.4	101337.6	11980.8	80870.4
Elk Lick	37689.6		16640.0	21049.6		21049.6	Measured	442.4	1584.0	960.0	5040.0		
							Indicated	3814.4	20025.6	6316.8	33163.2		
							Inferred	3756.8	14088.0	5779.2	30340.8		
							Total	7993.6	35697.6	13056.0	68544.0		
Jefferson	390.4			390.4		390.4	Measured						
							Indicated						
							Inferred			307.2	1612.8	83.2	524.2
							Total						
Lower T. Foot	25280.0		11456.0	13824.0		13824.0	Measured	89.6	336.0	806.4	4233.6	1587.2	13918.9
							Indicated			2233.6	11726.4	6694.4	54368.6
							Inferred					2412.8	18884.2
							Total	89.6	336.0	3040.0	15960.0	10694.4	86166.7
Middle Creek	18502.4		9964.8	8537.6		8537.6	Measured			659.2	3460.8	288.0	2376.0
							Indicated			4000.0	21000.0	57.6	475.2
							Inferred			3532.8	18547.2		
							Total			8192.0	43008.0	345.6	2851.2

Estimated reserves of upper Kittanning coal, 1953 data

Milford	19340.8		1324.8	18016.0		18016.0	Measured					307.2	2534.4
							Indicated			6368.0	33432.0	563.2	4646.4
							Inferred			9504.0	59875.2	1273.6	8023.7
							Total			15872.0	93307.2	2144.0	15204.5
Somerset	12083.2		7059.2	5024.0	44.8	4979.2	Measured			448.0	2352.0	396.8	2876.1
							Indicated			384.0	2016.0	2604.8	16910.4
							Inferred			64.0	336.0	1081.6	6814.1
							Total			896.0	4704.0	4083.2	26600.6
Stony Creek	14912.0		3129.6	11782.4	70.4	11712.0	Measured					499.2	3369.6
							Indicated					3500.8	23630.4
							Inferred					7712.0	52056.0
							Total					11712.0	79056.0
Summit	31276.8		11884.8	19392.0	435.2	18956.8	Measured			1785.6	9374.4	774.4	5227.2
							Indicated			8704.0	46696.0	185.6	1252.8
							Inferred			7379.2	38740.8	128.0	864.0
							Total			17868.8	94811.2	1088.0	7344.0
Upper T. Foot	24992.0		7065.6	17926.4	76.8	17849.6	Measured			2752.0	14448.0	2688.0	22176.0
							Indicated			2272.0	11928.0	8851.2	73022.4
							Inferred					1286.4	10612.8
							Total			5024.0	26376.0	12825.6	105811.7
TOTAL	294003.2		120505.6	173497.6	1843.2	171654.4	Measured	1472.0	5520.0	11987.2	62932.8	12032.0	93177.5
							Indicated	4147.2	21273.6	41760.0	220240.0	35840.0	273144.9
							Inferred	3756.8	14088.0	35865.6	198273.6	24793.6	176301.2
							Total	9376.0	40881.6	89612.8	481446.4	72575.6	542623.6

Estimated reserves of lower Freeport coal, 1953 data

Township	Area of Township (acres)	Area Excluded from Reserve (acres)	Area of coal lost by erosion (acres)	Coal over 14" before mining (acres)	Mined out and lost (acres)	Coal over 14" remaining (acres)	Measured Indicated Inferred	Coal Reserves in tons of 2,000 pounds					
								14" to 28" Thick		28" to 42" Thick		Over 42" Thick	
								Acres	kTons	Acres	kTons	Acres	kTons
Addison	41203.2	15872.0	25231.2				Measured						
							Indicated						
							Inferred						
							Total						
Black	27097.6	3123.2	23662.4	1312.0		1312.0	Measured						
							Indicated			275.2	1444.8		
							Inferred			1036.8	5443.2		
							Total			1312.0	6888.0		
Brothers-valley	41235.2		11494.4	29740.8	89.6	29651.2	Measured	851.2	2681.3	2502.4	13137.6		
							Indicated	8902.4	28042.5	2195.2	11524.8	12.8	84.5
							Inferred	14995.2	47234.9	192.0	1008.0		
							Total	24748.8	77958.7	4889.6	25670.4	12.8	84.5
Elk Lick	37689.6		17612.8	20076.8	70.4	20006.4	Measured	422.4	1520.6	428.8	2212.8		
							Indicated	2355.2	8748.7	1804.8	9299.5		
							Inferred	11424.0	35985.6	2400.0	12517.4	1171.2	7378.6
							Total	14201.6	45984.9	4633.6	24029.7	1171.2	7378.6
Jefferson	390.4	390.4					Measured						
							Indicated						
							Inferred						
							Total						
Lower T. Foot	25280.0	5664.0	14269.2	5356.8		5356.8	Measured	403.2	1512.0	38.4	201.6	576.0	4924.8
							Indicated	1945.6	7296.0	300.8	1579.2	2092.8	17893.4
							Inferred						
							Total	2348.8	8808.0	339.2	1780.8	2668.8	22818.2
Middle Creek	18502.4	3276.8	10688.0	4537.6		4537.6	Measured	416.0	1310.4	128.0	672.0		
							Indicated	3027.2	9535.7	953.6	5006.4	12.8	97.9
							Inferred						
							Total	3443.2	10846.1	1081.6	5678.4	12.8	97.9
Milford		7654.4	2784.0	8902.4	275.2	8267.2	Measured	672.0	2116.8	665.6	3494.4		
							Indicated	4992.0	15724.8	2297.6	2062.4		
							Inferred						
							Total	5664.0	17847.6	2963.2	15556.8		
Estimated reserves of lower Freeport coal, 1953 data													
Somerset		2630.4	8281.6	1171.2	19.2	1152.0	Measured	12.8	44.2	697.6	3642.2		
							Indicated	83.2	262.1	358.4	1873.9		
							Inferred						
							Total	96.0	306.3	1056.0	5516.1		

Stony Creek			3648.0	11264.0	140.8	11123.2	Measured	307.2	967.7	262.4	1377.6	1414.4	9335.0
							Indicated	5196.8	16369.9	1235.2	6484.8	313.6	2069.8
							Inferred	2393.6	7539.8				
							Total	7897.6	24877.4	1397.6	7862.4	1728.0	11404.8
Summit			14092.8	17184.0	134.4	17049.6	Measured			2342.4	12297.6	1004.8	7686.7
							Indicated			6681.6	35078.4	3084.8	22544.6
							Inferred			416.0	2184.0	3520.0	22176.0
							Total			9440.0	49560.0	7609.6	52407.3
Upper T. Foot		12332.8	8486.4	4172.8		4172.8	Measured	115.2	362.9	236.8	1243.2	236.8	1811.5
							Indicated	108.8	342.7	1414.4	7425.6	2060.8	16064.6
							Inferred						
							Total	224.0	705.6	1651.2	8668.8	2297.6	17876.1
TOTAL		50944.0	139340.8	103718.4	729.6	102988.8	Measured	3200.0	10515.9	7577.6	39723.8	3244.8	23855.9
							Indicated	26611.2	86052.4	18278.4	95778.2	7564.8	58656.9
							Inferred	28812.8	96760.3	3008.0	15709.4	4691.2	29554.6
							Total	58624.0	187328.6	28864.0	151211.4	15500.8	122067.4.

Township	Area of Township (acres)	Area Excluded from Reserve (acres)	Area of coal lost by erosion (acres)	Coal over 14" before mining (acres)	Mined out and lost (acres)	Coal over 14" remaining (acres)	Measured Indicated Inferred	Coal Reserves in tons of 2,000 pounds					
								14" to 28" Thick		28" to 42" Thick		Over 42" Thick	
								Acres	kTons	Acres	kTons	Acres	kTons
Estimated reserves of upper Freeport coal, 1953 data													
Addison	41203.2		26809.6	14393.6		14393.6	Measured			1312.0	6494.4	1652.6	12680.6
							Indicated			5894.4	29177.3	172.8	8812.8
							Inferred			5241.6	25945.9	115.2	881.3
							Total			12448.0	61617.6	1945.6	22374.7
Black	22097.6		24390.4	2702.2	198.4	2508.8	Measured			364.8	1930.6	915.2	6314.9
							Indicated			601.6	3158.4	83.2	798.7
							Inferred			76.8	403.2	467.2	2943.4
							Total			1043.2	5492.2	1465.6	10057.0
Brothers-valley	41235.2		13004.8	28230.4	147.2	28083.2	Measured			3148.8	16531.2	928.0	6165.1
							Indicated			7539.2	39580.8	524.8	3586.6
							Inferred			15942.4	83697.6		
							Total			26630.4	139809.6	1452.8	9751.7
Elk Lick	37689.6	13152.0	18393.6	6144.0		6144.0	Measured			691.2	3317.8		
							Indicated			5452.8	26173.4		
							Inferred						
							Total			6144.0	29491.2		
Jefferson	390.4			390.4		390.4	Measured						
							Indicated			108.8	571.2		
							Inferred			281.6	9856.2		
							Total			390.4	10427.2		
Lower T. Foot	25280.0		16108.8	9171.2		9171.2	Measured			550.4	2776.3	1094.4	8536.3
							Indicated			4243.2	21505.0	3136.0	24460.8
							Inferred			147.2	759.4		
							Total			4940.8	25040.7	4230.4	32997.1
Middle Creek	18502.4		10393.6	8108.8		8108.8	Measured			1779.2	9340.8		
							Indicated			5900.8	30979.2		
							Inferred			403.2	2116.8	25.6	215.0
							Total			8083.2	42436.8	25.6	215.0
Milford	19340.8		5113.6	14227.2	140.8	14086.4	Measured			4844.8	25435.2		
							Indicated			7910.4	41529.6		
							Inferred			1331.2	6988.8		
							Total			14086.4	73953.6		
Estimated reserves of upper Freeport coal, 1953 data													
Somerset	12083.2		9036.8	3046.4	12.8	3033.6	Measured			179.2	940.8	940.8	6447.4
							Indicated			1651.2	8668.8	76.8	1138.6
							Inferred			166.4	873.6	19.2	132.5
							Total			1966.8	10983.2	1036.8	7718.5

Stony Creek	14912.0		4394.4	9977.6		9977.6	Measured					300.8	2075.5
							Indicated			12.8	67.2	1126.4	7772.2
							Inferred			7456.0	39144.0	1081.6	7463.0
							Total			7468.8	39211.2	2508.8	17310.7
Summit	31276.8	5824.0	14412.8	11040.0	108.8	01931.2	Measured			972.8	5107.2		
							Indicated			4761.6	24998.4		
							Inferred			5196.8	27283.2		
							Total			10931.2	59388.8		
Upper T. Foot	24992.0		19843.2	15148.8		15148.8	Measured			702.4	4737.6	870.4	6880.0
							Indicated			11449.6	60110.4	569.6	4492.8
							Inferred			1132.8	5947.2	224.0	1881.6
							Total			13484.8	70795.2	1664.0	13254.4
TOTAL	294003.2	18976.0	152441.6	122585.6	608.0	121977.6	Measured			14745.6	76611.9	6707.2	49099.8
							Indicated			55526.4	286519.7	5689.6	51062.5
							Inferred			37376.0	203015.7	1932.8	13516.8
							Total			107648.0	566147.3	14329.6	113679.1

Estimated reserves of lower Bakerstown coal, 1953 data

Township	Area of Township (acres)	Area Excluded from Reserve (acres)	Area of coal lost by erosion (acres)	Coal over 14" before mining (acres)	Mined out and lost (acres)	Coal over 14" remaining (acres)	Measured Indicated Inferred	Coal Reserves in tons of 2,000 pounds					
								14" to 28" Thick		28" to 42" Thick		Over 42" Thick	
								Acres	kTons	Acres	kTons	Acres	kTons
Brothers-valley	41235.2		21625.6	19609.6		19609.6	Measured	3923.2	14712.0	2540.8	13339.2		
							Indicated	8172.8	30648.0	4972.8	26107.2		
							Inferred						
							Total	12096.0	45360.0	7513.6	39446.4		
Elk Lick	37689.6		21388.8	16300.8		16300.8	Measured	2355.2	8832.0	2112.0	11088.0		
							Indicated	5580.8	20928.0	6252.8	32827.2		
							Inferred						
							Total	7936.0	29760.0	8364.8	43915.2		
Stony Creek	14912.0		8812.8	6099.2		6099.2	Measured	979.2	3672.0				
							Indicated	3596.8	13488.0	1523.2	7996.8		
							Inferred						
							Total	4576.0	17160.0	1523.2	7996.8		
Summit	31276.8		17382.4	13894.4	6.4	13888.0	Measured	1228.8	4608.0	3136.0	16464.0		
							Indicated	345.6	1281.0	9177.6	48182.4		
							Inferred						
							Total	1574.4	5889.0	12313.6	64646.4		
TOTAL	125113.6		69309.6	55904.0	6.4	55897.6	Measured	8486.4	31824.0	7788.8	40891.2		
							Indicated	17696.0	66345.0	21926.4	115113.6		
							Inferred						
							Total	26182.4	98169.0	29715.2	156004.8		

Estimated reserves of upper Bakerstown coal, 1953 data

Township	Area of Township (acres)	Area Excluded from Reserve (acres)	Area of coal lost by erosion (acres)	Coal over 14" before mining (acres)	Mined out and lost (acres)	Coal over 14" remaining (acres)	Measured Indicated Inferred	Coal Reserves in tons of 2,000 pounds					
								14" to 28" Thick		28" to 42" Thick		Over 42" Thick	
								Acres	kTons	Acres	kTons	Acres	kTons
South-ampton	20230.4		11897.6	8332.8		8332.8	Measured			2784.0	14616.0	5548.9	40783.7

Estimated reserves of Wellersburg coal, 1953 data

Township	Area of Township (acres)	Area Excluded from Reserve (acres)	Area of coal lost by erosion (acres)	Coal over 14" before mining (acres)	Mined out and lost (acres)	Coal over 14" remaining (acres)	Measured Indicated Inferred	Coal Reserves in tons of 2,000 pounds					
								14" to 28" Thick		28" to 42" Thick		Over 42" Thick	
								Acres	kTons	Acres	kTons	Acres	kTons
South-ampton	20230.4		15692.8	4537.6		4537.6	Measured Indicated Inferred Total					1440.0 1907.2 1190.4 4537.6	21284.2 28608.8 17856.0 67749.0

Estimated reserves of Pittsburgh coal, 1953 data

Township	Area of Township (acres)	Area Excluded from Reserve (acres)	Area of coal lost by erosion (acres)	Coal over 14" before mining (acres)	Mined out and lost (acres)	Coal over 14" remaining (acres)	Measured Indicated Inferred	Coal Reserves in tons of 2,000 pounds					
								14" to 28" Thick		28" to 42" Thick		Over 42" Thick	
							Measured	Acres	kTons	Acres	kTons	Acres	kTons
Brothers-valley	41235.2		36307.2	4928.0	921.6	4006.4				499.2	2732.2	3507.2	22526.4
Elk Lick	37689.6		35692.8	1996.8	1996.8								
South-ampton	20230.4		19936.0	294.4	294.4								
Summit	31276.8		29248.0	2028.8	1171.2	857.6	Measured			409.6	2211.8	448.0	3229.4
TOTAL	110201.6		121184.0	9248.0	4384.0	4864.0	Measured			908.8	4944.0	3955.2	28755.8

Estimated reserves of Blue Lick coal, 1953 data

Township	Area of Township (acres)	Area Excluded from Reserve (acres)	Area of coal lost by erosion (acres)	Coal over 14" before mining (acres)	Mined out and lost (acres)	Coal over 14" remaining (acres)	Measured Indicated Inferred	Coal Reserves in tons of 2,000 pounds					
								14" to 28" Thick		28" to 42" Thick		Over 42" Thick	
								Acres	kTons	Acres	kTons	Acres	kTons
Brothers-valley	41235.2		37996.8	3238.4	6.4	3232.0	Measured	1510.4	4938.2	819.2	4300.8	902.4	5777.3
Elk Lick	37689.6		36224.0	1465.6	1465.6								
Summit	31276.8		29264.8	1312.0	870.4	441.6	Measured					441.6	2782.1
TOTAL	110201.6		104185.6	6016.0	2342.4	3673.6	Measured	1510.4	4938.2	819.2	4300.8	1344.0	8559.4

Estimated reserves of Redstone coal, 1953 data

Township	Area of Township (acres)	Area Excluded from Reserve (acres)	Area of coal lost by erosion (acres)	Coal over 14" before mining (acres)	Mined out and lost (acres)	Coal over 14" remaining (acres)	Measured Indicated Inferred	Coal Reserves in tons of 2,000 pounds					
								14" to 28" Thick		28" to 42" Thick		Over 42" Thick	
								Acres	kTons	Acres	kTons	Acres	kTons
Brothers-valley	41235.2		39244.8	1990.4	678.4	1312.0	Measured					1056.0	15048.0
							Indicated						
							Inferred					256.0	1612.8
							Total					1312.0	16660.8
Elk Lick	37689.6		37209.6	480.0		480.0	Inferred					480.0	3024.0
Summit	31276.8		30796.8	480.0	19.2	460.0	Measured					147.2	2581.4
							Indicated						
							Inferred					313.6	1975.7
							Total					460.8	4557.1
TOTAL	110201.6		107251.2	2950.4	697.6	2252.8	Measured					1516.8	19605.1
							Indicated						
							Inferred					736.0	4636.8
							Total					2252.8	24241.9

Natural Gas

Two producing wells exist within the mapped area, in the Ohiopyle Field and on the Laurel Hill anticline. The wells produce from a cherty zone in the lower part of the Middle Devonian Onondaga Formation. Five producing wells also occur in and around Fayette County that are in this same field. Most gas production comes from the Onondaga chert but some is also produced by the Ridgeley sandstone in the Lower Devonian Oriskany Formation.

Three wells have been drilled on the Negro Mountain anticline and two on the Deer Park anticline. A show of gas was found in one of the wells on the Deer Park anticline, and also in one of the Negro Mountain wells. The others were dry holes.

The Deer Park anticline well (Mowry well), from which a show of gas was obtained, is the deepest well drilled in the mapped area. Total depth of the well is 9,256 feet and it penetrates the basal Silurian Tuscarora Formation at a depth of about 9,140 feet. The other wells are bottomed in the Oriskany-Helderberg sequence or at a high stratigraphic level.

Producing Horizons

The only stratigraphic units in which gas in commercial quantities has been found in the mapped area and in the immediately adjacent area are (1) a cherty zone in the lower part of the Middle Devonian Onondaga Formation and (2) the Ridgeley sandstone of the Lower Devonian Oriskany Formation.

Controls of Gas Accumulation

All of the existing gas wells in the area have been drilled on anticlinal structures. In the Ohiopyle field, there are several wells which are located close to the surface anticlinal crest, but some are about a mile east of the crest. Some faulting is present and is probably a secondary control of gas accumulation within the anticlinal structure.

Shows of gas obtained in the wells on the Negro Mountain anticline and the Deer Park anticline also occur structurally near the crests of these anticlines.

A minor structural high in southern Somerset County that is as yet untested is the Centerville dome, which occurs between the New Lexington syncline and the Negro Mountain anticline. A structural terrace in the vicinity of Kingwood on the lower flank of the Laurel Mountain anticline where the New Lexington and Lower Youghiogheny synclines are offset by a distance of about four miles.

The Mowry Well

The Mowry well is the only extant well in the mapped area which bottoms below the Oriskany-Helderberg sequence. The well was drilled in September, 1962, and reached the basal Silurian Formation at a depth of 9,140 feet. The total well depth is 9,256 feet.

The following stratigraphic identifications were made by A.S. Cate of the Pennsylvania Geological Survey:

	Depth (Feet) to top of Formation
Devonian	
Hamiltonian	2,420
Onondaga	3,480
Oriskany (Ridgeley)	3,578
Silurian	
Tonoloway	4,160
Wills Creek	6,630

Bloomsburg	7,350
McKenzie	7,370
Rochester	7,970
Clinton (Rose Hill)	8,240
Thorold	9,010
Tuscarora	9,140
TOTAL	**9,256**

In the Mowry well, salt water but no gas was found in the Tuscarora Formation. In the Oriskany Formation at a depth range of 3583-3591 feet, 4190 mcf of gas was obtained after fracturing , but the well is no longer producing.

Cate recognized faulting in the Mowry well. The Tonoloway sequence appears to be abnormally thickened. This could be caused simply by stratigraphic thickening, but it is more likely the result of thrust faulting in incompetent beds. Cate interpreted the dominant faulting to have occurred at the Tonoloway-Wills Creek contact.

LIMESTONE

Introduction

Abundant limestone is present in southern Somerset County which is suitable for use as concrete aggregate, road metal, road base, riprap, railroad ballast, agricultural lime, and possible cement making. No limestone of sufficient purity (95% calcium carbonate) is available for use as metallurgical flux, chemical lime, or mine dust.

At least 15 distinct limestone beds have been mined or quarried in southern Somerset County. Only three are still actively being worked in the area : the Loyalhanna, the Deer Valley, and the Wymps Gap (Greenbrier) limestones. All three of these beds occur within the Mississippian age strata. Other limestone beds worked in the past include the Johnstown, lower Freeport, and upper Freeport in the Allegheny Group; the Irondale, Lavansville, Barton, Clarksburg, Franklin, and Lower Pittsburgh in the Conemaugh Group; and the Redstone and Fishpot limestones in the Monongehela Group.

All of the Allegheny, Conemuagh, and Monogehela limestone beds are freshwater limestones. They are generally thin (less than 10 feet thick), have interbedded thin shaly limestone beds, and are relatively low in $CaCO_3$ (from 70 to 90 %). The limestones are dark, bluish-gray rock which weathers to a buff to pale yellowish-brown color. The Mississippian Wymps Gap and Deer Valley limestones are each about 10 feet thick, and are pure enough for many modern commercial uses. These limestones are fossiliferous, and occur within the Mauch Chunk Formation. The Wymps Gap limestone is locally known as "blue stone", the less pure Deer Valley limestone is known as the "gray stone." Both beds are worked by the Keystone Lime Company west of Mount Davis on the Negro Mountain anticline; the plant in addition processes the Loyalhanna, a very sandy limestone that is used commercially. The Wymps Gap limestone is worked in a drift-mine operation; the Deer Valley and Loyalhanna limestones are worked together in open-pit mining.

No workable limestone beds lie below the Loyalhanna in southern Somerset County. The underlying rocks – Pocono, Castkill, and Jennings Formations – are composed entirely of shales and sandstones with no known occurrences of limestone within them.

Mississippian Limestones

Loyalhanna Limestone

The Loyalhanna limestone is a very sandy limestone having a calcite-quartz ratio of about 55:45 percent. It is a tough stone that makes a very good aggregate for road construction, but its high silica content precludes its use for Portland cement and agricultural lime.

Loyalhanna limestone outcrops in several widely distributed locations in southern Somerset County. It occurs on the Laurel Hill anticline, on the Negro Mountain anticline, on the outer flanks of the Deer Park anticline along Allegheny Mountain and Big Savage Mountain, and in western Bedford County where it occurs along Little Allegheny Mountain. Outcrops of this formation are not abundant in any of these places. The most notable occurrence is on the Negro Mountain anticline at two locations: one in the Casselman River gorge at and near the anticlinal axis, and west of Mount Davis at the Keystone Lime Company quarry. The Loyalhanna limestone is 50 feet thick at the Casselman River gorge. Its thickness is probably similar at the Keystone Lime quarry, but only the upper 25 to 50 feet of the bed is quarried there. The Loyalhanna limestone has been worked at two sites on the north side of the river adjacent to the Baltimore and Ohio Railroad. At one of these locations, on the anticlinal axis, the Loyalhanna limestone was first quarried and then "deep-mined"; at the other, about three-fourths of a mile downstream (to the southwest), the rock was mined in an open-pit quarry.

Deer Valley Limestone

In some areas of southern Somerset County, the Loyalhanna limestone is overlain by the Deer Valley limestone, which has a purity sufficient for agricultural lime and aggregate stone. The areal extent of the Deer Valley is less than that of the Loyalhanna. The limestone crops out at several sites along an east-west belt extending from Bidwell (on the Youghiogheny River) eastward to Hoblitzell (on Wills Creek in western Bedford County). The limestone does not occur in the Casselman River gorge as it travels through Negro Mountain suggests a northern limit to its extent. To the south, the limestone extends into western Maryland at least as far south as Grantsville.

The Deer Valley limestone is worked mostly in a V-shaped belt occurring to the southwest of Mount Davis. The Deer Valley limestone was quarried and burned for lime on almost every farm in the area along this belt before modern transportation became available to allow widespread distribution. The Keystone Lime Company quarry is the only presently operating Deer Valley limestone quarry. At the Keystone quarry, the Deer Valley bed is about 8 ½ feet thick ,but the top 1 ½ feet is discarded because it has a high siliceous lime content, which renders the stone too impure to use as agricultural limestone. The upper bench here is known locally as "bastard" rock.

Wymps Gap Limestone

The Wymps Gap (formerly Greenbrier) limestone is a purse, dense marine limestone with bed thicknesses from 10 to 25 feet and occurring within the Mauch Chunk Formation. The bed lies an average of 160 feet above the base of the Formation. There are some calcareous zones between the base of the Mauch Chunk Formation and the Wymps Gap limestone, but none contains any pure limestone. The higher quality stone within the bed is usually about 8 to 10 feet thick.

The Peoples Natural Gas marker well on the Negro Mountain anticline between Rockwood and Garrett penetrated the Wymps Gap limestone. The Wymps Gap layer there is 11 feet thick. It is overlain by green siltstone and underlain by gray fossiliferous shale.

At the Keystone Lime Company drift mine west of Mount Davis, about 8 feet of this bed is mined for commercial use. The mine is located very close to the crest of the Negro Mountain anticline, so bed dip is not an important factor in the mining operation. This mine produces stone throughout the winter months when the weather is inclement, whereas the Deer Valley and Loyalhanna limestones are worked in the Keystone quarry about one mile away and are extracted most of the year when the weather permits. Crushing and sizing is done at the quarry site. A typical section of the Wymps Gap limestone at the Keystone Lime quarry is as follows:

Description	**Thickness**	
	Feet	Inches
1. Shale, Red		
2. Limestone, pale red and pale green, somewhat clayey, crystalline, fossils abundant in some beds.	8	0
3. Shale, dark gray, calcareous, contains thin interbedded limestone layers, fossils	3	2

abundant in some beds.		
4. Limestone, gray, crystalline, in a single bed, fossiliferous (mined).	5	0
5. Limestone, gray, crystalline, contains several one-half-inch calcareous shale layers near the top, beds 3 to 8 inches thick (mined).	3	0

Wymps Gap limestone mined in southern Somerset County is used both as aggregate stone and agricultural lime. Some beds present in the Wymps Gap limestone may have potential for use in making Portland cement, but they are too thin to be commercially viable. The stone is too impure to be used as chemical lime or metallurgical flux.

An analysis of Wymps Gap limestone from an operation in Fayette County about 6 miles west of Confluence on the Laurel Hill anticline is as follows:

SiO_2	11.96%
Al_2O_3	4.38%
Fe_2O_3	2.07%
$CaCO_3$	77.09%
$MgCO_3$	2.38%
TOTAL	97.88%

The composition of the stone on Negro Mountain is likely to be similar.

Evaluation of Potential Mining Areas of Mississippian Limestones

Two area sexist with the best potential for working the Loyalhanna limestone in southern Somerset County : (1) in the Casselman River gorge through Negro Mountain and (2) on the breached portion of the Negro Mountain anticline southwest of Mount Davis. The Casselman sites is located near the Baltimore and Ohio Railroad on the north, and (the now defunct) Western Maryland Railroad on the south. The future mining potential is greater on the south, as it has not been mined as has the northern side. There is also sufficient room for a crushing plant near the junction of Lick Run and the Casselman River. The Wymps Gap limestone is also reported to be about 12 feet thick in this area, and represents another possibility for mining on this site. The outcrop occurs at about 200 feet above the level of the Western Maryland Railroad pathway (now the Casselman River portion of the Allegheny Highlands Biking/Hiking Trail). It also is found in the bed of Lick Run about three-fourths of a mile upstream from the confluence of Lick Run and the Casselman River. These beds are close to the Negro Mountain anticlinal axis, and therefore have only slight dip.

A second future mining possibility occurs in a V-shaped outcrop belt just north of the current Keystone Lime Company works west of Mount Davis. The outcrop diverges southwestward into White's Creek Valley at Unamis on the western flank of the syncline, and toward Hi-Point on US Route 40 in Maryland on the eastern flank. In this belt the Deer Valley limestone occurs as a 7 to 8 foot thick bed overlying the Loyalhanna, and the two can be worked in the same operation. The Wymps Gap limestone lies about 160 feet above the Loyalhanna, and also may be workable in this area. The most favorable exploratory sites are near the apex of the "V" where the strata have negligible dip angles. As the outcrop belt diverges and extends into the synclinal structure, the bed dip increases. At Unamis, on the western flank there is a dip of about 7°(12%) to the northwest, and at the Pennsylvania-Maryland line on the eastern flank of the structure, the dip is about 5°(9%) to the southeast.

Another potential area for future Loyalhanna limestone mining is in the Youghiogheny River gorge through Laurel Hill. The Loyalhanna limestone occurs at railroad level about 2 ½ miles downstream from Confluence. The bed rises to the crest of the anticline and is found in the crestal area mostly in Fayette County. On the eastern flank of the anticline in Somerset County the Loyalhanna bed dips too steeply and occurs in terrain which is too rugged to be readily accessible for drift mining or quarrying.

Loyalhanna limestone should occur in a narrow belt along the lower slopes of Allegheny Mountain east of its crest, but few outcrops occur in this area to confirm its existence. The limestone likely appears here, but would not be particularly easy to mine because of a probable 10°(17 ½ %) dip to the northwest. It is most accessible where Piney Creek and Flaugherty Creek cut through Allegheny Mountain southeast of Salisbury and Meyersdale, respectively. The limestone also occurs in the valley of the Raystown branch of the Juniata River near the site of the Pennsylvania Turnpike tunnel through Allegheny Mountain and in Breastwork Run valley near the northern boundary of the Berlin quadrangle. At Flaugherty Creek Gap, the Baltimore and Ohio Railroad is available for transportation of mined stone.

A similar situation exists along the Loyalhanna limestone belt on the lower western slopes of Big Savage Mountain east of the valley between Big and Little Savage Mountains, a valley developed mostly in the red shales of the Mauch Chunk Formation. The strata dip southeast at an angle of about 13°(23%) here, and few outcrops exist. The limestone bed is accessible where east of Fairhope where Wills Creek cuts through Big Savage Mountain. The limestone is at the level of the Baltimore and Ohio Railroad tracks one-half mile downstream from Fairhope, and then rises onto Big Savage Mountain on both sides of the valley. The Loyalhanna bed is also accessible near the headwaters of Flaugherty Creek in the area near the Big Savage Tunnel on the former Western Maryland Railroad, and possible could be quarried there.

The Loyalhanna limestone outcrops occur high on the eastern slopes of Little Allegheny Mountain in western Bedford County. The formation tends not to appear in outcrops because it is covered in sandstone rubble from the Pottsville and Allegheny Formations exposed on the up-slope side. The strata here exhibit a northwest dip at an angle between 60° and 80° on the steep eastern limb of the Wellersburg syncline. The dip decreases northward toward the nose of the syncline; at Hoblitzell, where the Loyalhanna bed crosses Wills Creek, the dip is about 10°. The Loyalhanna at Hoblitzell is overlain by about 13 feet of Deer Valley limestone. It is expected that both of these limestones would occur at the nose of the Wellersburg syncline about three-fourths of a mile northwest of the Mount Nebo School site in Bedford County and be available for either drift-mining or quarrying.

No information is available on the Wymps Gap limestone on the flanks or nose of the Wellersburg syncline. It is likely, however, that this bed does occur in these locations in minable thicknesses.

Pennsylvanian Limestones

The Pennsylvanian age limestones in southern Somerset County are generally thinner and of poorer quality than those of Mississippian age. At least twelve different Pennsylvanian limestone units have been worked in one area or another; these range from the Johnstown limestone in the middle of the Allegheny Group to the Fishpot limestone near the top of the uneroded part of the Monongehela Group. None of these beds is presently being worked in southern Somerset County. They were usually used by local farmers who burned the stone to produce agricultural lime. A higher quality product can now be quarried at some distance and transported economically, so these thin Pennsylvanian limestone units are no longer worked, except in some very small operations.

The three Pennsylvanian limestones which have been quarried primarily are the Johnstown, which underlies the upper Kittanning coal; the Barton, underlying the Barton coal (also known as the Elk Lick); and the Lavansville limestone which underlies the Harlem seam.

The Johnstown limestone is named for the city of Johnstown in Cambria County, and is known in that area as the "cement bed" because it has been used in the past for making natural cement. This bed extends to the south into Somerset County and Western Maryland. In Maryland, Waagé (1950) found in drilling studies that the limestone was impure and graded downward into calcareous claystone and clay with limy pellets. It runs as much as 15 feet thick in some areas, but averages 5 to 10 feet thick. Richardson (1954) noted the Johnstown limestone to be persistent over wide areas in northern Somerset County, having thicknesses of 5 to 10 feet. The bed in southern Somerset County commonly has a thickness of 8 to 9 feet, and outcrops are common, attesting to its persistence. This limestone crops out in all areas of the Allegheny Group in southern Somerset County except in the Wellersburg syncline where the limestone likely occurs but is probably covered with rubble. The greatest concentration of Johnstown limestone lies east and west of Laurel Hill Creek in the Metzler-King Bridge area. .

A set of ten analyses of Johnstown limestone in Somerset County (Miller, 1925, mostly central and northern) is as follows:

	Avg. %	% Range
$CaCO_3$	72	50 to 92
$MgCO_3$	9	1 to 23
S	0.21	0.088 to 0.464
P	0.064	0.013 to 0.142
Insoluble residue	10	4 to25

Six of these analyses also show the following:

$FeCO_3$	4	1 to 8
Al_2O_3	1.25	0.26 to 4.44

The above tests show that the Johnstown limestone contains too little calcium carbonate to be classified as high-calcium lime and contains too much magnesium carbonate on the average to be used in making Portland cement (the limit is about 5%). The stone is not hard enough or tough enough to make good aggregate stone or road metal; its level of contaminants, variability, and relative thinness precludes its modern-day use for agricultural liming.

The Barton limestone, like the Johnstown, is one of the more persistent freshwater limestones in the Pennsylvanian strata of southern Somerset County. The Barton limestone underlies the coal seam having the same name, and usually occurs in two benches with a shale parting that is generally calcareous. The total thickness of the limestone bed averages 20 to 25 feet, with one of the bedded limestone benches being as much as 10 feet thick locally.

The Barton limestone has been quarried in the Lower Youghiogheny syncline in the vicinity of Confluence and Ursina, and in the vicinity of Berlin. In the former area, this limestone bed occurs from 300 to 400 feet above the valley bottom and in the Berlin area it is found on the valley sides between Berlin MacDonaldton. Miller (1934) identifies the Barton limestone quarried at Ursina as being the lower bench (incorrectly named the Wellersburg). An analysis of the stone from that locality is as follows:

$CaCO_3$	90.803 %
$MgCO_3$	2.738 %
$FeCO_3$, Al_2O_3	1.986 %
S	0.084 %
P	0.048 %
Insoluble residue	3.740 %

The Lavansville limestone has also been quarried at several places in southern Somerset County in the past, but no currently operating quarries exist. The limestone is most prevalent in the New Lexington and Lower Youghiogheny synclines, but has also been identified in the Berlin syncline. Four abandoned quarries exist in the Lavansville bed about 1 ½ to 2 miles north of Ursina in Jersey Hollow. Two other Lavansville limestone quarries are known to exist in the hills north of New Lexington. At one time, according to Richardson (1934) this limestone was quarried and burned on nearly every farm in the vicinity of Lavansville, about 4 miles west of Somerset on Route 31. Richardson (1934) notes over 30 quarries in that area. He was uncertain of the identity of the stone and named it the Ewing.

In the Somerset quadrangle, the common thickness averages 5 feet, ranging from 4 to 6 ½ feet. Incomplete exposures prevent accurate determination of thickness of this bed in the area, but in at least one of the Jersey Hollow quarries the thickness is at least 10 feet.

The Lavansville limestone is a dense, dark bluish-gray stone that weathers to a buff to yellowish color. It appears to be free from shaly partings. An analysis (Richardson, 1934) is as follows:

	Percent
CaO	49.72
MgO	1.23
$Fe_2O_3 + Al_2O_3$	2.72
Insoluble	4.21
Ignition loss	41.64
TOTAL	99.52

Other limestones have been worked in southern Somerset County to a lesser extent than those previously discussed. These stones were quarried at one more places to use as agricultural lime. None of these is being worked at present, and their relative lack of quality and of thickness makes it unlikely that they will be worked in the near future.

Clay

Introduction

Nearly all of the coal in southern Somerset County used commercially occurs as underclay beneath Pennsylvanian coal beds, mostly those in the Allegheny Group. One exception is a surficial clay deposit near Springs used by the Otto Brick and Tile Works to manufacture housing brick and several different kinds of tile. No commercial clays have been found in Somerset County in strata of either Devonian or Mississippian age. The high-quality refractory clays are almost exclusive to the Allegheny Group, but some minor occurrences of low-quality flint clay and semi-refractory soft clay in the Glenshaw Formation of the Conemaugh Group.

The commercial deposits of flint clay that have been or are currently being worked in southern Somerset County are the Clarion, lower Kittanning, and upper Kittanning seams. The Clarion (Mount Savage, in Maryland) is being worked by General Refractories southeast of Fort Hill station on the western flank of Negro Mountain. It has also been worked on a small scale at MacDonaldton on the western slopes of Allegheny Mountain. This same bed of clay was previously mined by the Mount Savage Fire Brick Company about 1 ½ miles east of Meyersdale at Glade City and at Williams Station on Wills Creek about one mile downstream from Fairhope. Flint clay occurring in the lower Kittanning bed was also mined at Ellerslie, Maryland. The opening of the mine where the clay was extracted is in the extreme southeastern corner of Somerset County on Little Allegheny Mountain. The upper Kittanning bed was worked for flint clay at Silbaugh about 5 miles southeast of Confluence by General Refractories, and has also been mined a mile east of Bando on the north side of the Mud Pike.

The total underclay zones below coal beds are usually persistent, but bodies of flint clay and high-quality soft clays occurring within them are usually patchy and contain a high degree of lenticularity. These bodies of high-quality clay are difficult to locate because there are no known infallible guides to prospecting for them. Experience has shown, however, that some clay beds tend to contain more high-quality clays than others.

In southern Somerset County and Western Maryland, the Clarion clay has been the predominant source of flint clay. The upper and lower Kittanning clays also offer good potential. The middle Kittanning and upper Freeport are further possible sources of commercial flint clay. Some shows of flint clay have been seen at outcrops of all of these clays in southern Somerset County. It is probable, then, that deposits of high-quality clay lie within one or more of these clay beds. A systematic prosecting study of the area would be required to accurately determine this potential. The best place to search with such a study would be along the outcrop belts of the Allegheny Group. Clay beds from the Brookville to the upper Kittanning (a stratigraphic interval of about 175 feet) should be tested first, and then those from the upper Kittanning through the upper Freeport next (an interval of about 100 feet). Areas that are easily accessible and that have surface indications of flint clay should be assessed first, but good clays may also occur in areas where access is limited and no surficial indications are present.

Beginning with the upper Kittanning underclay zone and extending upward through the upper Allegheny, through the entire Conemaugh, and through the uneroded lower part of the Monongahela Group in southern Somerset County, the underclays all contain a considerable amount of calcareous material. This may occur as bedded limestone or nodular limestone. The calcareous zones may occur either within or above the clay bed. Flint clay generally appears in the lower parts of the clay zones; it is overlain by either soft clay or some kind of calcareous material, or both. The calcareous zones thicken and increase in relative proportion of the total underclay zone moving upward in the stratigraphic column. This explains why the upper Conemaugh and Monongahela Groups do not contain clay beds of commercial interest.

Clay Beds of the Allegheny Group

Clarion Clay

The underclays and associated coal beds in the lower Allegheny and upper Pottsville Groups are quit difficult to identify and correlate. The most obscure portion of the section lies between the lower Kittanning and Mercer coal beds. There are no marine limestones present to serve as stratigraphic guides, several sandstones are present that look similar at outcrops, and coal and clays have enough lateral variability to make them unreliable key beds. In areas where good drilling data are available, the identification is somewhat easier, but where only surficial data is available, correct bed identification is very difficult. Waagé's (1950) study of the Maryland refractory clays is valuable as a source of stratigraphic information relative to the area. His stratigraphic information meshes well with the conditions in southern Somerset County, and his work is primarily based upon core studies, which are inherently more informative than simple surface measurements.

Waagé (1950) correlated the Mount Savage coal and clay of Maryland with the Clarion coal and clay of Pennsylvania. The Mount Savage clay bed is a primary source of raw clay for refractory products in Maryland, and therefore by inference, the Clarion clay of southern Somerset County can be expected to be of good quality as well. The bed was worked from 1936 by the General Refractories Company at Fort Hill, about 7 miles east of Confluence. The bed was first identified as the Brookville clay (Flint, 1956; Flint, et. al., 1959;), this bed is now considered to be Clarion clay on the basis of the occurrence of an abundance of good quality clay at this stratigraphic position in nearby Maryland and also on the basis of the identification of that which was thought ot be the Scrubgrass coal a few feet above in some parts of the Fort Hill strip mine.

The General Refractories mine is located on the west flank of Negro Mountain about 2 ½ miles southeast of Fort Hill station. The mine is on the western flank of the Negro Mountain anticline. The clay bed has a northwest dip of about 4-5° (8%). The original mine is a drift-type, but up-dip strip-mining is now also being done. The 6 foot thick Clarion coal seam overlies the clay bed. The seam contains several interbedded shale layers which lower the value of the coal. The coal is discarded in the open-pit mine and is left in place as roof material in the drift mine. In some places the coal is overlain by the massive Kittanning sandstone, but in other places it is separated from the coal be several feet of shale. Considerable rubble from this sandstone is found on the adjacent slopes where strip-mining has not taken place. On the local scale, where the Kittanning sandstone has not replaced it, a thin bed of coal (Scrubgrass) can be seen about 15 feet above the top of the Clarion clay. The shale overlying this coal contains fossils of brachiopods (probably *Marginifera*). This shale may be a shaly variant of the Vanport limestone that occurs in Butler and Armstrong Counties, and several counties in eastern Ohio.

In the original Fort Hill mine, the clay was hand-loaded and hauled by mule; in the strip mine, it was loaded by power shovel and trucked. The clay was shipped via the Western Maryland Railroad to Salina, PA, in Westmoreland County. It was used there for making refractory products; the lower 3 feet of the seam was particularly good for making refractory brick.

The Clarion clay has also been worked at williams Station on the Baltimore and Ohio Railroad about 1 ¼ miles downstream of Fairhope in the Wellersburg syncline. The clay was first mined in 1870 by the Savage Fire Brick Company. The North Savage Fire Brick Company mined in the area in 1881. The seam was worked up to 1918, when a lack of good quality clay forced the company to turn to manufacturing paving brick from local shales. The main drift of the mine ran about 1,000 feet into the hill in 1885. The clay seam dips about 8° in the direction of

S30°E. No mining has taken place sine 1918, when the Williams Station plant burned.

The identity of the clay bed worked at Williams is questionable. Leighton (1941) and Shaw(1928) identified the flint clay portion of the 4 to 15 foot thick bed as the Mercer clay, and the plastic (soft) clay portion as the Sharon, but there is no regularity to the occurrence of these two types of clay within the bed according to Leighton (1941). He makes no discussion of the stratigraphic relations of the clay seams to any extent. Waagé (1950) found that the Pottsville section thins northeastward in the Geroges Creek Basin and reaches its thinnest proportions near the Pennsylvania state line where a core drilling revealed a thickness of only about 60 feet of Pottsville strata as compared to a thickness of over 300 feet about 35 miles to the southwest. He also noted that the Mercer and Sharon coal groups are absent in the northern part of the Georges Creek basin, and that almost the entire Pottsville section is composed of the combined Homewood and upper Connoquenessing sandstones. At Williams, about 10 miles northeast of the Maryland border, a similar situation is likely, though it has not been confirmed by core data. The surface geology indicates that the clay bed at Williams lies between the Homewood sandstone and the lower Kittanning coal at either the Clarion or the Brookville horizon. He also found that the Mount Savage clay is only rarely present in the northern end of the basin. Near the PA-MD state line, only impure claystones are reported to be present at the Mount Savage horizon. This, however, does not preclude the recurrence of this bed at other locales in the Wellersburg syncline to the north; patchy distribution of good quality clays in the lower Allegheny Group in western Pennsylvania and Maryland is well known.

If in fact the clay at Williams is the Clarion, then the 4 foot thick coal bed that lies 30 to 35 feet above it having two inches of slate within it lies at the stratigraphic position of the Scrubgrass coal. This, however, would be an abnormally thick occurrence of the Scrubgrass, which generally only appears as a thin streak. This 4-foot bed may actually be the lower bench of the lower Kittanning coal group lying an unusually small distance above the Clarion coal and clay bed. The Clarion bed lies immediately above the clay bed at Williams and ranges from 2 to 12 inches thick. Another thin (only up to 6 inches thick) underlies the clay and has been identified as the Brookville coal.

A section at the site of the North Savage Fire Brick Company mine (Harden, 1886, and Leighton, 1941) is as follows:

	Thickness Feet
Inches	
Coal (lower Kittanning)	4
Concealed	20
Fine white sandstone (Kittanning)	10
Coal (Clarion)	2 to 12
Flint clay or plastic clay (Clarion)	4 to 15
Shale	5
Coal (Brookville)	0 to 6
Cross-bedded sandstone	----

Below the poorly exposed cross-bedded sandstone (about 50 feet thick) lie the sandstone and red shales of the Mauch Chunk Formation, partially exposed on the slopes leading down to the Baltimore and Ohio Railroad tracks, a distance of about 300 feet from the level of the mine.

Physical tests of the Clarion clay at Williams are as follows:

	Williams		Glade City
	Flint Clay	Plastic Clay	Flint Clay
Water of Plasticity (% dry wt.)	20.11	20.77	24.11
Drying Shrinkage (% dry vol.)	2.23	9.98	13.95
Slaking time (min.)	1 ½	5 ½	2 ½
Maximum burning	15.32	18.13	20.78

Maximum shrinkage at cone	9	9	9
Fusion point, cone	30(1670°C)	26 ½(1610°C)	34(1740°C)
Suggested use	No.1 Flint	No. 3 Flint	No. 1 Flint

The flint clay of this mine is classified as grade No. 1. A substantial reserve of this clay may still exist in the Wellersburg syncline. No information is available on prospecting on the nose of the syncline in adjacent Bedford County, or on the flanks of the syncline along Big Savage and Little Allegheny Mountains. The clay may occur in either or both of these places. The presence of the clay on the southern side of Wills Creek at Williams is reported by Harden (1886). A 200 foot drift mine was driven into the hill at about 245 feet above the level of Wills Creek. Harden reports that the thickness of the clay bed in the mine is 7 feet, but makes no comments on its quality.

This clay has also been worked at a third location in southern Somerset County, at Glade City, about 2 miles east of Meyersdale. The Savage Brick Company operated a drift mine on the southern slope of Flaugherty Creek about halfway between Glade City and Keystone Junction near the Baltimore and Ohio Railroad. The elevation of the mine is about 2,290 feet. Shaw (1928) identified the mined seam as the Mercer clay, but more likely the seam was actually the Clarion. Shaw reported a bed thickness of about 8 feet and that about one third of the clay was present as flint clay nodules that were uniformly spread throughout the whole bed. Neither Shaw or Leighton give record of a section at this mine location, and none has been recently measured, as the workings have caved in. Leighton (1941) classified the mine's product as No.1 flint clay, used for making refractory bricks and special items, and was worked up until at least 1928; further information on the operation here is unknown.

Some surficial prospecting for Clarion clay has been done on the eastern flank of the Negro Mountain anticline about 2 ½ miles south of Mount Davis and about 3 ½ miles southwest of Garrett. The clay has also been south on the western flank of the anticline about 1 ½ miles southeast of the General Refractories Company's Fort Hill mine, near the Big Spring. Numerous core studies have been done in the area, and near Markleton and Silbaugh as well.

Lower Kittanning Clay

The lower Kittanning coal is underlain by a thick clay bed in southern Somerset County. This clay has been extracted in a few operations, but primarily in the Wellersburg syncline near Ellerslie, Maryland. The lower Kittanning horizon usually presents soft plastic clays, but some flint clay also occurs here in southern Somerset County.

The lower Kittanning clay was at one time mined on Little Allegheny Mountain between Wills Creek and Gladdens Run. The Ramsay mine was also used to produce clay to a local plant in Ellerslie. Most of the actual workings are in Maryland, but the mine opening is in the extreme southeastern corner of Somerset County, Pennsylvania. A typical section from this mine is as follows (Watts, et. al., 1922):

	Feet
Massive sandstone roof	
Heavy brown shale	1.5
Coal	1.9
Soft clay and coal smut	0.5
Soft clay	0.3
Brown flint clay	1.0
Soft gray clay	0.9
Coal smut	0.7
Soft clay	0.5
Flint clay	1.5

Leighton (1941) reported the clay as being 4 to 14 feet in thickness. In some places the bed is composed entirely of soft gray clay, and in others part soft clay and part brown flint clay. The flint clay softens at cone 33 and 34 and is a No.1 clay. The plastic clay softens at cone 26 to 30, burns tot a gray or buff color, and ranges from a

No.3 to a No.1 clay. The clay was transported to Ellerslie by the use of a one-half mile steep three-rail gravity plane and about 1 ½ miles of tram road originally, but by the 1940s it was trucked directly from the bottom of a 1200 foot plane to the plant. The clay was primarily used in the manufacture of cookware.

Some prospecting for lower Kittanning clay has been done in the Berlin syncline near Garrett, and on the Mud Pike about 4 miles west-northwest of Berlin. A large deposit of high-quality flint and plastic clay that has been identified as lower Kittanning has been mined about one miles southeast of Ohiopyle in the Ligonier syncline in Fayette County. The Mount Savage Clay Company at one time also operated amine nearby on the same seam of clay. At the Harbison-Walker Refractories Company mine in Ohiopyle, the bed averages 6 feet in thickness; the upper half is composed of plastic clay and the lower half is flint clay. Both clays are of high quality, allowing the removal of about 110 feet of overburden by dragline. The clay was trucked to a plant near Jennings, Maryland for processing.

The occurrence of high-quality clay at the lower Kittanning horizon in these two areas separated by 40 miles suggests that in between these localities there may be similar bodies of clay at this stratigraphic position. A search for such clay could and should be combined with a search for other clays in the lower Allegheny Group. Other clays in that part of the section which are known to be of high quality locally are the Clarion, middle Kittanning, and upper Kittanning, with the better ones likely occurring at either the Clarion or lower Kittanning horizons.

Middle Kittanning Clay

Although it has not been mined in southern Somerset County, the Middle Kittanning clay does hold some potential, particularly as a source of plastic clay. Some flint clay appears at the outcrops of this horizon, but is usually thin or discontinuous, and silty or sandy. There may be viable bodies of this clay large enough and pure enough to be mined in the area, however. The chances of finding such deposits is simply somewhat lower than at the Clarion, lower Kittanning, and upper Kittanning horizons. Commercial plastic clay is more likely to be found in the middle Kittanning horizon. This is inferred from Waagé's Maryland studies, where he has found a relative rarity of good grade middle Kittanning flint clays, but he states that this clay is second in rank to the Mount Savage clay in the Castleman basin because it contains several commercial bodies of soft clay (Waagé, 1950). The clay was for some time the chief source of soft clay for the Union Firebrick Company plant at Jennings (more recently, the Harbison-Walker Refractories Company), and has been worked at three different stripping sites on Meadow Mountain.

At least three prospecting operations for middle Kittanning clay have been dug in southern Somerset County. One is located near Garrett in the Berlin syncline, and the other two area on the western flank of the Negro Mountain anticline near Blackfield and Markleton. No information is available on the properties of the clay at these sites.

Upper Kittanning Clay

The upper Kittanning clay appears to have somewhat less potential than the Clarion, middle Kittanning, and lower Kittanning clays in southern Somerset County. This is due to the large amounts of calcareous material, in the form of bedded limestone, nodular limestone, or limestone pellets in the underclay zone. The upper Kittanning bed is the lowest Allegheny Group clay bed in southern Somerset County that contains significant amounts of persistent calcareous material. Some rare deposits of limestone are present in some places under the middle Kittanning coal, but it is not known to occur in the underclay zones of the Clarion or lower Kittanning coal beds. Waagé (1950) identified calcareous material in the upper Kittanning underclay zone in just over 50 percent of the cores taken in the Castleman and Georges Creek-Upper Potomac basins of western Maryland. Most likely, southern Somerset County's conditions are similar. The absence of calcareous material in the underclay zone may be necessary in the upper Kittanning horizon for the presence of refractory clays in commercially useful thickness. This is supported by the fact that the only body of this clay with commercial value located by Waagé in western Maryland contains no calcareous material and also by the fact that at the two places in southern Somerset County where the bed is worked, no calcareous material is present.

One of these locations is at the General Refractories Company stripping operation in the upper Kittanning clay bed about 5 miles southeast of Confluence at Silbaugh. This mine is located about half way between the axes of the Negro Mountain anticline and the Lower Youghiogheny syncline, where the average strata dip is about 5° (9%) to the northwest. The clay bed crops out along the nose of a small north-trending ridge and lies under thin cover over a considerable area. In July 1952, the maximum overburden removal was 30 feet and the working face cover was only about 6 feet thick. The total bed thickness averages about 8 feet, about half of which is comprised of flint clay. The clay is sectioned as follows:

	Feet	Inches
Sandstone rubble, boulders up to 4 feet in diameter:		
Coal blossom (upper Kittanning)	2	0
Clay, light gray, soft, plastic, weathers white	3	0
Flint clay, light bluish-gray, streaked and mottled	3	7 to
	4	6
Clay, light gray, soft, plastic	0	10
Sandstone, fine-grained	?	?

This operation only recovered the flint clay portion of the bed. The light bluish-gray color of the flint clay may be a reliable marker of the upper Kittanning horizon. The color was not noted in the Clarion and lower Kittanning horizons where the clays are darker in coloration, from brownish to dark gray.

The second site where the upper Kittanning clay has been worked is north of the Mud Pike about 1 ½ miles east of Bando. This is a stripping operation located on the western flank of the Negro Mountain anticline where the strata dip to the northwest at about 2 ½ ° (4 ½ %).

No other mines are known to have operated on the upper Kittanning clay in southern Somerset County. However, there are numerous shows of flint clay at this horizon in the study area and other commercially important beds of clay may exist. One notable outcrop of upper Kittanning clay is at Garrett in a road cut exposure on Route 219. A 28-inch clay bed underlies about 9 feet of Johnstown limestone. Samples of this clay fused at cone 32 ½. The continuity of this bed is unknown.

Lower Freeport Clay

Little commercial potential is ascribed to the lower Freeport clay bed in southern Somerset County as a source of refractory clay. The bed is persistent and is associated with limestone in many places. The bed is commonly overlain by the lower Freeport coal bed, which can be mined in some locales. The lower Freeport clay is generally too impure to classify as a refractory clay (fusing at cone 30 or higher). Few surface indications of flint clay in the lower Freeport bed are rare. In the Maryland Castleman basin, Waagé (1950) identified this clay in some of the cores he studied but reported that the clay was usually too thin and spotty in distribution to be commercially important. The same situation likely prevails in southern Somerset County.

Upper Freeport Clay and Bolivar Clay

The upper Freeport clay lies near the top of the Allegheny Group and is one of five underclays occurring in southern Somerset County that has potential as a source of refractory-grade clay. Less is known about this clay than about other clays of the Allegheny Group. No known operations exist in the study area where upper Freeport clay has been worked, and only two surface prospects are known. One of these is in the Berlin syncline about 1 ¼ miles northwest of Springs, the other is in the Lower Youghiogheny syncline near an abandoned General Refractories strip mine in the upper Kittanning clay.

Some information has been gathered regarding this clay in western Maryland, mostly in the Castleman basin, where its horizon was encountered in 40 core drillings by Waagé (1950). In that area, the upper Freeport underclay zone is known to be quite complex, ranging from 15 to over 50 feet in thickness. It is the thickest and most homogeneous underclay zone in the Allegheny Group of Maryland.

The Bolivar clay was named by I.C. White (1891). The bed was named for an operation extracting commercial clay at Bolivar in Westmoreland County, Pennsylvania. Shaffner (1958) reported a bed thickness at the type locality of 3 to 12 feet in thickness (with an average of 5 feet), including various amounts of plastic and flint clay. Siderite nodules also occur within the clay bed. The Bolivar clay can only be recognized where the upper Freeport limestone is present. If the limestone is not present, then the entire underclay zone of the upper Freeport coal is considered to be the upper Freeport clay. Waagé (1950) described the bed as the most persistent clay bed in the Allegheny Formation of western Maryland. He noted its presence wherever the upper Freeport coal is present. The Bolivar clay is widely varied in grade. In most locations it is comprised of pure and impure clay types and is of little economic value. The Bolivar clay contains some lenticular bodies of flint clay in the Castleman Basin that are sufficiently pure (cone 32 to 34) and thick to be of commercial interest as a source of flint clay. Drilling studies showed that the distribution of the high-quality clay is quite scattered, with irregularly shaped deposits. Waagé's observations regarding the Bolivar clay are expected to carry over into southern Somerset County.

Clay Beds of The Conemaugh Group

No economically important Conemaugh Group clay beds exist in southern Somerset County. In the lower part of the group there is some potential for use of certain clays, but most of the clays are too calcareous for commercial usage. No high-quality flint clays are expected in the Conemaugh underclay zones, but plastic clays are common. Their purity varies, with the more pure clays occurring beneath the lower Bakerstown coal and the Mahoning coal. The percentage of limestone contained within the Conemaugh Group clays increases moving upward through the group. At the Barton, Wellersburg, and Clarksburg horizons the presence of calcareous material is quite common.

Thomas Clay

The Thomas clay appears to be the most valuable of the Conemaugh Group clays in southern Somerset County. The bed was named by Swartz (1920) for its exposures in the Georges Creek basin in Maryland, where it underlies the Thomas coal. The Thomas coal in Maryland is correlated with the lower Bakerstown coal in Pennsylvania. The bed is persistent, but in some places is partially or completely replaced by the Albright limestone. Thomas clay has been mined on a local scale for making buff face brick at Compton's Mill, about 2 ½ miles west of Salisbury in the Berlin syncline. The mine is located about one-half mile upstream on Tub Mill Run just west of the plant. A section of the Thomas clay at this site is as follows:

	Feet	Inches
Sandstone, poorly exposed (Saltsburg)	15	0
Shale, gray, evenly bedded, contains *Lingula* in lower 5 inches (Friendsville)	4	0
Coal, bright, block (Lower Bakerstown)	2	9
Clay, gray, plastic (Thomas)	7	0
Siltstone, gray	--	--

Thornton Clay

The Thornton clay was named by I.C. White (1903). The bed underlies the Mahoning coal and overlies the Mahoning limestone in Taylor County, West Virginia. The bed extends throughout western Maryland, Pennsylvania, and eastern Ohio. Hennen and Reger (1914) describe a persistent clay of good quality in Preston County, West Virginia. Waagé (1950) observes that the Thornton clay has never been mined in Maryland, but drilling cores revealed the presence of semi-refractory grade clays at the horizon. He stated that the Thornton clay is associated in some places with the Mahoning coal and in others with the lower Mahoning red bed (where the coal is absent.) He considered the Thomas clay to be the best key bed in the upper Freeport – Brush Creek interval, as it contains a fragmented claystone with green and tan fragments that is fairly easily identified.

This bed is not known to have been worked in southern Somerset County. It has been reported by Hickok and Moyer (1940) to have been worked in nearby Fayette County. It apparently was also used at Mount Braddock, on the western side of Chestnut Ridge between Connellsville and Uniontown by the Eureka Fire Brick Company. This is a No.2 grade flint clay in this area. The Mahoning clay was also reportedly used at Layton, about 9 miles northwest of Connellsville by the Layton Fire Clay Company. The Mahoning in the area is about 8 feet thick and is composed of semi-flint clay used in conjunction with an 8 foot thick bed of soft clay and shale that lies about 40 feet above to make firebrick and paving brick.

Data on the Thornton clay in southern Somerset County is sparse; few good exposures exist at its horizon, and the clay is not known to have been worked. The clay also fails to be a good key bed in drill cores in nearby Maryland. Plastic clay has been noted at several Thornton horizon exposures, but no evidence of flint clay has been observed. This bed may be worth prospecting in southern Somerset County, however, because of Waagé's observations of the bed in western Maryland, and on the basis of its commercial use at times in Fayette County. The bed may prove to be a source of plastic clay of semi-refractory quality.

Surficial Clay

Surficial clay is worked at one location in southern Somerset County. The Otto Brick and Tile Works is located about one-half mile north of Springs and about 3 ½ miles southwest of Salisbury in the Berlin syncline. The surface clay deposit here is used for making red face brick, drainage tile, sewer pipe, and chimney flue tiles. The plant has operated since about 1900.

The plant obtains raw material that occurs in the same shallow valley in which the plant itself is located. The valley extends for about one-half mile southward through the headwater area of Tub Mill Run. This portion of the valley is broad-bottomed, and there is a gentle slope, and no stream is present. About 200 feet north of the plant, the valley suddenly narrows, and the gradient increases to about 150 feet per mile. A stream is present from this point to its mouth. The upstream broadening of the valley is likely due to partial filling by alluvial and lacustrine material, which is being used to supply the plant. The thickness of the deposit is at least 15 feet.

The deposit is primarily composed of light bluish-gray plastic clay that weathers to a buff color. Some pebbles and cobbles are present, as well as boulders up to 6 inches in diameter. Most of these fragments are sandstone. Some small bits of coal, less than 10 mm in diameter are common in the clay. The bed is calcareous in some places.

The clay at this deposit may have been laid down in ponded water occurring up-valley from the site of the abrupt change in the valley's gradient. This ponding may have been created by a threshold or sill in the stream channel made by erosion-resistant sandstone (possibly Morgantown) whose outcrop crosses the valley near this site. Float from this sandstone can be traced for half a mile westward on the north side of the road crossing the valley. Although clay was primarily impounded in the area, at times larger fragments washed in, and boulders probably were floated in on chunks of ice during the colder months. This could possibly explain the sparse occurrence of larger boulders in the deposit.

No other deposits of the type worked by the Otto plant have been identified in southern Somerset County. Some may exist, however, in similar broad-bottomed valleys where alluvial accumulation may have taken place. Alluvial accumulations are common in flood plains and stream terraces like those found along the major streams in the area, but mostly this alluvium is material coarser than clay.

Shale

Although shale is one of the most prevalent rock types in southern Somerset County, it does not rank as one of the more valuable mineral resources of the area. It is used in some locations for surfacing secondary roads, driveways, and parking areas, and as fill material.

No information on testing of southern Somerset County shales is available, but deposits of suitable quality for making ceramic ware and Portland cement are expected to be present. This shale is distributed from the Devonian Jennings Formation up through the Monongahela Group of the Pennsylvanian System. The shales overlying the Brush Creek coal, the lower Bakerstown coal, and the shale about the Harlem coal are considered to be the most persistent in the area. These shales are of marine origin and are 15 to 20 feet thick. The occur throughout the areas of Conemaugh outcrops in the Lower Youghiogheny, New Lexington, Berlin, and Wellersburg synclines.

Several shale beds occur in the Jennings Formation area of the Deer Park anticline in Greenville, Larimer, Northampton, and Allegheny Townships. These shales have found use as road material and fills on a small scale.

A minor resource more commonly included in discussion of shales is "red-dog", the product resulting from the slow combustion of coal gob piles. Gob piles contain discarded bone coal, coaly shale, shaly coal, and carbonaceous shale – materials ranging from pure coal to pure shale. These piles tend to spontaneously ignite from the heat liberated by oxidation of sulfidic material, mainly pyrite (FeS_2), which commonly occurs in coal-bearing strata. These piles burn slowly for long periods, sometimes many years, until the combustible materials are consumed. The leftover residue from this burning process is red-dog, a hard, tough substance occurring in various-sized pieces in shades of red. Red-dog is used as road metal, like the aforementioned shales, either "as-is", or after being reduced to the desired size.

Sandstone

Introduction

The next most abundant rock type in southern Somerset County is sandstone. Sandstones are found in all rock formations from the Jennings in the Devonian System through the Monongahela in the Pennsylvanian System. Several quarries exist in southern Somerset County. Three notable quarries are worked either on an intermittent or continuous basis: at Murdock, about 3 ½ miles south of Somerset (Somerset Stone and Lime), about 4 ½ miles west of Salisbury (Rodamer Concrete Block Company), and about 4 ½ miles west of Berlin and 3 ½ miles north of Garrett (M. and S. Stone Company). These quarries all extract sandstones of the Allegheny Group.

None of the southern Somerset County sandstones are used for glass sand, molding sand, or ganister rock, but various sandstones have been or are utilized for other purposes. Most of the sandstones are quarried from the Pennsylvanian rocks of the coal-measure strata, but the Mississippian Pocono Formation (Burgoon) sandstone has also been worked, and some small-scale quarries also probably exist in the Devonian Catskill red beds, though none are positively known.

Identification and Correlation of Sandstones

Some sandstones are somewhat difficult to identify and correlate, as they have very similar appearances at their outcrops. Lateral thickness and lithology differences compound the problem. The lower Allegheny Group sandstones are notably difficult to identify because no good beds exist in that section that would serve as reliable stratigraphic guides. A petrographic study by Ozol (1958) revealed that sandstones ranging from the Homewood in the upper Pottsville strata through the Worthington in the Allegheny Group have essentially the same composition. The primary components are quartz, chert, clay, coal fragments, and a micaceous material. The main differences found by Ozol were in the relative proportions of quartz and clay. The amount of quartz ranges from 80 to 95 percent and clay ranges up to about 10 percent. Samples from varying locales differ in properties such as color, grain size, and friability. Friability of the samples increases with the clay content of the rock. Ozol went so far as to make tentative correlations, but some of these have been disproved on stratigraphic grounds. This limited study underscores the fact that as much petrographic variability can occur within a given sandstone deposit as between different sandstones from separate locations.

Mississippian Sandstones

Pocono Sandstones

The upper Pocono Burgoon sandstone is usually quite easy to identify. This sandstone was quarried in the 1950's by the M. and S. Stone Company on Piney Creek about 2 ½ miles from Salisbury. The quarry lies on a small knob about 1,400 feet north of the Pennsylvania-Maryland border. This knob juts into Piney Creek valley, with the stream u-turning about it.

The quarry here worked a 15 foot thick layer of flaggy sandstone near the top of the Pocono Formation. The workable ledge had no overburden, but the 16° bed dip to N 67°With led to the relatively short-lived operation of the site.

This sandstone commonly occurs in 3 to 8 inch thick beds and is cross-bedded, with even bedding occurring within individual sets of cross-beds. This cross-bedding does not deter quarrying and in some cases certain bed sets are easily extracted and consist of high-quality stone. The sandstone coloration ranges from dull red to greenish and bluish-grays, but sometimes a purple color is seen. Color lamination and banding are common. The rock is medium-grained and firmly cemented.

During quarrying, slabs were pried loose along the bedding planes and rough-broken by sledgehammer before being mechanically trimmed. The stone was primarily used in the Somerset and nearby areas for building veneer and wall trim, patios, walks, drainage ditches, etc.

A similar sandstone appears to be abundant throughout the upper part of the Pocono Formation in southern Somerset County, and other workable areas may exist. One potential area is at the crest of the Negro Mountain anticline about 2-3 miles southwest of Mount Davis, where the upper Pocono Formation crops out and has a negligible bed dip. Some prospecting has been done here. Surface pit exposures reveal highly cross-bedded sandstone somewhat unsuitable for working, but unexposed ledges in the same general region may exist which contain higher-quality stone.

In most outcrops, the upper Pocono Formation strata dip too steeply to allow easy quarrying. One exception is at the nose of the Wellersburg syncline in Bedford County, but no information on the stone there is available.

Pennsylvanian Sandstones

Pottsville Sandstones

The Pottsville Group is well-known for its content of sandstone. The Sharon, lower and upper Connoquenessing, and Homewood sandstones all occur within its layers. The continuity of these beds is hard to determine solely from surficial geology, but the Connoquenessing and Homewood sandstones are considered to be quite persistent. Less information is available about the extent of the Sharon sandstone. Waagé (1950) identified the Sharon as a persistent unit in the Maryland Castleman basin, and it may extend into the Berlin syncline. He also noted a thinning of the Sharon to the northeast, in both the Castleman and Georges Creek basins, and also found that the Sharon sandstone was completely absent in the vicinity of Wellersburg.

Despite being persistent units with quality probably equal to or better than the Allegheny and Conemuagh Group sandstones, the Connoquenessing and Homewood sandstones have not been as widely worked. One reason for this maybe that Pottsville sandstones tend to crop out in less accessible locations than those in the Allegheny and Conemaugh Groups. One quarry of Homewood sandstone is known in the study area, about 2 miles east of Meyersdale in Flaugherty Creek Gap. The stone quarried here was likely used for the railroad bridge abutments nearby.

Float material from Pottsville sandstone, probably the Connoquenessing has been crushed for use in aggregate in a small operation near the Pennsylvania-Maryland state border about 1 ¼ miles south of Unamis in Addison Township. The sandstone outcrop occurs on top of a small knob-like hill west of an unpaved road leading to Unamis. "Float" boulders of sandstone have fallen down the eastern slope of the hill over the Mauch Chunk red shales, and these were gathered near road level for the crushing operation.

Allegheny Sandstones

The only currently worked sandstones in southern Somerset County occur in the Allegheny Group. These are the Kittanning and Freeport sandstones. The Kittanning is being quarried at two sites, and the Freeport at one.

The Kittanning sandstone lies near the base of the Allegheny Group between the Clarion and lower Kittanning coals, and the Freeport lies between the upper Kittanning and lower Freeport coals in the upper one-third of the Allegheny Group.

The Kittanning sandstone has been worked on both of the flanks of the Negro Mountain anticline, primarily on the western flank a few miles south of Somerset.

The outcrop trace of the Kittanning sandstone is usually inferred from the extent of the lower Kittanning coal bed. The Kittanning sandstone underlies this coal by about 20 feet. This sandstone is not, however, present in all areas occupied by the lower Kittanning coal. It is sometimes replaced by sandy shale or interbedded sandstone and shale with little value.

Kittanning sandstone has been quarried in the following locations:

Quarry	Location
Kimberly Run	Southern edge of Somerset near confluence of Kimberly Run and Coxes Creek
Murdock	At Murdock, about 3 miles south of Somerset
Bare Rock	About 2 miles east of Murdock
M. and S. Stone Company	Four miles north-northeast of Garrett

The abandoned Kimberly Run quarry lies on the southeastern border of Somerset near the junction of Kimberly Run and Coxes Creek. This sandstone is exposed in a stairstep-like formation in Kimberly Run. At the quarry, about 10 feet of stone was worked. Most likely, this stone was extracted for local use. When freshly broken, this stone is light gray in color, but weathers to various shades of brown.

Petrographic analysis by Ozol (1958) revealed a medium to coarse-grained stone with estimated average grain size ranging from 0.25 mm to 1.0 mm. Quartz content ranges from 80 to 95 percent, with the remainder clay, chert, sericite, and coaly material. No heavy minerals were noted, but due to the friability of the rock, Ozol acknowledged that these may have been lost during thin sample preparation. The quartz grains are reported to be subangular, equidimensional, anhedral, some clear, some cloudy, some with and some without dusty inclusions. Some evidence of undulatory extinction is present. Secondary enlargement of grains exists where voids are present; but not where voids are in abundance. Chert occurs in distinct, rounded grains. Partial void filling by clayey material is present. Ozol presumed that the clay was deposited from the semi-colloidal state from percolating groundwater prior to cementation.

Balsinger (1960) studied the cross-lamination of the beds and found that the mean azimuth for cross beds in the Kittanning sandstone is N 51°W. The beds are of the tangential, planar type, and are commonly seen at exposed faces in the quarry.

The Murdock quarry lies about 4 miles south of Somerset near the confluence of Bromm Run and Coxes Creek. This is one of the area's older quarries. The total worked thickness at the quarry face is about 23 feet. Bed thickness is about 1 to 3 feet. The upper part of the sandstone is massive, but thinner and less even bedding occurs in its lower parts.

Ozol (1958) performed a petrographic study and found chert and quartz to be the most abundant minerals in rock from this quarry. The rock is comprised of 90 to 95 percent quartz and 5 to 7 percent chert. Other minor constituents include clay, coaly material and heavy minerals. Little variety is evident in the quartz. It is subangular, well-sorted, equidimensional, and mostly anhedral, with some subhedral grains. Grain sizes range from 0.25 mm to

1.0 mm; the majority of the grains range in size from 0.25 mm to 0.75 mm, placing this in the category of medium- to coarse-grained rock.

Secondary overgrowths of quartz are often seen. Some grains show undulatory extinction, but most do not. Many of the quartz grains have opaque dust-like inclusions concentrated along roughly parallel lines.

Chert occurs as fine-grained chalcedony and cryptocrystalline quartz, and as their combinations. Distinct grains are present in the same range of sizes as for the quartz, but the grains are less angular. No secondary enlargement is evident. One sample showed a well-crystallized spherulite of chalcedony and several poorly developed ones at a magnification of 450x. Ozol presumed that the chert present in the Kittanning sandstone here is both clastic-detrital and authigenic in origin. Clastic chert is present as distinct, subrounded grains; authigenic chert occurs as interstitial chalcedonic cementing material having poorly crystallized spherulites.

Some sericite and muscovite are present in the Kittanning sandstone at the Murdock quarry. Ozol found a higher abundance of sericite than muscovite and that it occurs 1) along the boundary between grains of quartz 2) as an aggregate of a few flakes in a minute opening between grains of quartz and 3) as a penetrating fringe around individual quartz grains.

A minor amount of coaly material is present as a fine dust and in some larger particles with weak rectangular fractures. Ozol identified most of it as fusain (mineral charcoal).

Heavy minerals are rare in the Murdock quarry Kittanning sandstone. Two that are present are zircon and green tourmaline; the zircon occurs as euhedral crystals, and the tourmaline as anhedral crystals.

Clay also occurs in small amounts in the rock. It occurs in minor amounts as interstitial inclusions. Two other constituents are present in this sandstone: One is a fragile, delicate mineral, probably micaceous, and the other is a jointed, tubular, dendritic particle with tapering branches, possibly some sort of a plant fragment.

The Kittanning sandstone at the Murdock quarry contains abundant cross-bedding. Studies by Balsinger (1960) found a mean azimuth of the cross-bed dip of N73°E. This deviates from the mean azimuth of N 58°E for Allegheny Group sandstones in general. The cross-bedding does not affect the suitability of the stone for use as aggregate, but it does to some extent limit its extraction as dimensional stone.

The Bare Rock quarry was abandoned in 1929. At this site, the Kittanning sandstone was extensively quarried to use as crushed stone and dimension stone for foundations, retaining walls, curbstones, etc. in Somerset and nearby areas. At one time, a narrow-gauge railroad connected the Baltimore and Ohio tracks at Murdock with the quarry and was used to provide transportation for the stone.

The quarry is located on the western flank of the Negro Mountain anticline about 1 ½ miles from the crest. The Kittanning sandstone occurs in a pavement-like outcrop in topography which approaches a dip-slope situation but the sandstone dips more steeply than the surface slope.

The maximum thickness occurring in the Bare Rock quarry was 24 feet, but this probably does not represent the total thickness of the sandstone. The more uniformly bedded and thicker stone occurs in the top 17 feet of the quarry face. The lower beds are thinner and less regular but were still suitable for crushed stone. An unknown thickness of this type of stone was left as the floor in the quarry.

Cross-bedding is common in the Kittanning sandstone at the Bare Rock site. Balsinger (1960) found a mean dip of S63°E.

Ozol (1958) produced a petrographic study of the Bare Rock Kittanning sandstone. He found quartz present at an amount of about 90%; the remaining 10% was composed of clay, sericite, and coaly material. No heavy minerals were found, but Ozol thought that they may have been lost in the process of thin section preparation because of the friability of the rock. Clay content at this location is nearly 10% in the Kittanning sandstone, higher than in most other locations. The mineralogy is essentially otherwise the same. The grain sizes range from 0.25 to

1.55 mm, with the average falling in the 0.75 to 1.0 mm range, making the sandstone a medium to coarse-grained rock. Some thin lenses of conglomeratic material are present.

The M. and S. Stone Company quarry working the Kittanning sandstone is located about 7 miles southeast of Somerset and about 1 ¼ miles south of the intersection of the Mud Pike and the ridge road from Somerset to Garrett. The quarry is small and not operated on a full-time basis. The quarry face is about 10 feet high and contains massive sandstone in what is likely the upper part of the Kittanning bed. A crushing plant at the site produces sand and crushed stone for local use, mostly as concrete aggregate. The sandstone is friable, so crushing is not difficult.

Ozol found that the M. and S. quarry rock is essentially identical to that at the Bare Rock site. The mean dip of cross beds according to Balsinger is N52°E. The cross-bedding does not affect the working of the stone.

The Freeport sandstone is another bed that has been worked in southern Somerset County. It lies between the upper Kittanning and lower Freeport coal beds. The stone is only known to have been worked in one location, the Rodamer quarry west of Salisbury, on the eastern flank of the Negro Mountain anticline. The stone is also-well developed on the western flank of the anticline in the Listonburg-Harnedsville-Fort Hill area, and in the Lower Youghiogheny syncline near Humbert. The sandstone is not well-developed in the Garrett-Somerset area or on the western flank of Allegheny Mountain north of Meyersdale. The occurrence in the western and southwestern part of the study area suggests that this sandstone may lie in a northwest-trending belt that may be continuous with the one recognized by Waagé (1950) in Garrett County, Maryland.

The Rodamer quarry is located about 4 ½ miles west of Salisbury, about half way between the axis of the Negro Mountain anticline and the Berlin syncline. The stone quarried is identified as the Freeport, but the stratigraphic position of this member is in some doubt.

The quarry owner identifies the rock as Mahoning sandstone, but it probably lies considerably below this horizon. It also may be the Kittanning sandstone, since that rock is so well-developed on the Negro Mountain anticline to the north. Its stratigraphic position, however, from areal mapping appears to be above this horizon. Ozol (1958) placed it within the petrographic grouping of the Kittanning sandstone at the M. and S. quarry, the Kimberly Run quarry, and the Bare Rock quarry due to the similarities in friability, grain size, clay content, and color of the sandstones at these locations. Because areas and stratigraphic evidence are considered to be more reliable than petrography the unit is identified as the Freeport. The sandstones in the lower Allegheny and upper Pottsville rocks are so petrographically similar that separation by that means is not easily achieved.

The Freeport sandstone crops out at the Rodamer quarry as it rises toward the crest of the Negro Mountain anticline at an angle of about 7 degrees (12%). A maximum working thickness of 27 feet was reported in 1951, but the lower 6 to 7 feet was unused due to considerable coal content in the form of thin streaks and spars. The sandstone is medium- to coarse-grained and contains scattered layers of conglomeratic material with pebbles up to 1 inch in diameter. The conglomerate is concentrated mostly in the upper 6 to 7 feet. The rock is crushed at the site and used mainly in manufacturing concrete blocks for local use.

Conemaugh Sandstones

Several Conemaugh Group sandstones have been worked in the Berlin syncline for local usage. These include the Mahoning, Saltsburg, Grafton and Morgantown sandstones. None of these is currently being worked. Their most probable uses were for dimension stone in foundations, bridge abutments, retaining walls, etc.

All of these sandstones are cross-bedded and medium to coarse grained. Less quartz is present than in the Allegheny Group sandstones. The average thickness is about 15 to 20 feet but usually half or less of this thickness has been quarried.

Monongehela Sandstones

Less than 200 feet of Monongehela Group strata is represented in southern Somerset County, as the rest has been eroded. Sandstones do occur in this group but they have restricted areal extent and are considerably lenticular and are of little value.

Field Sandstone

An economic resource in southern Somerset County which cannot be overlooked is the rock known as "field stone," almost all of which is sandstone. It is used to considerable extent in the facing of private buildings and, in effect, is dimension stone which has been naturally quarried. The "quarrying" is the result of long-continued weathering and the breaking loose of blocks from their bedrock position. Such sandstone occurs as float on the down-slope side of sandstone outcrops and is widely distributed in areas of Pennsylvanian rocks. It is also prevalent in Catskill outcrop areas, but in the Pocono and Jennings outcrop belts, though sandstone float is common, the pieces are generally too small to be used in the facing of buildings.

Hazard Areas

Abandoned mine lands (AML) are scattered throughout the watershed and are the main cause of water quality degradation. The Pennsylvania Bureau of Abandoned Mine Land Reclamation has identified 59 mine problem areas within the basin. The Casselman River Watershed contains the following types of mine related hazard sites (A description and location can be found in Acid Mine Drainage Appendix); Vertical Shafts 8, Refuse / Spoil Piles 50, Mine Entries / Open Shafts 55, Subsidence / Landslide / Erosion Prone Areas 12, Abandoned Structures 14, Dry Strip Mines 97, & Flooded Strip Mines 11.

Five sites were identified under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or Superfund. The sites are Delta Coal Sales – Meyersdale, and four sites around Somerset - Briggs Industries, Devilbiss Health Care, Gibbs Electronics, & Uptegraff Transformer Company. These sites were found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) database. They all had notes stating that no further action would be taken. (Site descriptions can be found in the EPA permitted site Appenix).

Historical Profile of Somerset County

Somerset County occupies 1,085 square miles of southwestern Pennsylvania; its area is the seventh largest in the state. It lies in the Appalachian Plateau between Allegheny Mountain and Laurel Mountain, and is bounded on the north by Cambria County, and the south by the Mason-Dixon line, and Negro Mountain, which contains Pennsylvania's highest point, Mount Davis, at 3,213 feet. The area between Negro and Allegheny Mountains historically known as "The Glades" is noted for being well-suited to agriculture, and this area provided much of the driving force behind early growth in the region.

Some of Somerset County's earliest settlers were the Algonquins; the large mounds at Fort Hill and Fort McClintock, as well as the "Mud Pike" formation on Laurel Mountain have been attributed to their presence. Some evidence also suggests that the area was at one time inhabited by the Iroquois; remnants of their villages have been discovered in various area archaeological digs.

Recorded history in Somerset County dates approximately to the time of the French and Indian War. Between 1754 and 1768, various treaties with the Indians of the region secured most of the land that was to become Somerset County. Much of the area was part of Cumberland County until March 9, 1771, when it was annexed to become a portion of Bedford County to the east. During this period, the region encompassed between the Allegheny and Laurel Mountains, the Mason-Dixon Line, and the Purchase Line (which would now lie in Cambria County) was organized into Brothersvalley Township (derived from the reference of "Brudersthal", from the German Baptists who had settled in the Brotherton area in about 1760). Swiss and German immigrants settled a bit farther to the south, founding the town of Berlin. Trappers, hunters, and traders had many temporary settlements in early Somerset County, but permanent settlements were all but unknown until about 1768. In March of that year, and expedition was sent by John Penn to inform the settlers in the area that most of the land still belonged to the Indians. The settlers ignored Penn's proclamation, and continued to develop the area. By November of 1768, the Treaty of Fort Stanwix had been signed, and the Indians had relinquished their rights to the disputed land.

In 1755, the county was traversed by General Braddock and George Washington (who coined the name "Turkeyfoot" for the intersection of Laurel Hill Creek, and the Casselman and Youghiogheny Rivers at Confluence) during their unsuccessful campaign on Fort Duquesne. Their route, Braddock's Trail, is the present-day course of US Route 40, the "National Pike." Braddock's Trail was a major access route for settlers in their push west. In 1758, General John Forbes and his troops once again made an assault on Fort Duquesne, this time with success. A new trail leading over the Allegheny Mountains was blazed. Forbes' Road runs approximately parallel to what is known today as US 30. This trail provided good access to the famed "Glades", natural meadows that lie around the headwaters of the streams located in central Somerset County.

In 1771, Harmon Husband arrived in Somerset while fleeing a bounty in North Carolina which was placed on his head for protesting British taxes. Husband became a prominent citizen in the area and then a member of the General Assembly. In 1790 he petitioned the Pennsylvania Legislature to create a new county west of Allegheny Mountain. On April 17, 1795, the legislature organized Brothersvalley, Turkeyfoot, Quemahoning, Milford, Elk Lick, and Stonycreek Townships into Somerset county. About 1,250 citizens resided in the newly formed county.

In 1800, the county borders were expanded with the annexation of the southwestern corner of Bedford County. In 1804, much of the northern area of Somerset County was redrawn to be part of Cambria County.

Husband had been a key figure in the establishment of the settlement of Brunerstown. The town was rechristened as the county seat of Somerset, and in 1801 a two-story stone courthouse was built there. This building was in service for about 50 years, until it was replaced in 1853 by a larger two-story brick building. Again, in about 1904 to 1906, the courthouse was replaced with the County Courthouse that is still in use today.

The primary industry in the latter part of the 18th century in Somerset County was agriculture. In 1795, about 568 farms were known, averaging about 25 acres each. Typical crops were oats, rye, hay, buckwheat, and potatoes. Wheat and corn generally did not do well in the local climate, but recent advances have allowed these crops to be grown as well.

In the 1840s grazing sheep and processing wool were quite important portions of the local economy. By 1870 as many as eight woolen mills operated within Somerset county. With the advent of mechanical farming in the 1850s and 1860s, agricultural equipment manufacturing also flourished in the county.

Despite abundant raw materials such as water, limestone, and timber, Somerset County never developed a significant steel industry. The local iron ore deposits were irregular and of low quality, necessitating the importation of pig iron or ore from neighboring areas. Until the widespread development of rail lines and roads in the mid to late 19th century, transporting these materials tended to make the cost prohibitive.

Somerset County has notable coal deposits, particularly in the lower Kittanning and lower Freeport seams. Coal mining in the county dates to 1840 and is still a significant part of the present local economy.

Somerset county at one time contained a considerable amount of old-growth timber, and the logging industry flourished here from approximately 1870 up to the 1940s.

The area is also known for maple syrup production. In 1930, Somerset County was responsible for more than 1/3 of the production of maple syrup in the state.

Somerset County was once described as a "land of little towns off in the mountains," and the development of major transportation arteries between urban areas brought tourism to the forefront of major industry. Considerable growth in tourism in Somerset County is still occurring in the present day.

Indians of Somerset County

The earliest Indian tribe to inhabit Somerset County were a people known as the Monongahela Indians. This was the name given to them by Mary Butler an archeologist that studied the Fort Hill site in 1939. These prehistoric Indians also occupied the Gnagey site near Meyersdale. The occupation was between 920 and 1030 A.D., the second; between 1085 and 1190 A.D., and the final occupation was 1230.

The earliest Indian occupation, 920-1030 A.D., were nomadic tribes, following huge herds of game in search of food. They made their homes wherever game was abundant. This explains the time periods of occupation at the Gnagey site.

Their homes were built in a circular pattern about 11 m in diameter. The frame of the roundhouse was constructed of saplings. The saplings were placed one to two feet apart in the ground. The tops of them were bent over toward the center and tied together with a tough tendon from an animal called sinew. The entrance to the roundhouse was protected from wind and rain by sticking heavy sticks into the ground. The Gnagey site contained two large roundhouses and three rectangular houses.

The second occupation occurred between 1085 and 1190 A.D. Archeologists found that the Monongahela Indians were a warfaring group. They were constantly at war causing them to change the construction of their villages. They located the village in a strategic position, usually on top of a hill for defense. The Gnagey site also had a stockade surrounding the village. Most villages also had a trench surrounding the stockade, it may have been used for defense, drainage or for trash disposal (a lot of bones and flint were found in theses pits).

There is evidence that once these people settled down, they continued to hunt, and also took up agriculture and fishing. Their diet consisted of deer, elk, bear, turkey, grouse, corn, beans, squash, and wild berries and fruits from nearby forests.

Inside the stockade other structures were found at the Gnagey site. Sweat lodges were common, and were built larger than the roundhouses to accommodate several people. The roundhouses had storage pits connected to them to store foods during the warmer months.

During the 1500's the Monogahela people seemed to disappear from existence. The three main theories are; the made themselves extinct due to battle with neighboring tribes, they simply moved from the area and disappeared, and they merged with another tribe (either the Iroquois or Susquehannocks).

The next large group of Indians to live in Somerset County was the Delaware Indians abranch of the Algonquins. They moved into the area during the 1600's. The Delaware's relied heavily on corn, beans, and squash in their diets along with wild game and fruits and berries. Their houses were also roundhouses, but they were constructed of cattail mats. They also used a dugout canoe instead of the bark or hide canoes of other tribes.

The Iroquois Indians were also present in Western Pennsylvania at this time and were at war with the Susquehannocks. They lived in longhouses covered with bark. These people also live on the three main vegetables of corn, beans, and squash. Their meals were supplemented with wild game and any fruits and berries that they could find.

The Delaware's were soon outnumbered and lacked the warfare techniques of the Iroquois, they asked for a treaty from the Iroquois to protect them from their enemies. The Iroquois agreed and considered the Delaware's to be cowards. But this freed the Delaware's to fight the White people. From 1700 on, most of the fighting between the Indians and whites in Pennsylvania and New Jersey was with the Delaware tribes. The number of settlers killed coming through Somerset County from 1759 to 1763 is estimated to be in the thousands. From base camps in Somerset County the Delaware's struck at settlers as far away as fifty miles from Philadelphia. The skirmishes continued until 1784, when all the Indians were removed from Western Pennsylvania.

Negro Mountain

"Negro Mountain" is located between the Allegheny and the Laurel Hill Mountains. It constitutes a considerable change in elevation running from the state of Maryland through nearly half of Somerset County and forms a dividing ridge for the surrounding watersheds. Prior to 1749, this area seemed to have been unexplored by the settlers. Then, Christopher Gist, an agent of the Ohio Company and a surveyor from Nor Carolina, journeyed to this region to discover these lands and chose the southern route which was known as Nemacolin's trail. On this adventure however, he merely skirted this mountain range. Nevertheless, this trail later became the shortest distance between the Atlantic settlements and the Ohio Valley. Soon thereafter, (1754) Lt. George Washington who was stationed at Wills Creek (Cumberland, Maryland) in command of an expedition to occupy the forks of the Ohio (Pittsburgh) was credited with cutting the road, later known as Braddock's road, through the southwest part of Somerset County, approximately where U. S. Route 40 is now constructed. In doing so, Washington also circumvented the mountains plateau which was later called "Negro Mountain." In both of these instances, roads were constructed along the natural paths that had been cut by the Indians. Historical accounts, on the other hand, seem vague and uncertain about the precise time Turkeyfoot road was laid out—the road leading to Elk Lick, Pa. and over "Negro Mountain."

Several accounts exist as to the naming of Negro Mountain, however, none of these are bound by proven fact. Information found in the local history records of Somerset, Pennsylvania in the Library of Congress centers on three main accounts relevant to the naming of the mountain. The first account came from the fearless adventure of Captain Andrew Friend, pioneer hunter and Indian fighter who migrated from Virginia to this (Turkeyfoot) area and whose exploits rivaled those of Davy Crockett and Daniel Boone. It was Captain Friend's custom to journey with other settlers and his Negro slave as far as the meeting of three rivers in search of deer, elk, panthers, wild turkeys and other animals. This account stated further that the hunting party set out on one of these trips not only to hunt wild animals, but also to explore the surrounding countryside. They proceeded therefore at great peril to Fort Cumberland, which, at that time was quite an advanced frontier settlement, and in a region forbidden to whit men. On the top of this mountain range, they were surprised by a band of Indians. The Negro, at a risk which cost him his own life, held off the Indians until the others could get in position to defend themselves and repulse the attack. He was buried on the spot where he fell and the mountain was afterwards called "The Negro Mountain" or later "Negro Mountain."

Another account related the story of a different owner of a Negro; a hunter named Jacob Castleman who maintained a camp near the town of Meyersdale, Pennsylvania. In this camp, Castleman after whom the Castleman river takes its name, kept a Negro servant who was said to have been "almost as expert a woodsman as was his master"—a man after his own heart. On one occasion long before settlers had come into this area—this Negro was sent along with a neighboring hunter on an errand to the Turkeyfoot region. There, a band of Indians, doubtless under the leadership of Pontiac, succeeded in separating these two hunter. In a heroic effort to carry out their mission, the Negro was pursued up the mountain, whereas his companion was chased toward the river. And although this Negro was never heard of afterward, the story stated that he was killed on this mountain. Nor was it definitely known what happened to his companion, but it was believed that he escaped. The account concluded nonetheless that in recognition of the skill and bravery of this Negro servant, the plateau from that time on was called "Negro Mountain."

Still another account briefly recorded the bold adventure of a Maryland hunting party which included a giant Negro. This man displayed unusual bravery on the mountain range under discussion, but was killed after he led a devastating attack against the Indians. This battle occurred during the French and Indian War and was fought under the leadership of Colonel Thomas Cresap. This account also concluded that in appreciation of a Negro's bravery his comrades named the plateau "Negro Mountain."

In addition to these accounts, each telling of a different adventure about a Negro, several traditions persist, especially the frequently heard but unauthenticated one, that the name of this mountain stems from its strategic location as an Underground Railroad Station—four miles north of the Mason Dixon Line—and was well known as a refuge for runaway slaves. But the slaves' bitter struggle for freedom, in which the "Underground Railroad Conductors" played a major part, reached its climax several decades after the aforementioned expeditions.

While the naming of Negro Mountain can not be proven by historical fact, it is significant that all of the accounts that exist agreed at least on the point that a Negro on some sort of heroic adventure distinguished himself on this mountain range. And because of his heroic and faithful service the plateau was called "Negro Mountain" in his honor.

The Whiskey Rebellion

The Whiskey Rebellion of 1794 is regarded as the first test of the newly created American federal government's authority over its people. The Rebellion was marked by a series of unlawful and violent actions protesting the enactment of an excise tax on local liquor production.

The groundwork for the Rebellion is considered to have been laid as early as March of 1684, when the first excise tax imposed in the state of Pennsylvania was enacted. A number of later taxes were also passed, but few were ever actually enforced to the point of producing real revenue for the Treasury. Some of the later acts actually did produce some revenue, but little resistance to this acts was present, as most of the money was earmarked for the "Depreciation Fund" to provide additional compensation to Revolutionary War veterans whose pay was greatly diminished by rapid depreciation of the continental currency. Most of these laws were repealed in about 1791, as for the previous 20 years or so, they generally had not carried much weight anyway.

The piece of legislation most often blamed for the Rebellion was a 4 cent per gallon excise tax on rye whiskey proposed by then Secretary of the Treasury Alexander Hamilton which passed on March 3, 1791. At the time, rye whiskey manufacturing was a major winter industry for the southwestern Pennsylvania agricultural community. As many as 1 in 5 or 1 in 6 farmers in southwestern PA produced rye whiskey during the winter months; the area had a greater number of stills producing more whiskey per capita than anywhere else in the country. Rye whiskey entailed an important part of the Pennsylvania farmer's livelihood, as it served as a common exchangeable commodity for such necessary items as salt, sugar, iron, etc. The area terrain imposed practical limits on what quantities of goods could be transported; a typical horse could carry only about 4 bushels of grain, but could carry enough whiskey to equal 24 bushels of grain.

The excise tax incensed many of the area's settlers, who were of Scotch-Irish or German descent and came from countries where spirituous liquors were generally sparsely regulated and where excise taxation was regarded as one of the most despicable actions of a tyrannical government.

The first organized resistance of the Rebellion was assembled in a meeting on July 27,1791, at Old Fort (now Brownsville, PA) to put in place a series of organizations in Westmoreland, Fayette, Washington, Allegheny, and Somerset counties to resist enforcement of the excise tax. Shortly thereafter, an occupied campaign ensued, harassing the excise agents and those who complied with the tax. John Holcroft gained notoriety as "Tom the Tinker", "fixing" or shooting up stills in the area of those who complied with the excise tax.

In 1794, President Washington issued a call for 13,000 troops to put down the Rebellion. Troops from Virginia and Maryland met at Cumberland, and New Jersey and Pennsylvania troops met at Carlisle. Washington appointed Henry Lee, governor of Virginia, was commissioned as commander-in-chief of the army. Washington himself traveled to Bedford to preside over the control of the insurrection from the Espy House on Pitt Street. The Cumberland troops marched as far as Uniontown, and the Carlisle troops reached Bedford in October of 1794. Shortly thereafter, the combined army marched on Bedford, and by about November 18, 1794, the Rebellion had largely been put down without major incident. Two local residents, Thomas Philson, and Harmon Husband (founder of Somerset) were arrested for their part in the Rebellion. Philson was acquitted, and Husband died in prison while awaiting trial. The excise tax that had instigated the Rebellion was later repealed, in 1802.

Covered Bridges of Somerset County

The turnpike was originally developed in England during the seventeenth century. The technology and engineering techniques required to construct turnpikes were transplanted to America in the early nineteenth century. The covered bridge, however, was a central European invention native to the area that is now Germany, Switzerland, and Austria. Gradually, European technology for turnpike and covered bridge construction was adopted in America. Thus, the covered bridge and turnpike are two closely related technological designs, each contributing to the other's success. Covered bridges and turnpikes were an essential part of the early transportation system in Pennsylvania.

The earliest covered bridges located along the turnpike system in Pennsylvania were constructed entirely of wood. Large trees were felled to produce the necessary hand-hewn timbers. The bridges were covered to protect the woodwork from the elements. It also provided shelter for travelers and the sides helped to hide the water from the skittish horses. Of the numerous covered bridges that once stood in Somerset County only ten remain standing today. They include the Barronvale, Burkholder, Glessner, Kings, Lower Humbert, New Baltimore, Packsaddle or Dock Miller, Shaffer's, Trostletown, and Walters covered bridge.

Of the ten remaining covered bridges in Somerset County four stand within the Casselman River watershed; the Burkholder, Lower Humbert, Kings, and Walter Mill Bridge. The Burkholder or Beechdale covered bridge is located five miles southwest of Berlin, 250 feet west of Route 219, two miles northeast of Garrett in Brothersvalley Township. It was built in 1870 and spans Buffalo Creek. It was constructed using the burr Arch design. The Lower Humbert covered bridge is located two miles north of Ursina, thirty feet west of Legislative Route 3007 in Lower Turkeyfoot Township. It was built in 1891 over Laurel Hill Creek using the Burr Arch design. The Kings covered bridge is located two miles west of New Lexington, about thirty feet south of Route 653. It was built in 1806 and spans Laurel Hill Creek. The Kings covered bridge uses the Burr Arch construction. The Walters Mill covered was originally located four miles south of Somerset across Coxes Creek. In an effort to preserve it was moved four miles north of Somerset to the Somerset Historical Center in Lincoln Township. The Walters Mill covered bridge was built in 1859 using the Kingpost type construction. In 1908 arches were added for additional support, thus converting the Kingpost truss into a Burr Arch design.

The most important aspect of the covered bridge is the truss system. A truss is a system of rigid triangles composed of small timbers that can be combined to form a strong and stiff structure. Because the members are held together with pins, they carry loads efficiently in direct tension (stretching) or compression (pushing together). In Somerset County several basic truss designs were utilized with the most common designs being the Kingpost, Multiple Kingspost, and the predominant Burr Arch design.

The Burr Arch was designed by Theodore Burr of Pennsylvania in 1803. It has a large wooden arch added to a conventional Multiple Kingspost truss to increase the stiffness of the bridge. The ends were embedded in the abutments on both sides of the bridge and greatly increased the strength of the bridge as well as its stiffness. This system made it possible for covered bridges to span 350 feet in length without intermediate supports.

The advent of the railroad, continuous maintenance expense required for the turnpike system, and limited public funds contributed to the demise of the turnpike system. The expanding network of railroads required structures that could sustain enormous locomotive weights. In addition, the ever-present danger of fire was a hazard that had continually plagued the earlier all-wooden structures.

Thus, iron was introduced into the bridge building process. It provided the strength necessary to accommodate the increased weight of train, and it was non-combustible. Furthermore, since iron was weather resistant, the roof and siding earlier required for the protection of the wooden truss was no longer necessary. Iron permitted the construction of pre-fabricated bridges that could be ordered quickly and economically, in contrast to handcrafted covered bridges.

With the transition from wood to iron, the master craftsman's role in covered bridge building diminished. Following the Civil War, the engineer attained prominence in bridge construction, and what had earlier been considered an art was transformed into a modern science based on engineering practice.

Significant Historical Structures in Southern Somerset County

Manufacturing and Bulk Products

1.) Baker Mill

Location: East side of SR 4001, Bakersville, Jefferson Twp.

Date: 1820

Description: Baker Mill is a two-and-a-half story wood post-and-beam structure measuring 42 feet x 36 feet with a stone foundation. The windows are double-hung, six-over-six-light, with many of the panes broken out. An outline in asphalt paper on the south wall depicts a one-story gabled roof that housed the steam engine and boiler. A one car garage has recently been constructed abutting this wall. Gaps in the foundation wall on this side have been infilled with brick and concrete block. The north, south, and west walls are sheathed in asphalt siding while the east wall has wood clapboard. Some of the clapboard is missing on this wall, exposing the timber frame. Evidence of the grain hoist is visible at the apex of the roof on the west side. There is a metal water wheel on the east side. A portion of the foundation at the wheel pit has been filled with hollow clay tile blocks. The race, which originated at Kooser Run across the road, is no longer visible. The miller's house stands to the north of the mill.

History: Henry Baker settled in Jefferson Township in 1813 and built this grist mill along Kooser Run in 1820. Baker also owned a large distillery and a tavern at the same location. The village known as Bakersville served as both post office and center of commerce. Although the tavern and distillery were eventually abandoned, Baker Mill continued to operate, producing various types of flour and feed. Owners who followed Baker include his son, John, Henry Lohr, George Bodes (1898-1920), and Jonathan Bodes, who produced goods under the name "Bakersville Rolling Mills" until the mill closed in 1934. For a short time following its closing the mill was used in the production of mushrooms; since the 1940's it has been used for storage.

2.) Moses Barron Mill

Location: East side of Laurel Hill Creek between T 501 and Sr 3014, Barronvale, Middlecreek Township

Date: 1869

Description: The vacant Barron Mill is a two-and-a-half-story, wood-frame structure with a stone foundation. The windows are double-hung, six-over-six-light. The water wheel is not extant but the pit is still visible. Moses Barron's house is located across the road.

History: On this site in 1806 John Kooser built a grist mill. Moses Barron bought the property in 1864 and in 1869 constructed the present mill, which served as an important social and business center for the small village of Barronvale. During the flood of 1936 the mill dam was washed away and milling operations ceased. Milton Whipkey then took over the mill and used it for woodworking, and later for the production of corn meal and buckwheat flour. According to the 1876 county atlas there was also a saw mill on the site. The structure is now vacant.

3.) Berkley's Mill

Location: North Side of SR 2006; Village of Berkley's Mill, Summit Township

Date: c. 1863

Description: This mill is comprised of two gable-roofed portions: a three-and-a-half-story section measuring 34' x 34' and a two-and-a-half-story section to the east measuring 24' x 23'. The entire wood structure is sheathed in board-and-batten, and has a stone foundation, with double-hung, six-over-six-light windows. Constructed on a bank, only two stories are visible on the south side. A stone and brick tapered chimney abuts the east wall. On the interior the wood posts and beams are hand hewn. The mill's race from Blue Lick Creek, which entered the mill's west wall and exited the east wall, has been obliterated.

History: Jacob Berkley first built a grist mill on this site along Blue Lick Creek in 1821, one year after the village of Berkley's Mill was founded by John Berkley. The mill complex became the nucleus of the village, serving both as a social and commercial center. In 1861 fire destroyed the mill, along with a nearby woolen mill operated by Solomon Berkley. The grist mill was rebuilt in 1863, and the 1876 atlas indicates that a woolen factory was adjacent to the mill on the east side. Jacob Berkley sold the mill and surrounding property to Wellersburg businessman and investor John R. Brinham in 1863. Brinham in turn sold the mill to Jacob Steyer (the next known miller), and subsequent owners in the nineteenth century included Silas Walker (1880-1884) and Anne Critchfield (1884-1897).

By 1894 the Berkley Distillery stood just south of the mill but has since been razed. At this time Berkley's Mill was known as "Critchfield and Baldwin Flour and Feed Mill" and had a 25-horsepower steam engine in addition to water power. To the south of the distillery near Blue Lick Creek was a bonded whiskey warehouse.

Owners in the twentieth century included George D. Brant (1897-1901) and Howard Sellers (1940-1954). The mill remained in operation until 1954. The Meyersdale Lions Club acquired the tract in 192 and has developed it as a recreational site.

4.) Compton's Mill

Location: West side of SR 2001 at Tub Mill Run, Elk Lick Township

Date: 1868-1871

Description: The main portion of the three-and-a-half-story, clapboard Compton's Mill is banked and measures 54' x 42'. To the south is a one-story addition measuring 22' x 20' that housed the boiler used to provide steam power to the mill. Another smaller addition to this portion was added, measuring 22' x 12', to house a blacksmith shop. Both the original portion and the additions have metal roofs, stone foundations, and double-hung, six-over-six-light windows. To the west of these additions is a small wood shed. Between the second and third floors on the south wall of the original portion of the mill appears "ELKLICK. IXL. FLOUR EXTRA." At the same location on the east wall appears "COMPTONS. MILLS.

1872." On the east side of the mill is a hoist overhang at the roof apex and a stone inscribed with "Samuel Compton 1871" is the foundation wall. The mill race from Tub Mill Run ran along the west wall where the water wheel was located.

On the interior are white oak beams measuring 12" to 18" square and 50' long. These beams, along with head posts and the roof truss, are mortised with six-sided white oak pins. Milling machinery from the early part of the twentieth century remains inside.

History: John Griffith built the first grist mill on this site in about 1790. The original Griffith mill stood until Samuel Compton acquired the property in the 1860s and hired local craftsman Israel Schrock to oversee the construction of a modern "first-class flour mill." According to a history of the mill compiled by the Compton family, exceptionally high-quality materials were used in the mill's construction. The stones used for the foundation were gathered from the land surrounding the mill. None of the stones were quarried because Schrock believed that the strongest and most durable stones were those that had been "exposed to the elements for centuries." Similarly, white oak was used exclusively in the mill's framework, each beam having been "hand-dressed with an adz, and mortised on the ends and at the juncture of the head-posts." Schrock used six-sided white oak pins (such as those commonly used in ship-building) to secure all beams, head-posts and roof trusses. Construction of the mill was almost complete in 1873 when a new mill race was built to provide the water necessary to power the 18' x 5' wooden overshot water wheel. Three water-gates were installed to regulate water flow; one of these could be adjusted from the grinding floor inside the mill.

Samuel Compton supervised operation of the mill until his death in 1901, at which time his son Demetrius became the mill's owner. In 1905, Demetrius installed two stands of roller mills for the grinding of "fancy flour," but continued to use three buhrmills to grind whole wheat and buckwheat flour, cornmeal, and livestock feed. Demetrius' son Ward Compton continued this milling practice and marketed some products under the brand name "Penn's Best." He remodeled the mill in 1937 and operated it through 1941. This superb example of an intact nineteenth-century grist mill is still owned by the Compton family.

5.) Confluence Lumber Company

Location: West side of SR 281, North side of B&O Railroad, Borough of Confluence

Date: c.1901

Description: The Confluence Lumber Company retains much of its original appearance. The site includes two short rows of abutting buildings facing each other. In between, a railroad spur once ran to the nearby Pittsburgh Division of the B&O Railroad.

Only a few partially exposed ties remain. On the south side of the former siding are three abutting one-story warehouses. On the north side is a one-story planing mill, a two-story office, a two-story warehouse, and a smaller one-story shed – all abutting. To the northwest of these structures is a lumber shed and to the northeast a tall, one-story warehouse. Several structures are sheathed in contemporary siding.

History: The Confluence Lumber Company, in business as early as 1901, continues to manufacture and supply lumber products throughout the area. The company was founded by the five Clause brothers. After William, the last brother, died, the company then became the property of Joseph's son Norton, who immediately sold the company to Ralph Wright, an employee who had been working for Confluence since 1961. Wright sold the company to the present owners in 1989.

The warehouse that stands apart from the other structures was constructed sometime between 1901 and 1907 and originally served as the power plant for Confluence Borough. Utilizing a steam-powered dynamo, the power plant functioned until 1918, when it was acquired by Confluence Lumber Company. Confluence Borough, meanwhile, had developed other sources of electricity. A large shop/planing mill, now razed, was located near the northwest corner of the former power plant. A railroad spur from the nearby Pittsburgh Division of the B&O Railroad once entered the site, but use of this spur was discontinued in about 1986, and the tracks removed several years later. One piece of machinery built in the 1890s was actively used as late as 1987. The company once owned and operated horse-drawn wagons to deliver lumber (the stables were demolished by 1975).

6.) J.M. Cook and Son Company

Location: NW corner of 8th and Meyers Streets, Borough of Meyersdale

Date: ca. 1910

Description: The J.M. Cook and Son Company candy factory consists of two abutting buildings. Facing 8th and Meyers Streets is a trapezoidal, three-story brick structure with double-hung, two-over-two-light windows that was used for storage. Abutting this structure on the west is a two-story concrete-block structure. This building was used for storage and for cooking candy.

History: The J.M. Cook and Son Company was a candy manufacturer operating in Meyersdale as early as 1910. In 1919 it was still in operation with a total of seven employees, and it continued to operate until at least 1930. The building is currently vacant.

7.) Fogle & Long Cigar Company

Location: 401 Diamond Street, Borough of Berlin

Date:	ca. 1905
Description:	The former Fogle & Long Cigar Company is presently used as a residence. It is front-gabled, with two-and-a-half stories, and has double-hung, two-over-two-light windows. The north and west walls retain the original window trim but are covered in asphaltic brick siding. The south and east walls have been altered, window trim has been removed and the first level is covered in stucco. The second level is sheathed in a vertical board paneling. There is a brick chimney at the apex of the roof and a concrete-block chimney has been added on the north wall.
History:	The Fogle & Long Cigar Company's factory was operating on Diamond Street as early as 1905. In 1916, this manufacturer of hand-rolled cigars employed a total of thirty-one workers. In about 1918, partners Edgar Fogle and George Long moved their factory into another building, which had served as a public school since at least 1898. Among the products manufactured by the Fogle & Long Cigar Company was the "Hi-De-Ho Stogie," advertised as the stogie "for the smart smoker." When Long retired in 1930, Fogle assumed complete ownership of the company and operated the factory at this location until Fogle's retirement in 1962.

8.) Friedline Brothers Planing Mill

Location:	7th Street; between Broadway and North Streets, Borough of Meyersdale
Date:	ca. 1897
Description:	A combination warehouse and office building is all that remains from the Meyersdale Planing Mill, formerly the Friedline Brothers Planing Mill complex. This is a hollow clay tile one-story structure, somewhat triangular in shape. There is another structure on the west side of this building that may once have been part of the planing mill that is now used as a residence. The former warehouse and office building has three large doors facing the Baltimore and Ohio Railroad tracks.
History:	In 1873 John H. and Herman L. Friedline built the Friedline Brothers Planing Mill at a cost of $8,000. In September of 1882 fire destroyed the mill, but John H. Friedline and D.S. Cober rebuilt it that same year. In 1884 the mill was described as "the best planing mill in the county...provided with the latest and best machinery." At that point the mill employed eight men and produced between 300,000 and 400,000 feet of lumber per year. In 1887 the Friedline facilities included a lime storage house, a lumber shed, and a woodworking and machinery building connected to an engine house by an elevator shaft and a sawdust conveyor.

Sometime between 1887 and 1892 the mill changed hands and operated briefly as the Kennedy Price Planing Mill, Sash and Door Factory. The Friedline planing mill enterprise probably continued to operate at another location in Meyersdale, since a "Friedline Planing Mill" appears in industrial directories through 1922. Maps show that by 1892 the complex had been enlarged to include the area south of Pennsylvania Street between 7th Street and the Baltimore and Ohio Railroad tracks. An office building was located in this area and lumber was stored there as well. At this time another building, which housed a gluing room and a dry house, was also added to the north of the engine room. Sometime prior to 1897, the complex was once again enlarged by the addition of a second dry house and the construction of a warehouse on the land south of Pennsylvania Street.

By 1897 the tract had been purchased by the Meyersdale Planing Mill Company, whose partners included S.A. Kendall, John S. Graves, and later, W.H. Deeter. The Meyersdale Planing Mill was at one time a very successful enterprise that shipped lumber and shingles to many eastern cities. The mill also provided the lumber for most of the buildings constructed in Meyersdale during the first decades of the 1900s, including the school, the Colonial Hotel, and the C.W. Truxal residence. In 1911 the mill was awarded the contract to build five stations for the Western Maryland Railway, including the local Meyersdale depot. The mill also manufactured the lumber used to build Meyersdale's Baltimore and Ohio Railroad depot.

After World War I construction in the area came to a virtual standstill and employment at the mill dropped steadily, from twenty employees in 1916 to one employee in 1938. The Meyersdale Planing Mill closed down in the early 1940s.

9.) Globe Column Manufacturing Company

Location: North side of intersection of SR 4055 and SR 281, Somerset Township

Date: 1903

Description: One, and perhaps two, buildings from the Globe Column Manufacturing Company are now extant. Occupied by Agway, Inc., at the Agway Group Center, one of the structures is a two-story, brick structure painted white with a 1928 one-story brick addition on its south side. A cornerstone on this addition bears the inscription "A.D. Graham & Co. Inc. 1928." There are large sliding wood doors on both the east and west walls. A wood structure that may have been part of the original Globe Column Manufacturing Company complex is to the north of the brick structures. Later buildings on the present site include a concrete-block structure and a metal building. A railroad siding branches off from the nearby Baltimore and Ohio Railroad Somerset and Cambria Branch onto the site.

History: The Globe Column Manufacturing Company was incorporated in 1903. A 1912 description of the company offers a detailed listing of the company's products, including "built up, lock joint Colonial columns, porch and stair balusters." Globe Column also specialized in "detail work, large Colonial columns, pilasters and pedestals; also interior columns in hard and soft wood."

Globe Column's manufacturing complex, located on the Pittsburgh, Westmoreland, and Somerset Railroad, underwent extensive change over the years. In 1904 there were three structures on the site, including a woodworking shop and a lumber shed. By 1910 the woodworking shop had been enlarged to house a planing, sawing, and turning factory, and an attached engine room, a drying kiln, a gluing room, and an office. Sometime between 1910 and 1917 two additional lumber warehouses were also constructed.

In 1928 the tract was purchased by A. D. Graham and Company to house Albert Graham's Somerset County Fertilizer Works. At this time Graham built a one-story brick addition, which is still standing. The fertilizer works included a rendering plant to provide animal tankage used in the fertilizer, and a Pittsburgh, Westmoreland, and Somerset Railroad locomotive was used as a stationary boiler to provide steam for this operation. Other ingredients used in Graham's commercial fertilizer included "tobacco stands, superphosphate, sulfate of ammonia and German potash." Graham packed the mixed fertilizer in 167-pound burlap bags for delivery to local farms.

Somerset County Fertilizer Works occupied the site until about 1951. There were several subsequent owners, including Summer's Fertilizer Company, from whom Agway purchased the property in 1969. This complex of buildings continues to house Agway's fertilizer and crop protection chemical business.

10.) A. Growall and Sons Planing Mill

Location: East side of Bridge Street, Borough of Rockwood

Date: ca 1872

Description: Presently occupied by Clapper's Building Materials, the Growall Planing Mill originally consisted of two, two-and-a-half-story, front-gabled structures. These structures have since been connected. The larger portion nearest the Baltimore and Ohio Railroad was the planing mill itself, which is covered in both asphalt and aluminum siding. The smaller banked structure is covered with aluminum siding and was most likely originally used for storage. The double-hung, two-over-two-light windows on both of these structures may be original. The one-story, flat-roof section connecting the two is similarly sided in aluminum as are the fronts of the two original structures.

History: In 1872 Anthony Growall spent $1,000 to establish a planing mill along the south side of the Pittsburgh and Connellsville Railroad tracks in Mineral Point, later known as Rockwood. By 1884 the mill was co-owned by Anthony Growall and his sons, Jonathan P. and Ananias. A nineteenth-century photograph of the planing mill shows horse-drawn sleds being used to bring in timber and take out lumber. Despite a boiler explosion at the mill in 1900 that killed Frank Growall, the son of one of the proprietors, business at the mill continued. A 1905 view of Rockwood shows a sign on the roof of the mill which reads, "J.P. Growall, Contractor Builder & Dealer In All Kinds Lumber & Builders' Supplies." Sometime before 1905 the mill was apparently taken over by Jonathan, and it operated as the J.P. Growall Planing Mill at least until 1922; by 1925 it was called the Growall Brothers Planing Mill.

The Growall family retained ownership of the mill until 1958, when the tract was purchased by Clapper's Building Materials. The following year a small addition to the north building was razed and a center portion was added, thus linking the two structures on the site. A small concrete block addition to the south side was also constructed. The building continues to house Clapper's Building materials and lumber store.

11.) Hay's Mill

Location: Near southwest corner of T415 and T658 in village in Hay's Mill, Brothersvalley Township

Date: ca 1806

Description: Hay's Mill is presently in ruins. Only portions of its stone foundation walls remain. The northwest wall, the most intact, also retains some of the wood framing of two door openings. Blue Lick Creek continues to flow on the south side of the remains, but the race and the wheel pit are no longer discernable.

History: Simon Hay built Hay's Mill in about 1806. Hay had come to the area from Maryland in about 1779 and had built his first mill in the 1790s. This site proved to have insufficient water power, however, so Hay built the present mill on reliable Blue Lick Creek and turned his first mill into a carding mill.

The stonework at Hay's Mill was executed by Irish mason Thomas Short. Massive log timbers comprised the upper portion of the structure. The mill became an important part of community life (at one point a store and post office were located on the second floor of the mill), and the tiny village of Hay's Mill grew around it. A 25' water wheel powered the mill's three buhrstones, and a saw mill operated adjacent to the site.

The Hay family operated the mill until 1854, after which a succession of individuals owned the business. The Boger family was the last to operate the mill in the late 1910s. The mill was largely intact until 1936. Shortly thereafter the mill was dismantled and most of the wood and many of the stones were used on other structures. Several of the wooden cog wheels are on display at the Mountain Playhouse in Jennerstown.

12.) M. Knecht & Sons Foundry

Location: North side of T 323 in West Salisbury, Elk Lick Township

Description: The site of the original Knecht Foundry, presently the West Salisbury Foundry & Machine Company, is a red brick structure with two subsequent additions. The building is two stories high, with nine-over-six-light windows on the first floor and twelve-over-nine-light windows on the second floor. All of the lintels are arched brick and the sills are stone. The first addition abuts the west wall and for the most part matches the original, except where it has flat lintels and brick sills. On the north side is a tall one-story concrete-block addition. On the west side of the site is the former right-of-way of the Baltimore and Ohio Railroad Salisbury Branch, the grade of which is still extant.

History: The origins of M. Knecht & Sons Foundry date to 1880, when Michael Knecht established a blacksmith shop in West Salisbury. In 1892 Knecht purchased the Salisbury Foundry, which manufactured and repaired various machinery. In 1905 Knecht formed a partnership with his five sons and the establishment became known as M. Knecht and Sons. This partnership lasted seven years until William bought out his father's and siblings' interests. A siding from the adjacent Baltimore and Ohio Railroad Salisbury Branch once entered the site. A fire in 1936 completely destroyed the building and its contents. The business was immediately rebuilt in a new building housing new equipment and machinery. The company grew from two employees in 1928 to five employees ten years later. Two addition have been constructed since the original building was completed in 1936.

William Knecht died in 1956, but his daughter and three sons continued the family business. While the foundry quit operating in 1964, the business continued to do repairs and machine work. The company remained in family ownership until 1978. The present owners repair strip mining machinery, milling, acetylene and electric welding.

13.) C.W. Kurtz Planing Mill

Location: North side of the B&O Railroad and west side of SR 281, Borough of Confluence

Date: ca 1901

Description: The Abandoned C.W. Kurtz Planing Mill is a two-story, gabled-roof building with a one-story flat-roof addition on the west side. This addition, probably built as an office, is presently sheathed in an asphalt brick siding. Its most prominent feature is the pedimented front portico over the front door. The original portion of the building is presently sheathed in corrugated metal siding, with a large sliding door on the south side. Standing outside next to this door is an abandoned band saw manufactured by the R.B. Yates Machine Company of Beloit, WI. There is evidence that another building once abutted this structure on the west side.

History: The C. W. Kurtz Planing Mill was in business as early as 1901. The site consisted of the extant original portion, as well as several abutting structures, including a powerhouse, that have subsequently been razed. By 1924 the mill had switched from a steam engine to a gasoline engine to supply its power needs. Sometime after that date the west side addition was built, and the company began selling builders' and farmers' supplies. The site has been abandoned for many years.

14.) Meyersdale Concrete Products Works

Location: North and south sides of T554, Borough of Meyersdale and Summit Township line

Description: The Meyersdale Concrete Products Works, presently Clapper's Building Materials, consists of the original portion on the south side of T 554 (11th Avenue) in Summit Township. This two-and-a-half-story structure that was built as a stable is abutted on the east, west, and south sides by newer buildings of rough-faced concrete block manufactured on site. On the east side is a one-story office and warehouse built around 1928, while to the east is a garage built around 1930. On the west wall of the stable is a one-story steam curing room, built ca. 1935. To the west of the curing room is a two-story storage building, and to the south of the original stable is a two-story addition, ca. 1930, containing a .contemporary concrete silo. To the south of the curing room is a tall, one-story structure built ca. 1935. To the east of these building is the founder's house, which is now owned by his son, the current president.

The first structure to be built on the north side of 11th Avenue was a 1939 two-and-a-half-story lumber shed measuring 100' x 60'. Abutting the north wall of this structure is a ca. 1949 planing mill also measuring 100' x 60'. Together, both portions form a structure with 24,000 square feet of space. Abutting the east wall of the planing mill is a late-1950s post-and-beam storage building for sand and gravel measuring 75' x 75'. All these structures are constructed of rough-faced concrete block manufactured on site. Against the east wall of the lumber shed is a ca. 1963 retail store. On the east side of this group of four connected structures are storage buildings, one of which is now used by Clapper Industries, producers of laminated tabletops.

History: The origins of Clapper's Building Materials date to 1925, when Carl Clapper was planning to fill in a ditch near his house. Clapper made concrete blocks from a form in his stable, and when people became interested in his pipes, he began to sell them. With the success of the venture Clapper began to manufacture drain tiles, and then bought a concrete-block machine and began producing up to 100 blocks a day.

By 1928 the business had grown substantially. Naming his business the Meyersdale Concrete Products Works, Clapper supplied concrete pipe to the highway department and the Western Maryland Railway, among others. By the mid-1930s Clapper had acquired a stone crusher for sand and gravel, and was involved in the retail sales of building materials. Lumber was added to the product line in 1939, and a new structure was built on the north side of 11th Avenue. During the 1930s the primary business was in concrete products, with three people, most likely Carl Clapper and his two sons, Bob and Dale, making up the bulk of the work force. In 1946 Carl's sons officially became part of the business, a planing mill was added, and the company acquired its present name of Clapper's Building Materials. Dale Clapper opened a second location at the former Growall Planing Mill in Rockwood in 1957.

A fire in 1976 severely damaged the former lumbershed/planing mill structure. The roof was destroyed during the blaze, which was probably started through electrical problems. The concrete floor on the second level kept the fire somewhat contained. The roof and attic space were rebuilt at this time with wooden truss members, whereas the original was a post and beam system. The company continues to manufacture concrete blocks in addition to the primary retail business. At present there are twenty-eight employees and 100,000 square feet of space including both locations.

15.) Meyersdale Manufacturing Company

Location: Southeast corner, Chestnut Street and Lincoln Avenue, Borough of Meyersdale

Date: ca. 1900

Description: The foundry of the Meyersdale Manufacturing Company is a one-and-a-half-story, side-gabled brick structure. The south wall is constructed of rough-faced concrete block. An addition once abutted this wall but was removed between 1904 and 1910. The original windows of the foundry were double-hung, two-over-two-light. On the west wall is evidence of another smaller addition. A building comprised of the former assembling and machine room and "Japan" room is presently used as the J. Bruce Philips service station.

History: The Meyersdale Manufacturing Company foundry machine works, formerly known as the Tubular Lock and Saw Set Manufacturing Company, was founded in 1902. Levi Deal, H.G. Will, and E.G. Boyles were the primary promoters of this large business that made locks and casings. The manufactory was built on the site formerly occupied by the Cyclone Dust Collector Works; in 1904 the company occupied four buildings at this location. A 1904 map identifies the four structures on the site as a "Foundry," and "Assembling and Machine Room," a "Japan Room," and an office and storage building. In 1905 the complex was severely damaged by fire. Along with the machinery, $6,000 worth of patterns were destroyed, and although the plant was rebuilt, the company never recovered. The manufactory's foundry remained active for several years, but by 1919 it was no longer in operation.

16.) Miller Machine Works

Location: North side of T317 near its intersection with T402, .5 miles west of Springs, Elk Lick Township

Date: 1894

Description: The former Miller Machine Works complex of structures is now occupied by Beiler Machine. The original 1894 structure is a hollow clay-tile building that has additions constructed of the same material. Inscribed in a concrete window sill on the wall of an addition is "1927." Behind the original portion is a series of structures that through later additions were formed into one long structure. One of the early structures was the blacksmith shop and foundry which still has forges, anvils, and various blacksmith tools inside. The most visually prominent structure of the complex, the blacksmith shop is constructed of brick on the façade and hollow clay tile on the exposed east side.

On the south side of T317 across from the complex is the two-and-a-half-story residence of the Mennonite founder of the company, Gideon Miller. To the west of this house is the former home of Aaron Miller, his son.

History: Miller Machine Works was founded by Gideon Miller in 1894. The company first manufactured steam-powered traction engines (claimed to be the largest at the time) but this operation was moved to the Twentieth Century Building in Boynton. Miller Machine Works also manufactured and repaired mining machinery. From four employees in 1931, the company grew to as many as fifty-three workers in 1976, many of whom were third-generation employees. Over the years the company also manufactured equipment for the local lumber and maple sugar industries. Miller Machine Works ceased operations about 1983. In 1985 it changed ownership and became Beiler Machine and Tool Works, which primarily does machine work and repairs. In July 1990 the company became Beiler Machine.

17.) Otto Brick and Tile Works

Location : Southeast side of intersection, SR 669, SR 202, and T 323, .5 miles north of Springs, Elk Lick Township

Date: 1902

Description: Otto Brick and Tile Works is a complex of several abutting structure that include an office constructed in the early 1960s, a mechanics' garage and several storage buildings. The open area between the complex and SR 202 is used for brick and tile storage. There is a small hollow clay-tile building in this area, which was the original office. The tallest structure is a clay storage building, constructed in the early 1950s. Later structures are brick, and all have metal gabled roofs. On the west side of the complex are two brick kilns. The original kiln, constructed in 1902, is round with reinforcing steel bands; the other is rectangular with vertical reinforcing steel beams and horizontal reinforcing steel bands, constructed in the 1920s. Both kilns are underneath a tall gabled-roof canopy structure constructed in the 1950s.

On the north side of SR 202 across from the site are three brick houses. The largest was built around 1905 for the company founder, D.D. Otto. The other two smaller houses were constructed shortly after and were occupied by Otto's sons. Eight more houses were built between 1930 and 1950 for other Otto children and grandchildren in the immediate vicinity of the company. All are constructed of brick from the site.

History: D.D. Otto founded Otto Brick and Tile Works in 1902. Several brick factories that had been operating in the southern part of Somerset County during the 1890s had closed their doors by 1900, and friends of Otto urged him to open a new brick plant near Springs. After finding that the clay on his farm was of sufficient quality, Otto purchased brick-making machinery from brothers Joe and John Knecht, and by 1903 Otto Brick and Tile Works was fully operational.

Initially all clay used at the plant was mined by pick and shovel. Molded bricks and tiles were placed on pallets to dry, a process that could take as long as two weeks. The process of firing the wares was also fairly imprecise. No instruments were available to accurately measure temperatures inside the kilns, and as a result kilns were often overburned. In 1912 the installation of modern machinery, including a dryer kiln system, allowed the plant to produce higher-quality brick and tile.

In 1915 Otto Brick and Tile began producing tile silos, and for the next thirty years hundreds were erected in the region, some as far away as Delaware. In 1928 Roy and Walter Otto joined in partnership with their father and for several years the company operated under the name D.D. Otto and Sons.

Between 1952 and 1954 the plant was enlarged and improved; modern facilities enabled the factory to run year-round. After the senior Otto's retirement in 1945 his sons continued as partners in the business, once again known as Otto Brick and Tile Works.

In 1950 the plant stopped manufacturing tile silos and began to concentrate almost exclusively on the production of brick, the product for which there was the greatest demand. In 1962 the plant had a capacity of 250,000 standard bricks per month. The business was incorporated in 1964. In 1979 the plant stopped manufacturing and subsequently has operated as a distributor, handling brick from other manufacturers, as well as stone, masonry tools and supplies, ceramic tile, flue lining, fireplace equipment, drainage pipe, and marble. Otto Brick and Tile Works remains in the Otto family and today usually employs ten people.

18.) Philips-Jones Corporation: Meyersdale Factory

Location: Southeast corner of Grant and Dale Streets, Borough of Meyersdale

Date: 1928

Description: Presently occupied by the Meyersdale Manufacturing Company, this structure consists of two brick sections. The north portion is banked and two stories in height, whereas the south portions are one story high. Windows throughout the structure are multi-light casement. A brick chimney abuts the east wall.

History: The structure was built in 1928 to house the New York-based Philips-Jones Corporation's Meyersdale shirt factory. To finance its construction, over $30,000 was raised by popular subscription in the Meyersdale community. The rear one-story portion of the building was completed by 1931. The funds raised for construction were returned to the original contributors or their heirs around 1958, when the building was sold to Herman D. Baskind of the H.D. Baskind Co. At that time the factory began to operate as the Meyersdale Manufacturing Company. The parent company has changed twice since the time of Baskind's ownership, but the factory has continued to manufacture clothing. Currently, men's and women's uniforms, in addition to shirts, are produced in the building.

19.) Ream Mill

Location: Northwest corner of SR 3003 in Draketown, Lower Turkeyfoot Township

Date: 1819

Description: Located on the north side of Drake Run, this site is heavily overgrown and the mill's stone foundation is all that remains. The foundation is banked on the north side (where the race entered) and the wheel pit is discernible. The north foundation wall appears to have been reinforced with concrete. The mill pond has been converted for use as a reservoir by the Citizens Water Company. Just below the present concrete dam are stone remains most likely associated with the mill.

History: A succession of mills was built on this site, beginning with a ca. 1787 mill built by Oliver Drake, founder of Draketown. A new mill replaced this one in 1812, and when it burned Oliver Drake's son, Jonathan, built the Ream Mill in 1819 for Thomas Ream. The mill was operated for many years by Ream and by his son Thomas, Jr. A saw mill was established to the north, and the Ream residence stood across SR 3003. There were once five overshot water wheels on the hill between the dam and mill. In 1904 the Citizens Water Company was created, and it is likely that the Ream Mill ceased operations then.

20.) Ringer Lime Kiln

Location: North side of Christner Hollow Road, Addison Township

Date: ca. 1880

Description: Ringer Lime Kiln is the best preserved example of its type in the county. It is a banked stone structure with a brick interior and a brick arch. One corner has severely deteriorated. As is typical of lime kilns, its arch faces south to avoid northern winds that could case uncontrolled, accelerated combustion. To the east of the kiln is the concrete foundation of a lime shed, and beyond that is a two-and-a-half-story side-gabled house. On the hillside to the north of the kiln is an abandoned coal mine.

History: The Ringer Lime Kiln was established as early as 1880 by Samuel and Norman Ringer to produce lime fertilizer for fields. The fact that this kiln was fueled by coal rather than wood, and that fire brick was used in the kiln's construction, indicates that this is a later style of lime kiln. It was last used by Isaac Maust during the 1930s.

21.) Savage Fire Brick Company: Keystone Junction Brickyard

Location: Both sides of SR 2006, east of Glade City, Summit Township

Date: 1871

Description: Situated close to the north side of SR 2006 are three houses probably built by the Savage Fire Brick Company. One is front-gabled while the other two are side-gabled. All are two-and-a-half-stories and are sheathed in contemporary siding. Located on the south side of SR 2006, the site of the brick plant and kiln is wooded and overgrown. It appears that there are no remains.

History: The Savage Fire Brick Company, once considered the most prominent non-coal related business in the county, constructed a brickyard on this site in 1871. The company was founded by James, John, and J.M. Porter, all of West Virginia, John J. Hoblitzell of Meyersdale, Nelson Bell of Maryland, and W.D. Porter of Pittsburgh. The company later established plants at Williams' Station and in Hyndman, Bedford County. The site was leased from the Keystone Coal and Manufacturing Company, which established the town as a connection for its narrow-gauge railroad with the Baltimore and Ohio Railroad.

Although the primary product was firebrick, the company also made building and paving brick. In 1876 the village of Keystone Junction included the Keystone Coal and Manufacturing Company's facilities, the Savage Fire Brick Company's main plant, a carpenter shop and blacksmith shop, a railroad depot and a post office. On the north side of the present SR 2006 company houses were laid out on several streets named after Savage Fire Brick Company founders.

By 1884 the company was using the railroad to ship bricks all over the country. With 350 employees, the company could produce 15 million bricks a year from a site that included a main building, two annexes, and five kilns. John Hoblitzell and his two sons acquired full control of the company in 1893. A fire five years later destroyed the plant but it was immediately replaced with a 28,000 square foot facility. The Hoblitzells' ownership of the company came to an end in 1902 when Johnstown and Pittsburgh interests bought the company (including the Williams' Station and Hyndman sites). A coal mine was operated at the Keystone Junction site to provide fuel for steam. In 1910 workers extracted approximately 6,000 tons of coal from the drift mine. Brickmaking permanently ceased at Keystone Junction in 1913 after a devastating fire.

22.) Shultz Distillery

Location: 4.75 miles south of Berlin, Brothersvalley Township

Date: ca. 1830

Description: This complex of distillery buildings is in a dilapidated condition, and the foundations are all that remain of several buildings. The most prominent structure, and the only one still in use, is a hollow clay-tile building with adjacent smokestack that was built around 1940. This structure, located on the west side of SR 160, is presently occupied by "Distillery Storage Potatoes." Just to the south of this facility are foundations of early buildings and a hollow clay-tile grain silo. On the east side of SR 160 is a large windowless wooden building. To the north of that is a two-and-a-half-story wood clapboard residence, in dilapidated condition. To the north of the house are several abutting cinder-block and hollow clay-tile wiles. Several vats are extant within these walls.

History: Records indicate that a man named Baer built a distillery on this site as early as 1830; S. J. Baer's distillery and residence appear at this location on the 1876 atlas. The tract was later purchased by Shultz, who owned and operated the business into the early 1900s. Subsequent owners included Minor and Hawking, but the name "Shultz Distillery" was apparently retained during their ownership. Shultz, Minor, and Hawking all worked to improve and refine the distilling process and the Shultz Distillery did a brisk business, providing the area's coal miners and railroad workers with locally produced whiskey.

The distillery was still operating under the Shultz name in 1919 when production was halted by prohibition. Following the repeal of prohibition in 1933, Frantz Distilleries of Pittsburgh purchased the site and activity at the plant resumed. During World War II the production of whiskey was suspended and the facility was used to process the alcohol needed to produce methyl rubber. At this time the complex was enlarged, and a grain storage tower was constructed. The distillery also added to its production list yeast, syrup, cattle feed, and potato flour. According to one history "trainloads" of potatoes were brought in from across the country and parked at every railroad siding in the area. After the war, potato flour produced by the distillery was sent to Germany at the rate of 30,000 pounds a day. Frantz Distillery was one of Somerset County's largest employers in 1946, when part of the plant was destroyed by fire. Mr. Frantz died in 1950 and the distillery closed in 1952. The building is now used as a produce market and storehouse.

23.) Somerset Door and Column Company

Location: East side of Edgewood Drive, south of Cannel Drive, Somerset Borough

Date: 1905

Description: The original brick building is now surrounded by contemporary structures, but the interior is intact.

History: The Somerset Door and Column company, a manufacturer of "first-class built-up Colonial Columns," was incorporated in 1905. In 1912 the plant consisted of a brick building measuring 170' x 70' several storage sheds, and a sizable lumber yard nearby. At this time the company employed between twenty and thirty men and was one of the area's best known industries.

24.) Somerset Foundry and Machine Company

Location: 809 South Edgewood Avenue, Somerset Township

Date: 1946

Description: The Somerset Foundry and Machine Company consists of three one-story sections abutting each other, with the original portion lower than the subsequent additions. The oldest section is of brick construction with double-hung two-over-two-light windows. The two larger additions are of concrete block construction with multi-light casement windows. Next to the west wall facing South Edgewood Avenue are several large metal structures – possibly sand tipples. A railroad siding that once served this and other nearby industries is partially visible running along the west wall parallel to South Edgewood Avenue.

History: The Somerset Foundry and Machine Company was established in 1932 by William Lloyd one block north of its present location. At that time Somerset Foundry bought out much of the equipment of the Somerset Garage and Machine Works, which had gone bankrupt. After Somerset Foundry moved to its new location, its original building was occupied by Maust Excavating Company.

The brick portion of Somerset Foundry's facilities was built in 1946, while the two concrete block additions were built in the 1950s. Originally a manufacturer of stove and furnace castings, mining cars, and weights for tractors, Somerset Foundry expanded its product line in later years to include castings for generators and printing machinery. After founder William Lloyd retired, his sons William and Eugene took over the company. The company was sold in the mid-1960s.

25.) Somerset Lumber Company

Location: 329 South Pleasant Avenue

Date: 1903

Description: Structures built by the Somerset Lumber Company include a two-story brick warehouse, a one-story brick planing mill, and a clapboard lumber shed. This site is presently occupied by Singo & Sons Feed. The west wall of the warehouse has been severely altered. The planing mill is now used for storage and several contemporary structures are extant on this site. Rails from a spur which ran beside the site are partially exposed.

History: Beginning operations is 1903, Somerset Lumber supplied building material for numerous construction projects, particularly churches, throughout Somerset as well as Cambria, Westmoreland, and Fayette Counties. By 1924 the extant planing mill had been built on the north side of an earlier structure and a heating plant was erected between the two by 1930. Somerset Lumber was finally overwhelmed by competition from other companies and closed about 1980. The site was vacant until Singo & Sons Feed acquired it in 1984.

26.) Somerset Roller Mills

Location: 302 Stoystown Road, Somerset Township

Date: 1904

Description: The Somerset Roller Mills building is a three-and-a-half-story, gable-roof structure sheathed in aluminum siding. Some of the original two-over-two-light, double-hung windows remain. Contemporary grain storage bins and machinery stand adjacent to the mill.

History: George Ferner constructed this mill in 1904. C.M. Williams and William G. Ogline took over operations seven years later. Also known as the Ogline Grist Mill, this facility was originally steam-powered and produced flour from spring and winter wheat, cornmeal, buckwheat flour, and feeds. All of the original machinery on the inside of the mill was removed in 1950. Since then the sole business has been animal feed. A short rail spur that connected the mill to the Somerset and Cambria Branch of the Baltimore and Ohio Railroad was remove about 1990. Somerset Roller Mills continues to prosper under the ownership of Robert Ogline, the grandson of William Ogline.

27.) H.H. Stahl Distillery

Location: Northwest corner of Keystone and Walnut Streets, Borough of Meyersdale

Date: ca. 1894

Description: Until recently, the site of the former H. H. Stahl Distillery was used as a small grocery store. It is presently unoccupied. The structure consists of a three-and-a-half-story portion with a gable on the front measuring 38' x 24' and a three-story, shed-roof addition on the rear constructed sometime after 1894. Just to the west of this structure is a stone and concrete foundation of another structure that once abutted the former distillery.

A two-story, front-gabled bonded whiskey warehouse covered in asphaltic siding stands to the west of the distillery. This structure, measuring 74' x 38', originally had a 250-barrel capacity.

History: In 1894 the distillery had a cistern room abutting the west wall. The operation was run only four months of the year, producing rye whiskey at an average yield of about four gallons per bushel. At that time the street was named River Avenue but by 1904 it had acquired its present name. Buhl and Gatesman purchased this distillery from H. H. Stahl in 1903. In 1904 the complex consisted of a wagon shed, warehouse, hog shed and whiskey distillery. By 1910 the distillery was steam powered and fueled by coal, and was processing sweet mash and rye whiskey and operating four months out of the year. The distillery was closed in 1919, one year before the advent of national prohibition.

28.) Stanton's Grist Mill

Location: East side of Niverton Road in Niverton, Elk Lick Township

Date: 1898

Description: The stone foundation of Stanton's Grist Mill has been incorporated into a garden, and much of the foundation is now lawn. Across the road is the miller's residence.

History: Eli Stanton built this mill and the house across the road in 1898. His son Howard operated the mill. No doubt this mill was an important part of the small coal company town of Niverton. Prior to being destroyed by fire in the early 1920s, the mill had been used for a store and for apartments.

29.) Twentieth Century Manufacturing Company

Location: Village of Boynton, Elk Lick Township

Date: ca.1900

Description: Pittsburgh Nipple Works currently occupies the former Twentieth Century Manufacturing building, a brick, concrete and steel structure with panes of glass comprising much of the wall surfaces. The most prominent feature is the raised center portion with windows allowing additional light inside. The structure has concrete block additions on the south and east walls. A brick chimney abuts the east wall.

History: The Twentieth Century Manufacturing building was built in the early 1900s and enlarged in 1913 to serve as the plant for Twentieth Century Manufacturing Company. This producer of machinery, traction engines, cars, and parts was formed by the merger of the Improved Traction Company of Elk Lick, Pennsylvania, and the Champion Thresher Company, formerly of Orville, Ohio. A company catalog invites "close inspection of our 20th Century Traction, Road Roller, and Portable Engines," and "20th Century – Champion Grain Separators." Twentieth Century further guaranteed that the company possessed "the exclusive right for the many patented improvements as herein stated." Some of the improvements included V-shaped cleats, an all-steel compensating gear, and all-steel gearing. The catalog also contains written testimonials from satisfied users of Twentieth Century Engines.

During World War I, John Wagner built mining card in this building, which at the time also housed a lumber mill. In 1922 the company had twelve employees; by 1925 the number of employees had dropped to four. A distinct shift occurred in the company's focus in 1928, when Twentieth Century

Manufacturing Company became a producer of lumber and planing mill products. The company quit operating about 1940.

30.) H. W. Walker & Company

Location: 1019 North Center Street (SR 601), Borough of Somerset

Date: 1924

Description: The previous site of H. W. Walker and Company, now occupied by Mayfair Creamery, was actually the fourth location for the Walker company. The site includes the original building, which is a two-story brick structure with casement windows, abutted by several brick and concrete-block additions. On top of this facility as well as abutting it are several storage tanks. To the south of this plant is a two-story Art Moderne-style brick structure with a limestone façade. The façade has plate-glass windows as well as glass blocks. A limestone tower on the façade bears the name "Berkey's" in vertically laid letters, while "Dairy Products" and "Lockers" appear on the façade itself.

History: H.W. Walker and Company is the county's oldest and most prominent dairy. It was key in establishing the prominence of the dairy industry in Somerset County. Hiram W. Walker and his brother Alvin began making butter at a creamery on the farm north of Somerset in 1890. Later they began manufacturing ice cream as well, and rought it into Somerset to sell. Alvin died in 1897 but four years later Hiram W. Walker joined G.A. Darr and W.W. Gustin in founding H. W. Walker and Company. The company's first Somerset facility was in a frame building at 233 West Main Street. Their specialty was Walker's Ice Cream, which was shipped via the Baltimore and Ohio Railroad throughout the region. The company had innovative equipment, including a cream separator and a steam-powered ice cream freezer.

Outgrowing this space after only a decade, a new brick three-story building was erected to replace the earlier one in 1911. Designed by local architects Walker and Mong, the building housed the company's manufacturing facilities in the rear of the first floor while the front was used as an ice cream parlor and soda fountain as well as a small grocery store. The floors above the facility were used for apartments. The building is presently occupied by the Somerset Candy Company.

By 1924 H. W. Walker and Company had again outgrown its space and the building at the present site was constructed. The mechanical refrigerator had been invented only the year before and the company was able to phase out the need for block ice at its new plant. It was during this period that L.C. Berkey became a partner in the company. He assumed total ownership during the 1930s and renamed it the Berkey Milk Company. Ice cream and popsicles continued to be manufactured under the Walker name. The Berkey locker plant was built about 1944 as a butcher shop and for retail meat lockers. The front of the building was used as an ice cream parlor.

Sometime prior to 1962 the company stopped making ice cream and popsicles. That year Mayfair Creamery began leasing the facility from Berkey, manufacturing butter in the areas of the building previously used for ice cream and popsicles. During the 1960s and 1970s several major food companies owned and operated the facility. As late as 1976 aluminum tumble churns were replaced with more modern continuous churns. In 1986 the locker plant closed. The present owner has returned the Mayfair Creamery name to the operation, which currently manufactures butter and condensed milk.

31.) J. Williams and Brothers Cigar Factory

Location: Fourth Avenue and Beachley Street, Borough of Meyersdale

Date: ca. 1904

Description: Recently vacated by Agway, the cigar factory was located in the house portion of this structure. The original house is a two-and-a-half-story, side-gabled structure with a similar projection on the rear. It features contemporary siding and a stone foundation. An arched-roof structure with a concrete-block foundation has been added to the east wall of the original house.

History: The J. Williams and Brothers Cigar Factory was a manufacturer of "cheroots and stogies" that was operating as early as 1904. In 1916 eleven men and twenty-two women were employed at this factory, but by 1919 it was no longer in operation. It was occupied from about 1944 until 1964 by the Somerset County Farm Bureau, which sold feed and farm-related machinery. Until recently Agway was the tenant at this site.

Utilities

1.) Berlin Water Company: Berlin Reservoir

Location: North side of SR 2023; 2 miles east of Berlin, Brothersvalley Township

Date: 1904

Description: Presently owned by the Municipal Water System of Berlin, the former Berlin Water Company circular concrete reservoir was recently enclosed by a concrete top. This top has three metal access doors and a metal vent. On the south side is a brick water control building. This 550,000 gallon reservoir and water-control building is surrounded by a metal fence. On the east side are several concrete slabs covering the springs that feed the reservoir, which is also fed by wells. Berlin's daily use of water nearly drains this reservoir so it has the back-up of three other nearby reservoirs to refill it. Two earthen reservoirs to the east and a recently constructed earthen reservoir approximately one mile to the northwest are used for a back-up water supply in case of fire in the area.

History: The Berlin Water Company may have been incorporated as early as 1874, but the borough's first public water system was not in place until 1904, when lines were laid and the company's concrete reservoir was constructed. The spring-fed reservoir has always had a capacity of 550,000 gallons. In 1904 the reservoir's gravity system began carrying water through cast-iron pipe to the residents and industries of Berlin. The two earthen reservoirs to the east of the original were constructed in the 1950s to increase the available water supply. The Berlin Water Company was purchased by Berlin Borough in 1959 and renamed the Municipal Water System. In 1979 a third reservoir was constructed, and in 1990 a concrete top was built over the reservoir and a brick water-control building constructed next to it. The local engineer for this work was Ronald Fogle.

2.) Brothers Valley Coal Company: Macdonaldton Dam

Location: North side of SR 2023 at Macdonaldton, Brothersvalley Township

Date: 1911

Description: The Macdonaldton Dam is an earthen structure with a concrete stepped spillway. Between this spillway and the embankment is a concrete wall that has two steel beams propping it up. The dam, while no longer being used in its original capacity, still retains water.

History: The Macdonaldton Dam was built in 1911 by the Brothers Valley Coal Company to provide water for its powerhouse. As an auxiliary use, the dam also provided the nearby town of Macdonaldton with large quantities of ice during the winter months. Two-foot blocks of ice were cut by hand and transported by horse-drawn wagon to town. Here the blocks were stacked and stored in ice houses, to be used throughout the warmer months. The Macdonaldton Dam is now used as a fishing spot.

2.) Citizens Water Company Reservoir

Location: West side of SR 3003, 3.5 miles north of Confluence, Lower Turkeyfoot Township

Date: 1904

Description: The dam of the Citizens water Company reservoir is concrete.

The reservoir, which is narrow with steep banks, was originally the mill pond for the Thomas Ream Mill, which stood just to the south. A contemporary pumphouse exists on the west side of the dam.

History: In 1904 Charles Kurtz founded the Citizens Water Company and began building a reservoir to supple the town of Confluence with water. The spring-fed reservoir, located about 3 miles from Confluence, was completed by August, and in November 1904 the gravity system began carrying water through cast-iron pipe to the town below. The reservoir is still owned and maintained by the Citizens Water Company and continues to provide water for the town of Confluence.

3.) Garrett Water Company: Bigby Run Dam and Reservoir

Location: East side of SR 2037, southwest of Garrett, Summit Township

Date: 1931

Description: The earthen Bigby Run Dam is on the north side of the reservoir it creates. Recently condemned because of the dam's weakened condition, the reservoir is currently being drained. The dam has a concrete spillway on the east side and a small, hollow clay-tile, hipped-roof valve-control building on the crest. This structure houses the wheels that controlled the four valves at the bottom of the reservoir. Pipes from the reservoir under the Casselman River are still in place.

History: A dam was built in 1903 on Bigby Run at (or near) the site of the present dam to provide the town with water. It later washed out after a heavy rain. In 1909 Piney Run Reservoir was constructed n the north side of the Casselman River to provide the town with water. In 1931 the Garrett Water Company built a new reservoir, 20' deep with a capacity of 15 million gallons, to provide water for the town and for the steam engines of the Baltimore and Ohio Railroad. Water was piped from the reservoir to a B&O coaling station. By the late 1950s diesel had replaced steam power in locomotives and the reservoir became a second water supply for Garrett. Chlorinators were installed in the valve control building.

In 1988, a Pennsylvania Department of Environmental Resources investigation of the Bigby Run Dam found that it was weak and in need of repairs. The Borough of Garrett did not want to spend the money for repair, and consequently the dam was condemned in 1990 and the water drained. Piney Run Reservoir was condemned for use the same year because it contained excessive amounts of contaminants from a nearby strip mine. The town's present water supply is from two underground wells.

4.) Penn Public Service Corporation: Somerset Electrical Substation

Location: Between SR 31 (East Main St.) and the Pennsylvania Turnpike, Somerset Township

Date: Ca. 1920

Description: This tall, one-story, flat-roofed structure is constructed of light-colored brick. The brick is corbeled halfway up the walls. A standard substation design for Penn Public Services Corporation, it appears to retain its original six-over-six-light windows under contemporary storm windows. On the north side are nine insulator conduits and it is unlikely that any of the original transformers remain inside. The structure is situated on the west side of several electrical transformers enclosed by a fence.

History: The Somerset Electrical Substation was constructed about 1920 by the Penn Public Services Corporation.

5.) Rockwood Water Company Reservoir

Location: East side of T412, 2 miles south of Rockwood, Black Township

Date: 1906

Description: The Rockwood Water Company Reservoir consists of two, fenced-in adjacent concrete reservoirs and a one-and-a-half-story vertical board pumphouse that is no longer in use. The pumphouse has a leaning brick chimney to the east, and visible through a window is a diesel engine. On the west end of the reservoir is a small concrete-block chlorination building.

History: The Rockwood Water Company was formed in 1904 and in 1906 the company began constructing the reservoir. Located at an elevation of 350', the spring fed reservoir had a capacity of 1.75 million gallons. This reservoir may have originally been contained by an earthen dame, although around 1908 two concrete basins were added and the reservoir's capacity was increased to 2.5 million gallons. The pumphouse may have also been built at this time. Housing a deep well pump which was run by a 35 horsepower steam engine, the pumphouse had a capacity of 230 gallons per minute. In the early 1960s, the steam engine was replaced by a compressor powered by a diesel engine. The Rockwood Water Company is currently planning the installation of and electric submersible deep well pump, at which time the pumphouse will be razed.

6.) Salisbury Water Works

Location: East end of Union Street, Salisbury Borough

Date: 1938

Description: Finley Spring (elevation 2,260') in Elk Lick Township feeds into this reservoir, located approximately 3 miles to the west in the Borough of Salisbury. With a capacity of 87,000 gallons, the 40' x 40' x 10' reservoir is divided into two sections. Water within the enclosed reservoir is not exposed to sunlight and cannot be contaminated with runoff or debris. With more than 5 miles of pipes, houses in the community receive their water by gravity flow, except for houses to the east of Rock Street, where water must be pumped. The pumping mechanism is housed in a small brick pumphouse at the end of Union Street adjacent to the reservoir.

History: By the 1930s individual wells were no longer adequate to meet the needs of the community of Salisbury. An engineering plan that would link the reliable Finley Spring with the town was submitted to the Johnstown Works Progress Administration in the mid-1930s. The project could not immediately go forward because the Borough had reached its legal debt limit and could not provide its share of the matching money. After a local citizen pledged financial support, two acres comprising Finley Spring, the reservoir site, and a 10' wide ten mile long right-of-way between the two were purchased. The project was completed in 1938 and dedicated in August of that year. As late as 1962 the water source for the system was so pure there was no need for chlorination or filtration, the only such example in the state.

7.) Sand Spring Water Company: Crystal Lake Dam and Reservoir

Location: East side of T363 on Stamm Run 2.5 miles southeast of Meyersdale, Summit Township

Date: 1913

Description: Water from a former Baltimore and Ohio Railroad reservoir to the northeast is pumped into the 8.5 million gallon Crystal Lake Reservoir, with the upper intake catching sediment from the former B&O facility. The dam on the north side of the reservoir is constructed of stone and concrete with a concrete spillway on the west end of the dam. A small sheet metal pumphouse stands near the crest of the dam. The dam is 16' high and 230' in length. The drainage area above the dam is 1.4 square miles and the capacity of the reservoir is 5 million gallons.

History: Crystal Lake Dam and Reservoir was built in 1913 as an additional source of water for Meyersdale after the concrete Blue Lick Reservoir north of Meyersdale was abandoned because of excessive acid mine drainage. In 1919 the Crystal Lake Reservoir was raised 3' to its present capacity and two years later the upper intake on Stamm Run was built. The metal pumphouse was constructed in 1965.

8.) Sand Spring Water Company: Sand Spring Reservoir

Location: Summit Township

Date: 1888

Description: The Sand Spring Reservoir, with a capacity of 500,000 gallons, is the main water supply for the Borough of Meyersdale. It consists of a concrete and stone wall on the north side that is 100' long and 10' high. A concrete spillway is located at the northwest corner and a small pump house (ca. 1955) is just to the east.

History: In 1888 the Sand Spring Reservoir contracted John S. Graves and Company to construct its water works system. The main reservoir was built east of town on Allegheny Mountain, and was fed by Sand Spring as well as by water from Stamm Run. In 1889 a supplemental well was drilled adjacent to the reservoir, and in 1894 over 13,000' of 6" cast-iron pipe were installed to connect Meyersdale to a proposed reservoir site on Stamm Run. This reservoir was used primarily by the Baltimore & Ohio Railroad to supply its water tank near Flaugherty Creek; the reservoir was enlarged in 1924, and in 1979 it had a capacity of 3 million gallons.

A 1906 history praises the water company (which in that year had an annual revenue of $8,000) for charging rates "considerably lower than those of most private corporations elsewhere." In 1955 the Meyersdale Municipal Authority purchased the water works. Since then the water works have been expanded and modernized, and continue to serve the Meyersdale area.

9.) Somerset Electric Light, Heat and Power Company

Location: 140 West Sanner Street at Ankeny Avenue, Borough of Somerset

Date: ca. 1893

Description: Presently occupied by Somerset Sport Shop, this former power plant is comprised of two sections, the original portion on the west side and a later, larger building on the east. The east portion is a tall, one-and-a-half-story structure with a steeply-pitched gable roof. Original six-over-six-light windows are in place on the east and south sides while the north side has two-over-two-light windows. The sills and lintels are stone.

History: The original portion of this structure was most likely constructed in 1893 when the Borough of Somerset entered into a contract with the Somerset Electric Light, Heat and Power Company to provide power to street lamps. From 1875 until this time the street lamps were powered by oil. The power plant also provided electricity to homes and businesses in town.

By 1897 the power plant referred to as the "Electric Light Station" was providing electricity with its steam-driven direct-current dynamos. The structure was slightly enlarged by 1904 but by 1910 a large addition was built on the east side of the original building. Also by this time the west portion of the original structure, which had originally housed the dynamos, was converted to a supply room. Penn Electric Service Company acquired and ran the power plant by 1917. The newer portion housed two 500 and one 125-horsepower steam engines as well as one 275 and two 150-kilowatt alternating current generators.

The building ceased operating as a power plant in 1924 when Penn Electric Service Company used it as an office, garage, and warehouse. The supply room on the west side was partially demolished and has since been totally razed.

10.) Somerset Waterworks

Location: North of Borough of Somerset Line, Somerset Township

Description: Presently known as the North Somerset Water Plant, this is the second facility to be used by the Borough of Somerset for its municipal water supply. The most prominent portion of the site is a tall cylindrical concrete reservoir. On the south side a large hole has been cut and wood panels hanging on a metal track added. To the east is a tall, one-story brick structure that was originally the pumphouse and has recently been used as the Somerset Greyhound Bus Station. A wood shed, possibly housing a well, is located to the south behind a contemporary concrete structure near the bank of the east branch of Coxes Creek.

History: Somerset's first water works (no longer extant) was located between North and Union Streets and was known as the Water Works Pumping Station. Completed in 1894 it had two wells, but had expanded to ten wells by 1910 with a 750,000 gallon reservoir approximately .5 miles west. The Somerset Water Works pumphouse was constructed in 1911 to replace this plant. The adjacent reservoir was built between 1917 and 1924.

Initially there were three wells and a pumphouse with a duplex triple-action pump, and two 760-horsepower boilers. By 1917 there were four wells and within the pumphouse a Platt Iron Works Compound duplex steam pump and an Epping

Carpenter duplex steam pump. The concrete reservoir was constructed in 1924, with a capacity of 500,000 gallons. The 6 miles of 4" and 10" water mains laid in 1893 were still in use in 1924. Two 500,000 gallon reservoirs were constructed by 1930 northwest of Somerset. The Borough of Somerset completed the Coxes Creek Water Plant, located roughly 3 miles west of Somerset, in 1947. No longer used, it was replaced by the present water plant, which is seven miles west of Somerset.

Transportation Industries

1.) Baltimore and Ohio Railroad: Benford Tunnel

Location: 2 miles northeast of Harnedsville, Lower Turkeyfoot Township

Date: 1870

Description: The Benford Tunnel is 406' long and 18' wide at its widest point with brick portals and interior. The tunnel's portals, adorned with "BENFORD" in a raised brick pattern, face northwest and southeast. The single set of tracks through the curved Benford Tunnel breaks off from the double-track Pittsburgh Division in Confluence, creating the Fort Hill Low Grade Line. The Fort Hill Low Grade Line veers south, then east and northeast through the Benford Tunnel, and mets the other single track, forming the double track again, just before the eastern portal of the Brook Tunnel.

History: Chartered in 1824 to build a line from Baltimore to the Ohio River, it took nearly twenty years for the Baltimore and Ohio Railroad to reach Cumberland, Maryland. Finally completed in 1842, plans were soon made to continue the line to Pittsburgh in order to service businesses dissatisfied with the slow Pennsylvania Canal and its portage railroad. However, it was not until 1858, when John W. Garrett became president of the B&O, that the project began to take any practical form. The Pittsburgh and Connellsville Railroad, chartered in 1837, had already attempted to construct the route but had been plagued with financial problems. The B&O Railroad pledged financial support in return for partial ownership. Construction began in Pittsburgh and Cumberland and met in Fort Hill, Somerset County, in 1871. The route was an engineering challenge, with many tunnels, bridges, curves and a steep, 2.5% grade on the east slope of the Allegheny Mountains to maneuver. The Confluence to Meyersdale route follows the Casselman River through a mountain valley and the many sharp curves on this route alone required the construction of four tunnels.

After establishing controlling interest in the B&O Railroad, the Chesapeake and Ohio Railroad began buying additional stock in the B&O in the 1960s. In 1973 these railroads and the Western Maryland Railway (which the B&O owned stock in) became part of the newly created Chessie system. CSX Corporation was created in 1980 to merge the Chessie System and the Seaboard System. Seven years later CSX Transportation, Inc. was formed.

2.) Baltimore and Ohio Railroad: Brook Tunnel

Location: 1 mile west of Fort Hill, Lower Turkeyfoot Township

Date: 1884

Description: The Brook Tunnel is 1856' long and 26' wide at its widest part and has stone portals and a stone interior. Stone plaques on each portal are inscribed with "BROOK" and carved in the keystones of each portal is "1884". The single-track route through the curved tunnel breaks off from the double-track Pittsburgh Division mainline at Confluence, creating the Fort Hill Low Grade Line. The Low Grade Line runs through Benford Tunnel and meets the mainline again just east of Brook Tunnel's east portal.

History: After completing construction of the Low Grade Line in the early 1880s, the B&O built Brook Tunnel in 1884 to replace an 1,800 timber crib tunnel that was set on fire by a spark from a passing locomotive. Before the tunnel was built, local farmers rented horses to the railroad to pull trains over the steep hill at the site. It is likely that the original tunnel was named after Chauncy Brooks, Baltimore and Ohio Railroad president from 1855-1858. The "s" appears to have been dropped from the name of the present tunnel.

3.) Baltimore and Ohio Railroad: Confluence Freight Depot.

Location: Between Laurel Hill Creek and Baltimore and Ohio Railroad, Borough of Confluence

Date: ca. 1876

Description: This one-story, hipped-roof freight depot is presently used for tool and equipment storage by CSX Transportation. The structure retains the Baltimore and Ohio Railroad colors of pale yellow and brown on its tongue-and-groove clapboard exterior. A large freight door on the south side faces the tracks; on the north and west sides are windows and standard doors.

History: This structure may have been extant as early as 1876, since a railroad building on this site appears on the county atlas that year. In addition to the present freight depot, there was a turntable, a water tower, a passenger depot (also extant in 1876) and CF tower, which was destroyed in recent years by a derailment. A rail spur that passed in front of this structure to Confluence Lumber Company was removed after 1954.

4.) Baltimore and Ohio Railroad : Meyersdale Depot

Location: Meyers Avenue and Chestnut Street, Borough of Meyersdale

Date: ca. 1875

Description: This hipped-roof frame depot has two sections, one slightly smaller than the other. The roof has a wide eave overhang with carved brackets. Brick appears to have been added from the foundation to the windows, which are not original, however the freight doors on the north, south, and east walls appear to be original. A platform has been removed from the north side of the depot, but one remains on the east end. A short spur extends behind the depot. Hanging from the eaves at both ends of the depot are wooden signs bearing the name "MEYERSDALE".

History: Meyersdale Depot was constructed during the same period as the Pittsburgh and Connellsville Railroad in 1871. Shortly afterward the Pittsburgh and Connellsville became part of the Pittsburgh Division of the Baltimore and Ohio Railroad. At one time there was a small second-story gabled-roof section, but it has been removed.

5.) Baltimore and Ohio Railroad: Pinkerton Tunnel

Location: 2 miles south of Markleton, Upper Turkeyfoot Township

Date: 1885

Description: The Baltimore and Ohio Railroad Pinkerton Tunnel runs parallel to the 1911 Western Maryland Railway Pinkerton Tunnel, and cuts through Pinkerton Point on the Casselman River. The 1,081' tunnel is constructed entirely of stone, and above both portals are two stones inscribed with "Pinkerton" and "1885". Originally constructed as a double-track tunnel, presently only one set of tracks passes through.

History: Baltimore and Ohio Railroad's Pinkerton Tunnel was constructed in 1885. Sometime between 1954 and the present the double-track mainline through the tunnel was reduced tot a single set of tracks.

6.) Baltimore and Ohio Railroad: Rockwood Depot

Location: Confluence of Coxes Creek and Casselman River, Borough of Rockwood

Date: 1871

Description: Rockwood Depot is a one-story wood structure, with an asphalt-shingled hipped roof. The structure is sheathed in wood clapboard and there are two large freight doors on the south and west sides. This site is at the intersection of the mainline and the Somerset and Cambria Branch of the B&O Railroad, and is known as the Somerset and Cambria Branch Switch. The mainline tracks are to the south of the depot and a spur and "Y" intersection are to the north.

History: The Rockwood Depot was constructed in 1871, the same year as the Pittsburgh and Connellsville (Baltimore and Ohio) Railroad was completed from Connellsville to Cumberland. Then named Mineral Point, the town's growth was a direct result of the success of the new railroad. Also in 1871, the line from Rockwood to Somerset was completed by the Somerset and Mineral Point Railroad. The B&O Railroad later acquired this branch, and extended it to Johnstown in 1881.

A photograph taken from a nearby hill in the 1920s clearly depicts a larger depot than the one today. A derailment sometime during the 1950s caused severe damage to the depot and could account for the present smaller size. It had a two-story section at the center, with a gabled roof flanked by two one-story additions. A two-story telegraph building stood on the same side of the mainline tracks as the depot, but on the other side of the viaduct. This viaduct spans the mainline and Casselman River on the east side of the depot. The telegraph office used the call letters "RW", and existed as early as 1905. A railroad locomotive repair shop that was demolished in the 1950s stood to the west of the depot. Rockwood House, a hotel that catered to railroad travelers, once stood on the south side of the mainline tracks, just to the west of the depot.

During the 1920s there were two round-trip passenger trains daily to Johnstown from the B&O Railroad mainline at Rockwood, but this service was suspended in 1929. In 1954 there was a 42' track scale with a capacity of 200,000 pounds.

7.) Baltimore and Ohio Railroad: Rockwood Viaduct

Location: Spanning B&O Railroad and Casselman River, Borough of Rockwood

Date: ca. 1912

Description: The Rockwood Viaduct is a curved, eight-span plate-girder structure. Presently abandoned, the rails are still extant on the single-track structure. The concrete abutment on the Rockwood bank is skewed (and at a higher grade than the adjacent Somerset and Cambria Branch) while the one on the Black Township bank is not. Spanning the Casselman River are five deck plate-girder sections on concrete piers. Two through plate-girder sections with metal plate guard span several sets of tracks, including the mainline, a set ending behind the nearby Rockwood Depot, and a set forming a wye.

Supporting these two spans is a skewed concrete pier with a steel bent providing additional support to one of these spans. Some pier deterioration is evident.

History: The Rockwood Viaduct was constructed around 1912 when the Connellsville Subdivision of the Western Maryland Railway was completed. The viaduct was built by the B&O Railroad for use by the Western Maryland Railway, to reach Coal Junction. Western Maryland Railway had trackage rights over the Somerset and Cambria Branch of the B&O to Coal Junction. A. ca. 1920 photograph depicts the structure with 'BALTIMORE AND OHIO FREIGHT LINE" painted on its east side. Rail traffic probably stopped in the mid-1970s when the Western Maryland Railway Connellsville Subdivision was abandoned.

8.) Baltimore and Ohio Railroad: Salisbury Branch Bridge

Location: Spanning Casselman River, Borough of Meyersdale and Summit Township

Description: This Pratt through truss is a single-track bridge with ashlar stone and concrete abutments. Although the structure has been abandoned, the rails that were rolled in 1951 are still there. This is the last extant bridge on the Salisbury Branch, where there were once as many as three other truss bridges. Abutments from several bridges are extant along the route.

History: This bridge was built either by the Baltimore and Salisbury Railroad, or by the Baltimore and Ohio Railroad, which later absorbed this railroad and renamed it the Salisbury Branch. The Salisbury Branch met the mainline just to the north, at Salisbury Junction.

9.) Baltimore and Ohio Railroad: Shoofly Tunnel

Location: 1 mile east of Fort Hill, upper Turkeyfoot Township

Date: ca. 1880s.

Description: The Baltimore and Ohio Railroad Shoofly Tunnel is a single track brick-portaled and brick-line railroad tunnel constructed in the 1880s. Near both portals are switches that bring two sets of tracks of the mainline down to one. The curved, horseshoe-arched tunnel is 307' long and 30' wide. On both portals above the openings are rectangular brick patterns with "SHOOFLY" in raised brick. On both sides of the name there is a pattern laid diagonally made up of the ends of bricks. The arches are made up of five bands of brick. Over the raised bricks that form the keystone on the east portal is what appears to be "1902". On the west portal there is a deteriorating concrete parapet.

History: Originally constructed for two tracks, the tunnel presently handles only one. Renovations may have been done to the structure in 1902.

10.) Baltimore and Ohio Railroad: Somerset Shops

Location: SR 3025; west of Borough of Somerset, Somerset Township

Date: 1910

Description: The Baltimore and Ohio Railroad Somerset Shops consist of several structures on both sides of SR 3025. These shops functioned as a maintenance facility for the Somerset and Cambria Branch of the Baltimore and Ohio Railroad. On the west side there is a two-story frame tower covered in aluminum siding, and an early B&O Railroad passenger car. To the south is a long one-story structure. The north section was probably used as a blacksmith shop, as indicated by a circular metal vent on the roof. The building is a tongue-and-groove clapboard, hipped-roof structure. On the south end of the building is a one-story, board-and-batten gabled-roof addition. South of that building is a small, one-story, tongue-and-groove clapboard, hipped-roof structure that was probably a supply house. Evidence of many sets of railroad tracks exist between these two structures, and the tracks used by CSX Transportation. The site is being used as a scrap yard. The area around the supply house is used to store telephone poles.

On the east side of SR 3025 are early B&O Railroad passenger and freight cars that are used as offices for CSX Transportation. To the north are two early B&O box cars. The concrete foundation of the roundhouse is extant with brick and rubble in the concrete mechanics' pits. There are two structures to the north of the roundhouse site. The first was most likely and oilhouse; it is an exposed frame gabled-roof structure, with a hose apparatus over an abandoned set of tracks. To the north of this structure is a small tongue-and-groove, clapboard, hipped-roof building. Two sidings from the yard cross Coxes Creek on both the eat and west sides of SR 3025.

History: The Baltimore and Ohio Railroad constructed the Somerset Shops between 1910 and 1916. The shops began with fifty-two employees and by 1931 employment was at its peak, with a work force of ninety-seven. On the north side of an 80' electric turntable was a combination machine shop/powerhouse and a roundhouse. Just to the north of the roundhouse was an office supplyhouse. The roundhouse was expanded from two to six tracks sometime between 1924 and 1930. By 1930 a rooming house existed on the north side of the yards provided temporary housing for railroad workers. The southern section of the blacksmith shop was probably constructed after 1930. By 1941 employment at the shops had dropped to fifty-eight.

11.) Baltimore and Ohio Railroad: Wells Creek Bollman Bridge

Location: T 381; 1.5 miles northwest of Meyersdale

Date: 1871

Description: The Wells Creek Bollman Bridge employs a Warren truss design, rather than a Bollman truss, which its designer Wendell Bollman was noted for. Originally constructed as a railroad bridge, it is presently used as a vehicular bridge. It is 81' long and 13' wide. The east abutments are constructed of concrete, while the west are earthen with wood ties. This bridge has a wood deck, and ornate cast-iron end pieces, lacework, and compression members. End posts and tension members are constructed of wrought iron.

History: Designed by the renowned self-taught engineer Wendell C. Bollman in 1871, this bridge is the last remaining on the Pittsburgh Division designed by him. The bridge originally carried the Baltimore and Ohio Railroad over Wills Creek. It was moved about 1910 to the present location after it was no longer able to safely carry the newer and heavier locomotives.

Bollman began his career with the Baltimore and Ohio Railroad as a carpenter in 1828. By 1840 he was designing bridges, and in 1852 he received a patent for his unique design known as the Bollman truss. Wendell Bollman left the B&O and founded W. Bollman and Company in 1858 with his partners John Clark and John H. Tegmeyer. The railroad continued to contract with him for bridge design, this bridge included. Not all of his designs used the Bollman truss. W. Bollman and Company dissolved about 1863, but two years later Bollman founded Patapsco Bridge and Iron Works, which lasted until his death in 1884.

12.) Barronvale Bridge

Location: T501 spanning Laurel Hill Creek, Middlecreek Township

Date: 1846

Description: The Barronvale Bridge is a Burr-arch multiple kingpost covered bridge, measuring 162'3" long and 13'10" wide. The double-span bridge (92' and 55') is the longest of the remaining covered bridges in Somerset County. Closed to vehicular traffic, this county-owned bridge has stone abutments, a stone pier, and vertical-plank half sidewalls.

History: The Barronvale Bridge was constructed in 1846 by John Mong for $738. This bridge replaced an earlier covered bridge at the site, constructed in 1830. Major renovations were made on the bridge after a flood in 1906 caused severe damage. It was reinforced with wood circular arches and iron rods. In 1962 the present concrete bridge was constructed, relieving the

Barronvale Bridge of vehicular traffic.

13.) Beachy Street Bridge

Location: T 805 spanning Casselman River

Date: 1894

Description: This through Pratt truss has a span of 107' over the Casselman River and a roadway width of 12'. Connecting the north end of Salisbury with the north end of West Salisbury, the structure has concrete abutments and a wood plank deck.

History: Contemporary guardrails have been added to the bridge. Constructed in 1894, the vertical or compression members have riveted lattice bracing.

14.) Casselman River Bridge

Location: 2 miles northeast of Salisbury, Elk Lick Township

Date: 1894

Description: Township Road 502 is a narrow paved road serving a rural area south of Meyersdale. This single-span, pin-connected Pratt through truss carries T 502 over the Casselman River. It contains an upper chord (composed of laced channel sections), vertical (laced angle sections), and hip vertical, diagonals, and a lower chord (all composed of eyebars). The wood Deck is supported by steel I-beams, which in turn rest on steel I-beam floor beams. The bridge is 111' long and 11' wide, and rests on stone abutments. The north side of the bridge contains stone wingwalls.

History: According to the builder's plate, this bridge was built in 1894 by Horseheads Bridge Company of Horseheads, New York. The Horseheads Bridge Company was established in 1890 and operated until 1900, when it was acquired by the American Bridge Company of U.S. Steel.

15.) Burkholder Bridge (above)

Location: T548 spanning Buffalo Creek, Brothersvalley Township

Date: 1870

Description: The Burkholder Bridge is a Burr-arch covered bridge measuring 52' in length and 12' in width. This county-owned structure originally had a clearance of 9'-6" but after its recent renovation a hanging sign has reduced the clearance to 8'.

16.) Coxes Creek Bridge

Location: T485 spanning Coxes Creek, Milford and Black Townships

Date: 1900

Description: This Pratt pony truss bridge with stone abutments has been abandoned. On the east bank in Black Township is the raised grade of the Somerset and Cambria Branch of the B&O Railroad. The other plate on the opposite top chord lists the county commissioners at the time. There are four outriggers on each side and the bridge has a wood plank deck.

History: A builder's plate on one of the top chords indicates that the bridge was constructed in 1900 by Walker Brothers Contractors of Charleston, West Virginia.

17.) Fall Creek Bridge

Location: T493 spanning Fall Creek, 3 miles northwest of Stoystown, Middlecreek Township

Date: 1912

Description: Township Road 493 is located in a mountainous section of southern Somerset County and extends along Fall Creek in Middlecreek Township. The Fall Creek Bridge is a single span concrete arch structure that crosses Fall Creek. The bridge is 45"long x 15' wide. It has concrete abutments, concrete wingwalls, and an inscribed concrete parapet wall.

History: The Farris Bridge Company of Pittsburgh, Pennsylvania, constructed this single span concrete arch bridge in 1912. At that time A.E. Rayman served as superintendent of bridges for Somerset County. The bridge carries a rural road across Fall Creek Run and is in fair to deteriorated condition. Numerous other examples of this bridge type are extant in Somerset County.

18.) Fike Bridge

Location: Bender Bridge Road T504, Summit Township

Date: 1885

Description: This pony Warren truss has a span of 45' and a roadway width of 13'. It has both stone and concrete abutments. The little-traveled T 504 (Bender Bridge Road) forms an "S" curve at the bridge, which is most likely constructed of iron.

History: The bridge was constructed in 1885 by Penn Bridge Works of Beaver Falls, Pennsylvania. This company was established in 1868 as the Penn Bridge Company.

19.) Heckle Bridge

Location: T385 spanning Casselman River, Petinbrink Road, Summit Township

Date: 1900

Description: This Pratt through truss bridge has a span of 109' over the Casselman River and a roadway width of 13'. Constructed in 1900, the structure has stone abutments and a metal grate deck. The bridge is adjacent to SR219 and the Baltimore and Ohio Railroad tracks on the east bank, and is in the shadow of the Massive Western Maryland Railway Salisbury Junction Viaduct. The bridge serves several farms in the area and carries only a minimal amount of traffic.

20.) King's Bridge

Location: South side of SR 653 spanning Laurel Hill Creek, Middlecreek Township

Date: 1802/1906

Description: King's Bridge is a Burr-arch covered bridge measuring 127' in length and 12'-4" in width. This bridge has stone abutments and vertical plank sidewalls. With a clearance of only 12'-3", this bridge is closed to vehicular traffic.

History: King's Bridge was constructed in 1802 and rebuilt in 1906. The bridge, and the land on which it sits, has always been owned by the King family. It carried what was once the Clay Pike over Laurel Hill Creek but was abandoned when the present bridge just to the north was completed in 1934.

21.) Lower Humbert Bridge

Location: T393 spanning Laurel Hill Creek, 2 miles north of Ursina, Lower Turkeyfoot Township

Date: 1891

Description: The Lower Humbert Bridge is a single-lane, Burr-arch truss covered bridge that is 126'-6" long and 12'-4" wide. Prior to the recent addition of a center pier, the structure suffered from a severely sagging span of 105'. This structure has horizontal-plank inside walls, and a clearance of 11'.

History: Constructed in 1891, the Lower Humbert Bridge is the newest of the remaining covered bridges in Somerset County. This bridge replaced an earlier covered bridge built at the site in 1845. During the summer of 1991 major renovations were performed on the bridge. A stone pier was constructed in

Laurel Hill Creek to support the sagging center, and steel beams were added under the bridge, relieving the original Burr-arch truss support system. The stones of the abutments appear to have been repointed during this renovation.

22.) Maust Bridge

Location: T351 spanning Casselman River, Elk Lick and Summit Townships

Date: 1900

Description: This bridge is a Pratt through truss with concrete abutments. It is 130' long and 10'-4" wide and has a builder's plate on both portal struts. These plates identify the bridge as being constructed in 1900 by the Walker Brothers of Charleston, West Virginia.

History: The Maust Bridge, also known as the Red Bridge, once carried Pennsylvania and Maryland Street Railway trolleys across the Casselman River. A 1908 photograph of the bridge shows a trolley on the bridge with timber reinforcements supporting the center of the span.

23.) Meyersdale Center Street Bridge

Location: SR 219 spanning Flaugherty Creek, Borough of Meyersdale

Date: 1914

Description: This stone arch bridge has a span of 50' and a relatively wide roadway width of 34'. It carries the well-traveled SR 219 (Center Street) over Flaugherty Creek in Meyersdale. On the concrete parapet walls are two stone plaques, complete with concrete balusters and four lampposts mounted on the ends.

History: One plaque identifies the bridge as being constructed in 1914 by F.H. Ziegler and engineered by B.J. Lynch. The other plaque identifies county officials at the time of construction. The stone arch span of the bridge may have been constructed prior to 1914.

24.) Pennsylvania and Maryland Street Railway: Powerhouse and Carbarn

Location: East side of SR 219, Boynton, Elk Lick Township

Date: 1907

Description: The carbarn of the Pennsylvania and Maryland Street Railway is a tall one-story brick structure, standing near the eastern edge of SR219. The structure is presently used as a manufacturing facility by Pittsburgh Nipple Works, Inc. It has slightly arched brick lintels and the remaining original windows are twelve-over-twelve-light. Brick pilasters adorn the side walls and at the north end is an opening with large wooden doors where the trolleys once entered. Parts of the structure may have been removed: a portion of the southern end of the structure is enclosed by concrete blocks, with the gable end constructed of clapboard rather than the brick that is used at the northern end.

The powerhouse on the north side of the carbarn is presently used for storage by the Pittsburgh Nipple Works, Inc. It is a one-story brick structure but is taller than the carbarn. The twelve-over-twelve-light windows have slightly arched brick lintels, and several are boarded up. There is a small shed addition on the west side. On the east side, part of the large arched doorway built for access of large machinery has been filled in. No original machinery seems to remain in the interior except for the overhead crane.

History: Incorporated in 1906, the Pennsylvania and Maryland Street Railway was to have a 30 mile route from Somerset to Frostburg, Maryland, but only 12.5 miles of it was actually constructed, carrying passengers and mail. At Frostburg there was to be a connection to Cumberland via the Cumberland and Westernport Electric Railway. At the same time that the Pennsylvania and Maryland Street Railway was beginning, Salisbury businessmen were forming the Meyersdale and Salisbury Railway. A lawsuit concerning the right-of-way was filed which the Pennsylvania and Maryland Street Railway won.

In April 1907 construction began on the standard-gauge route. The carbarn and powerhouse were constructed the same year. The route was planned to cross the Salisbury Branch of the Baltimore and Ohio Railroad three times. The B&O Railroad sued to prevent the crossing but again the Pennsylvania and Maryland Street Railway won. The first trolley, manufactured by J.G. Brill Company of Cleveland, left Salisbury and arrived at Meyersdale in October 1907. The following year service was extended north to Garrett but the B&O Railroad refused permission for the line to cross the Salisbury Branch at Meyersdale. Passengers had to walk across the tracks and transfer to a waiting trolley to actually reach Garrett. The railroad finally allowed the trolley to cross the right of way in 1909. There was still discussion of extending the line to Somerset and Cumberland in 1915 but automobiles and buses were emerging as the most popular methods of transportation. Two years later the Pennsylvania and Maryland Street Railway was sold to Wilmoth Electric Company for its electrical distribution system. Wilmoth continued the trolley but reduced service to one round trip a day, whereas originally there had been twelve.

Service from Meyersdale to Garrett was permanently stopped in 1924, but heavy rider use on the Salisbury to Meyersdale route kept it running. In fact, to accommodate numerous miners in that area a spur was constructed to Shaw Mines in

1925. The following year Wilmoth was bought by Pennsylvania Electric Company which operated the line only one year. After losing money for many years, the operation finally died and the overhead wire system and track were removed.

Pittsburgh Nipple Works, Inc., a manufacturer of various pipe products, has acquired both buildings as well as the nearby Twentieth Century Building.

25.) Pennsylvania Turnpike: Laurel Hill Tunnel

Location: East portal 4 miles north of Bakersville, Jefferson Township

Date: 1883/1940

Description: The abandoned Laurel Hill Tunnel is 4,541' in length. Similar in appearance to the other Pennsylvania Turnpike tunnels, the Laurel Hill Tunnel has concrete portals with large vents above and a garage with an office above. This tunnel is presently used as storage space by the Pennsylvania Turnpike.

History: Excavation began on the Laurel Hill Tunnel in 1883 by the South Pennsylvania Railroad contractors Patterson and Kahn. The tunnel's uncompleted length in 1885 was 1,295'. A serious accident occurred shortly after excavation began in which nine men were killed and eleven seriously injured by scaffolding that collapsed.

The partially completed tunnel remained vacant for fifty years until it was completed and used by the Pennsylvania Turnpike. Construction on Laurel Hill Tunnel began in April 1939 by Hunkin-Conkey Construction Company with a contract for just under $2 million. The tunnel was holed through in March 1940.

Frequent traffic back-ups at the two-lane Laurel Hill Tunnel led to the decision to bypass the tunnel rather than excavating a second tunnel. Latrobe Construction Company was contracted for a 3.3 mile bypass that included excavation of a 145' cut through rock at the top od the Laurel Hill Mountain. The four-lane bypass has a third lane on both the east and west approaches to the crest and maintains the turnpike's 3% maximum grade. The bypass was completed in 1964 and the Laurel Hill Tunnel was abandoned.

25.) Petersburg Tollhouse

Location: North side of SR 3002, Addison Township

Date: 1835

Description: Constructed of smooth-faced ashlar stone, this tollhouse is located extremely close to SR 3002 (US 40 until the bypass was built) and is one of three remaining tollhouses along the old National Road. The structure consists of a five-sided, two-story section with a one-story porch and is flanked by a one-story section on the northwest side. The windows are double-hung, two-over-two-light. A window on the first floor near the front door has a restored "Rates of Toll" chart mounted within it.

History: The Petersburg Toll House was constructed along the National Road (now US 40) shortly after the federal government yielded control of the road to the states through which it passed. Officially opened in 1818, the National Road, also known as the Cumberland Road, stretched between Cumberland, Maryland, and Wheeling, West Virginia, and provided an important link between the eastern coastal states and the rapidly devolving northern territories west of the Alleghenies. Proper maintenance of this heavily traveled road was costly, and tolls were charged to help defray those expenses.

The toll station, known as Tollhouse No. 1, is a reminder of the tremendous economic impact that the region's first interstate government-improved highway had on Somerset County. Tolls were collected at the Petersburg toll house from the mid-1830s until operations ceased in about 1906. During its peak years the toll house had an annual revenue of $1,750. Since 1919 the structure has been maintained by the Great Crossings Chapter of the D.A.R.; in 1979 it was listed on the National Register of Historic Places.

26.) Salisbury and Baltimore Railroad: West Salisbury Company Houses

Location: T326 and T323; West Salisbury, Elk Lick Township

Description: Fifteen company houses remain in West Salisbury, several of which are abandoned. Most are side-gabled single-family houses with contemporary siding and are located on T326 (West Salisbury Avenue). Empty lots between these houses indicate where many more once stood. Parallel to T326 is T200 (High Street), which is an unpaved lane. Connecting the two streets are T199 (Eighth Street) and T210 (Ninth Street). A few company houses are located on T323 (Tub Mill Run Road) near the intersection with SR 669. One abandoned house facing the grade that bisects the town retains the original clapboard siding and six-over-six-light, double-hung windows. Still remaining in the town are an old schoolhouse and St. Michael's Roman Catholic Church. The town's post office, established in 1904, remains in operation.

History: The small village of West Salisbury existed prior to the Salisbury and Baltimore Railroad's construction of most of the houses. The Salisbury and Baltimore Railroad Company was formed to build a railroad from Salisbury north to Meyersdale where it connected with the B&O Railroad. The railroad built a few houses between 1871 and 1876 on the north side of town on the David Levingood Farm, but the peak period of construction was 1876, when the railroad was completed and some seventy-five houses and a depot were constructed. An extension was later completed south from Salisbury to Niverton. The Salisbury and Baltimore was later absorbed by the Baltimore and Ohio Railroad and the route became the Salisbury Branch. Most of the route has long since been abandoned.

27.) Sandy Run Bridge

Location: T455 spanning Sandy Run 6 miles west of New Lexington, Upper/Lower Turkeyfoot Townships

Date: 1910

Description: Sandy Run Road is an unpaved, narrow lane in a lightly populated area near the village of New Lexington. The lane is carried across Sandy Run by this small reinforced concrete arch bridge. The single span measures 39' in length and about 11' in width. The roadway conforms to the rise in the arch and is not paved over the length of the span. Concrete abutments support the arch span and stone wingwalls retain the soil on either side of the stream.

History: This single-span concrete arch bridge was built in 1910 to serve residents in a rural area near New Lexington. It is typical of the short-span concrete arch bridges constructed in southwestern Pennsylvania during the first two decades of the twentieth century. The Sandy Run Bridge remains in good condition.

28.) South Pennsylvania Railroad : Gieger Tunnel

Location: West side of T 546, 2.5 miles northeast of Somerset, Somerset Township

Date: 1885

Description: The slightly curved Gieger Tunnel is 145' long and 29' wide. With a clearance of 19'-6" over the B&O Railroad tracks, the single-track tunnel has ashlar stone portals and interior walls while the interior arched roof is constructed of brick.

History: Gieger Tunnel was constructed in 1885 to carry the South Pennsylvania Railroad over the B&O Railroad Somerset and Cambria Branch. The tunnel was completed, but a court decision ruled against the formation of the railroad line. The John McGovern and P.& T. Collins firms both had contracts to complete the grade and to perform other necessary construction in the area, including building the Gieger Tunnel. Either or Both of these may have completed the construction.

29.) South Pennsylvania Railroad : Negro Mountain Tunnel

Location: East portal, east side T529, Stony Creek Township

Date: 1884

Description: Only the rock-faced east portal of the Negro Mountain Tunnel is extant. Strip mining in this vicinity has razed the grade around the opening and it appears to be a pit.

History: Construction on the South Pennsylvania Railroad Negro Mountain Tunnel was begun around Christmas in 1884, but ceased in 1885 when construction of the railroad was stopped by order of the court. Contractor John McGovern had already successfully excavated 734' of what was planned to be a 1,100' tunnel. Fifty years later, planners for the Pennsylvania Turnpike decided to bypass the nearly completed Negro Mountain Tunnel in favor of the present cut just to the south.

30.) Walter's Mill Bridge

Location: West side of SR 985, spanning Haupt's Run at Somerset Historical Center, Somerset Township

Date: 1830

Description: Walter's Mill Bridge is a Burr-arch covered bridge that is 60' long and 12' wide. This structure has vertical-plank siding. Originally designed as a vehicular bridge, it is presently used for pedestrian traffic only.

History: Constructed in 1830 by Christian Ankeny, Walter's Mill Bridge was originally located 4 miles south of Somerset spanning Coxes Creek. One of the oldest covered bridges in Pennsylvania, it was moved to the Somerset Historical Center in the early 1960s because it was in danger of being demolished at the original site.

31.) Western Maryland Railway: Big Savage Tunnel

Location: West portal, south of intersection of T313 and T331, Greenville and Southampton Townships

Date: 1911

Description: Big Savage Tunnel is a 3,300' long single-track tunnel that cuts through Big Savage Mountain in Greenville and Southampton Townships. Rails within the abandoned tunnel have been removed and drainage ditches in the tunnel are clogged, leaving standing water. Seeping water in the lining of the tunnel has caused severe damage in several sections, exposing timber and brick. Previous attempts at repairing the interior by the Western Maryland Railway are evident. Inscribed above both concrete portals is "BIG SAVAGE" and "1911".

History:

The Western Maryland's origins date back to 1852 when the Baltimore, Carroll and Frederick Railroad Company was chartered. The following year it became the Western Maryland Railroad Company but was not actually completed until 1859. The original 10-mile route ran from Hollins to Owings, Maryland.

The City of Baltimore provided financial support to keep this line running and the railroad provided an important transportation function during the Civil War. By 1884 the railroad was extended to connect with other railroads and freight volume increased, especially coal. In 1902, George Gould and the Fuller Syndicate purchased the railroad from the City of Baltimore to be part of a transcontinental railroad system. In 1907, shortly after the railroad expanded to Cumberland, Maryland, revenues could no longer pay for improvements, and the Western Maryland entered into receivership.

In 1910, Rockefeller interests gained control, and the Western Maryland Railway emerged. The same year three engineering firms completed the survey for the new Connellsville Subdivision and construction began. Originally designed for four sets of tracks, the route was modified to accommodate two. Only one set was actually built. In 1912, the Connellsville Subdivision was completed through Somerset County from Cumberland to Connellsville (where it had a traffic alliance with the Pittsburgh and Lake Erie Railroad). The Carter Construction Company of Pittsburgh was the main contractor for the required tunnels, viaducts, and bridges. The route ran roughly parallel to the B&O Railroad along the Casselman and Youghiogheny Rivers, but the grade was not as steep. The first train passed through Somerset County on the new route in May 1912. Although the 88-mile route was primarily built for freight traffic, passenger service was also provided and many depots were constructed.

Boring on the tunnel was begun from both ends, using air compression drills and dynamite. The tunnel was holed through in December 1911 and completed in 1912 by the Carter Construction Company. Interestingly, the tunnel was constructed for only one set of tracks, instead of the usual two sets of tracks in other Connellsville Subdivision projects. In 1915 the Western Maryland took over the 5-mil Somerset Coal Railway from Coal Junction on the B&O Railroad to Bell. At that time the Western Maryland Railroad had trackage rights on the Somerset and Cambria Branch of the Baltimore and Ohio Railroad from Coal Junction to Rockwood.
The B&O Railroad bought a large percentage of the Western

Maryland Railroad in the 1920s. After a compromise was reached with the federal government, the ownership of the Western Maryland Railroad was held in trust, allowing the company to operate with relative independence. The important coal route from Coal Junction to Bell was later acquired by a merger with the Somerset Coal Railway Company in 1950. In 1967 the B&O Railroad acquired full ownership of the Western Maryland Railway. The B&O (by then itself a subsidiary of the Chesapeake and Ohio) gained full ownership of the Western Maryland Railway in 1972. The Chessie System was created in 1973 to own and operate all three railroads. Shortly after the Chessie System was created the Western Maryland Railway Connellsville Subdivision, which ran from Hancock, Maryland, to Connellsville, was terminated. Big Savage Tunnel was abandoned along with the rest of the Subdivision. The Chessie System then merged with the Seaboard System in 1980, becoming CSX Corporation. CSX Transportation, Inc. was formed in 1987. There are now plans to rehabilitate the tunnel as part of a rails-to-trails project. An initial estimate by the engineers Transmark Associates for rehabilitation of the tunnel is $500,000.

32.) Western Maryland Railway: Confluence Casselman River Bridge

Location: Spanning Casselman River, Addison Township

Date: ca. 1911

Description: This deck plate-girder bridge is 365'-8" long. The rails have been removed from the deck and there is a walkway on the north side. Although the four concrete piers are skewed, the concrete abutments are straight. The piers and abutments were constructed wide enough to handle two sets of tracks, although only one set is extant. Painted on the north side is "WESTERN MARYLAND RAILWAY".

History: This bridge was completed in 1911 or 1912. It is presently being considered by the Somerset County Rails to Trails Association as a possible complement of a hiking and biking trail. SR 281 has been rerouted in recent years between this bridge and the Western Maryland Railway Youghiogheny River Bridge just to the northeast, cutting through the high grade.

33.) Western Maryland Railway: Confluence Youghiogheny River Bridge

Location: Western Maryland Railway spanning Youghiogheny River, Henry Clay Township (Fayette County) and Borough of Confluence (Somerset County)

Date: ca. 1910

Description: This single-track plate-girder bridge has seven skewed concrete piers. On the Fayette County side of the bridge between the concrete abutment and the first pier is a through plate-girder section built for two sets of tracks (the deck is built for one).

History: This bridge was constructed in 1911 or 1912.

34.) Western Maryland Railway: Keystone Viaduct

Location: Spanning B&O Railroad; Flaugherty Creek, Summit Township

Date: 1911

Description: The single-track Keystone Viaduct, with concrete abutments and eight concrete piers, is a curved structure designed to accommodate two sets of tracks. Near the summit of Allegheny Mountain the viaduct spans the Flaugherty Creek valley, also known as Sand Patch Pass. Spanning three sets of tracks the Baltimore and Ohio Railroad is a large through Pratt truss. Crossing SR 2006 and Flaugherty Creek is an eight-span deck plate-girder section.

History: The Keystone Viaduct was constructed in 1911 by McClintic-Marshall Construction Company. This company was founded in 1900 by McClintic and Marshall, who left Shiffler Bridge Company when it was acquired (along with twenty-three other companies) by American Bridge Company the same year. Regular Western Maryland Railway traffic ceased on this structure in the mid-1970s.

35.) Western Maryland Railway: Meyersdale Depot

Location: 529 Main Street, Borough of Meyersdale

Date: 1912

Description: Presently being restored for the Meyersdale Historical Society, this brick passenger and freight depot has wide, overhanging eaves with large wood brackets. The hipped roof with slate tiles has several small gabled dormers. The depot is comprised of a passenger section on the east end and a freight section on the west, with a baggage room in between. On the rear is a small platform and freight door in addition to several standard doors. Abutting the west end is a platform with a freight door. On the north side of the depot facing the tracks is a bay-window projection for the passenger portion that is boarded up, as are all the windows. A brick chimney extant on the apex of the roof indicates a possible fireplace in the passenger section and on the east gable end is a sign identifying the station stop. To the rear of the depot is a metal crane structure. Sets of rails leading to it are partially exposed.

History: In 1910, during planning for the Western Maryland Railway route through Meyersdale, problems arose with the Meyersdale Borough Council. The city was reluctant to allow railroad tracks to bisect the town. The railroad, on the other hand, wanted to avoid costly right-of-way acquisitions. The following year the city agreed to let the railroad cut through town, if in turn the railroad agreed to construct one of the finest depots along the route. The Western Maryland Railway Meyersdale Depot was constructed in 1912 by the Meyersdale Planing Mill for $10,000. The Meyersdale Planing Mill also had contracts to construct depots for the Western Maryland Railway at Rockwood, Confluence (both since razed), Ohiopyle in Fayette County, and Garrett (dismantled and move to Listie in Somerset Township). The short spur ending at the crane structure behind the depot once had a coal shed beside it. Another short spur came alongside the platform, ending at the depot. The depot was abandoned well before the Western Maryland Railway Connellsville Subdivision stopped running in the mid-1970s.

36.) Western Maryland Railway : Pinkerton Tunnel

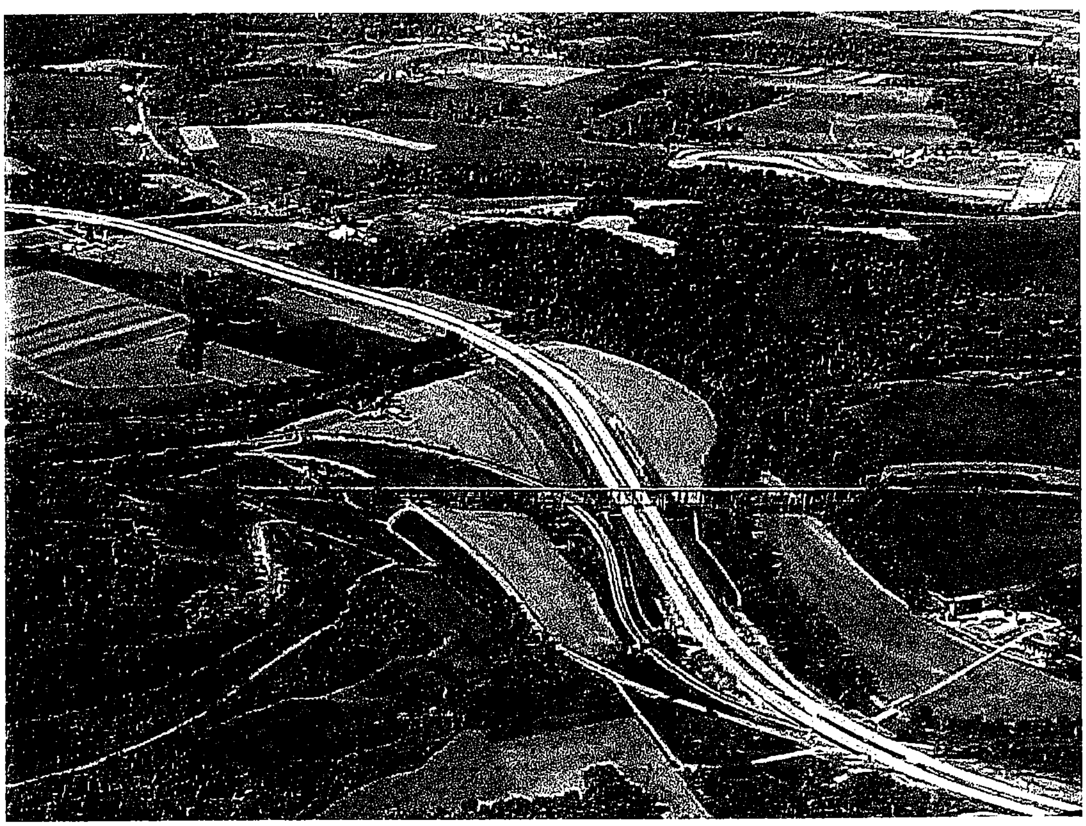
Location: 1.5 miles southwest of Pinkerton, Upper Turkeyfoot Township

Description: The Western Maryland Railway Pinkerton Tunnel has concrete portals and a concrete interior. Inscribed on both portals is "PINKERTON" and "1911". The abandoned double-track tunnel cuts through Pinkerton Point parallel to the B&O Railroad Pinkerton Tunnel. Parts of the interior have collapsed. Spanning the Casselman River on the east side of the tunnel is a four-span, deck plate-girder bridge, while a six-span, deck plate-girder bridge crosses the Casselman River on the west side.

History: The Western Maryland Railway Pinkerton Tunnel was completed in 1911 by the Carter Construction Company. The tunnel was abandoned in the mid-1970s along with the rest of the Connellsville Subdivision. At one time, there were plans to renovate the tunnel as part of a hiking / biking trail, but the extensive damage to the interior of the tunnel caused the idea to be abandoned in favor of restoration of the larger, and less dangerous, Big Savage Tunnel. Present construction of the trail skirts around and over the tunnel via a short bypass to rejoin the bridge on either side spanning the Casselman River.

37.) Western Maryland Railway: Salisbury Junction Viaduct (below)

Location:	Spanning Casselman River, SR 219 and T 381, Summit Township
Date:	1911
Description:	The Salisbury Junction Viaduct is a single-track, 1,900'-long structure built to accommodate two sets of tracks. It consists of a deck plate-girder section supported by two steel bent towers resting on concrete piers, some of which reach down as far as 40'. The rails have been removed from the deck, and recent renovations have made the structure part of a biking / hiking trail.
History:	The Salisbury Junction Viaduct was constructed in 1911 by McClintic-Marshall Construction Company of Pittsburgh. Eight workers died during construction of the viaduct, six in an accident in which a crane on the viaduct fell. It took two weeks to clear the wreckage and install a new crane before work could be continued. The first Western Maryland Railway train crossed the viaduct in January of 1912. By the mid-1970s the Western Maryland Railway Connellsville Subdivision was abandoned.



COAL, IRON, FIREBRICK, LUMBER, ETC.

At this day it is not known where or when the first coal was discovered in Somerset County. In 1774, John Stump had a survey made for a tract of land on top of the hill just west of the little mining village of Keystone, in Summit Township, that is called "Coal Bank" in the survey. The land is under-laid by the great Pittsburgh coal seam. This name applied so early to a land survey would indicate some knowledge of the existence of coal there. The belief is that probably long before 1800, coal was discovered and that blacksmiths, living a good many miles away from such a discovery, would go and contract with the owner of the land on which it was, for the privilege of digging such quantity as they needed. In their ignorance of the geological formations, they did not know that perhaps the very site of their smithies might be under-laid with coal. The first discovery of coal in Brothers Valley Township is supposed to have been on the Countryman farm; the time is not known. As late as 1810, the blacksmiths at Somerset procured their coal from this mine, hauling it dozen or more miles, when it exists all about Somerset.

Solomon Glotfelty settled in Elk Lick Township about 1773, and was probably the first blacksmith in the township. It is a well attested fact that he procured the coal supply for his smithy from the Samuel Brown farm, then owned by Philip Hare, part of which is on either side of Mason and Dixon's Line. He was accustomed to send a boy after it with a sack, and horse on which to pack it. The first known opening of a coal mine north of the Livengood Mill farm. The date is not known.

The first farms or tracts of land that were bought anywhere in Somerset County, west of the Allegheny Mountains, solely as a matter of speculation or investment on account of the coal underlying them, were bought in 1853, and were in the Salisbury coal basin. The purchasers were J. Philip Roman and Norman Bruce, of Cumberland, Maryland. These farms are partly in Elk Lick and partly in Summit Townships. They were purchased on options of six months, Jacob Brown, an attorney of Cumberland, securing them. The following are the farms as they were known in 1853: The Peter Saylor farm, 190 acres, consideration $8,170; the Samuel J. Miller farm, 100 acres, $5,000; the Peter Maust farm, 100 acres, $6,000; the Jacob Yoder farm, 232 acres, $12,000; the John B. Meyers farm, 134 acres, $8,000; the Samuel Flickinger farm, 338 acres, $25,000; and the Jonathan Lichty farm 338 acres, $16,000. Total acreage of 1,447 acres, and a total payment of $80,187.

For purely agricultural purposes these farms rank among the best in Somerset County. All of them are underlain with the great Pittsburgh seam of coal. The prices paid for these farms was an unheard of one for those days, and was a theme for conversation everywhere; yet, when the real value of coal lands, such as these were, is considered, they were simply given away. The Flickinger farm contained a smaller farm that Mr. Flickinger had bought years before from John Moyer, who had removed to Ohio. So great was the sum he realized from the sale to Bruce and Roman, that he thought perhaps he had not paid Moyer enough, so he carried a thousand dollars of the money to Ohio and gave it to him.

These farms were probably purchased on the assumption that the Pittsburgh & Connellsville railroad would be speedily constructed, when there would be little trouble in selling them at a large advance, but the construction of that road was distant almost twenty years in the future. Both Mr. Bruce and Mr. Roman died before the lands could be realized on. About the same time, David Livengood, of Elk Lick Township, sold 110 acres of the Flog Hill farm to F. B. Tower, of Cumberland, Maryland, and D. W. C. Tower, of New York, for $7,000. This was also a coal deal. With these two transactions, there were no further sales of coal lands for many years.

The completion of the Pittsburgh & Connellsville railroad in 1871, and of the Salisbury and Baltimore railroad in 1876, were the keys that unlocked these doors of nature's store house in the southern part of Somerset County. In 1868-69 Hon. Hiram Findlay and Michael Hay, of Salisbury, believing that the time could no longer be far distant when the county would have railroad facilities, began the purchase of coal lands. They secured several thousand acres in Elk Lick Township, paying some money down and the balance on payments. To realize on their venture required the construction of railroad from Salisbury to some point near Meyersdale. Associating with them John Anspach, of Philadelphia, they succeeded in getting it under way, but the hard times following the panic of 1873 delayed both the completion of the road and the sale of the lands. Mr. Findlay and Mr. Hay, to whom the Salisbury and Meyersdale coalfield owes so much, reaped no benefit from their efforts to bring the coal of this region in touch with the market. These were for others.

The coalfield between Meyersdale and the Maryland line is designated in the geological reports as the Salisbury coal basin, that town being near its center. The field, and particularly the northern end of it, is also known as the Meyersdale coal region. The basin so far at least as its Pittsburgh seam, in a commercial sense in Somerset County dates from the opening of the Keystone mine by the Keystone Coal and Manufacturing Company in 1872. The company was chartered in 1870. As the township lines then were, this mine was in Elk Lick Township, and about two and a half miles southwest of Meyersdale. Through this opening the coal on the David Lichty farm in Elk Lick Township was brought out. The village of Keystone, which is the first mining village in the county, grew up about this mine. At this time the Salisbury railroad was not yet constructed, and in order to get out their coal the company built about two miles east of Meyersdale. As the loaded mine cars came out of the mine they were made up into trains and run to the junction, where the company had a tipple. Some time after the completion of the Salisbury railroad the narrow-gauge road was abandoned. The principal stockholders in the company, which since 1878 has been known as the Keystone Coal Company, at the time of its organization were Henry Thomas Weld, William J. Baer, George F. Baer, Henry F. Stiles (president), William Brace and others. Mr. Brace was the first superintendent of the company. This company has ceased to mine coal its coal being mined on royalty by others.

The Cumberland-Elk Lick Coal Company's Shaw mines are at Romania, about two miles from Meyersdale, on the Salisbury branch road. The first coal was shipped from them in 1875. They are the second mines opened in the entire region. At the time mine No. 1 opened it was one of the best-equipped mines in this field. It was well drained and had an electric haul over 10,000 feet in length. Cutting machines driven by electricity were used. Mine No. 2 is on the opposite side of the ravine and has only been opened four or five years later. It also used electric power. In 1886 the company began the building of coke ovens and has one hundred in operation. The lands of this company are the same that were purchased by Bruce and Roman in 1853. Alexander Shaw, of Baltimore, was the first president of the company and Alonzo Chamberlin, of Meyersdale, vice-president. He was also superintendent of the mines, which are better known as the Shaw mines, from 1875 to 1899. Neither this company nor the Keystone ever opened a company store.

In 1877, John Anspach opened the first mine in that part of the field about Salisbury on the well known Abraham P. Beachey farm. Other openings followed these, giving employment to hundreds of miners, and all of this section has shown a great growth in population.

In the Berlin field, so far as can be ascertained, the first mine from which coal was shipped was opened by Thomas Price in 1875. Samuel Adams opened a mine on the Berlin branch in 1876. These mines were not operated very extensively. More extensive were the Althouse mine, opened in 1899, and the mines of the Pine Hill Coal Company, also opened in 1899. This company had 2,200 acres of coal land in Brothers Valley that had been purchased or optioned by Isaiah Good, Norman E. Knepper and Daniel B. Zimmerman, of Somerset, and who were the principal stockholders of the company. There are two mines, known as Lottie Nos. 1 and 2, so named after a daughter of Mr. Good. The village that grew up about these mines is known as Goodtown. At the time they were sold to the Somerset Coal Company their daily output was between five and six hundred tons.

The Listie Coal and Manufacturing Company was the pioneer company in the region north of Somerset. Its holdings of 2,200 acres, about four miles northeast of Somerset, were purchased from William J. Baer, who had acquired the lands or mineral rights from farmers. The company began operations in 1893, the first shipment of coal being made March 1, 1893. Simon Krebs, the head of this company, was fully conversant with the business of mining coal and went about the work in a systematic manner. Before purchasing they satisfied themselves by a careful analysis of the value of this coal. Practical tests demonstrated that it was equal to the best steam-producing coal found anywhere in the United States. It is known as the Listie smokeless coal. Yet the company found almost insurmountable obstacles in obtaining a foothold in the eastern markets for their product, and less tenacious men would have given it up in disgust. The coal was condemned again, and again, even by those who it was thought would give it a fair trial. Mr. Simon Krebs, the principal owner and manager, finally visited Baltimore, Philadelphia and other eastern cities and insisted on having test made of the coal, with himself superintending the firing. The result was that the Listie Company had no further trouble in marketing its full product, and incidentally some well paid employees in the establishments in which the tests were made lost their places. After operating its mines successfully until 1901, the Listie Company sold its holdings to the Somerset Coal Company. After 1893 other mines were opened along the line of the Somerset & Cambria railroad, until the coal trade in this field had attained very respectable dimensions, but these were only the forerunners of a greater era in the history of the development of the county's vast mineral resources.

What has been said is only a sketch of the beginnings of the coal industry in Somerset County. This industry, like everything else, must pass through a period of growth and development, which in this ease has required more than a quarter of a century. These earlier mining operations, while they contributed largely to the material interests of the county, were only the pioneers of the gigantic interests that have sprung up in our coalfield since 1895.

Judge William J. Baer, of Somerset, held options on 9,000 acres of land in Somerset and Lincoln Townships, a small part being in Quemahoning Township. These were taken up by A. L. G. Hay in his own name, in the spring of 1889, but for Judge Baer. Judge Baer opened a mine at Kimmelton and a second one at Mostoller Station. In the summer of 1899 these lands were sold to the Reading coal and Iron Company, who at once commenced operations on a large scale. In 1902, the Somerset Coal company, a corporation with a capital of $4,000,000, absorbed the following of the smaller companies: Cumberland and Summit Coal Company; Cumberland and Elk Lick Coal Company (Shaw mines); Benjamin Thomas Coal Company; the Wilmoth Coal Company; Duncomb and Hocking Coal Company (Hamilton mine), in Elk Lick Township; Ehlen Coal Company, Chapman and Tub Mill Run mines in Elk Lick Township; Pine Hill Coal Company; W. D. Althouse & Co., in Brothers Valley; Enterprise Coal Company, Garrett; Wilson Creek Coal Company, in Black Township; Casselman Coal Company, in Upper Turkeyfoot Township; Listie Mining and Manufacturing Company, of Somerset Township; Stuart Coal Company, of Quemahoning Township. This consolidation took in sixteen companies and about one-third of the mines in the county, there being fifty-three mines operated in Somerset County in 1902.

About the same time this company also acquired 20,000 acres of coal land in Somerset, Lincoln and Jenner Townships, and 15,000 acres in Stony Creek Township.

The holdings of the W. K. Niver Company are mostly in Brothers Valley Township, where they acquired 15,000 acres of coal land in 1901. This body of mineral lands lies between Berlin and Stony Creek post office, on the Bedford Pike, and was optioned in 1900 by Z. T. Kimmell, S. P. Brubaker, F. B. Collins, A. C. Floto, G. P. Brubaker and J. J. Hoblitzell, of Meyersdale. Development of the lands was at once commenced and several openings were made. A part of the coal here can be mined by slope, but a part must be taken out by shaft. At Pen Mar No. 2, near McDonaldton, a shaft 360 feet deep was completed in 1903. Fifteen months after its commencement this mine has a capacity of 2,000 tons per day. The W. K. Niver Company also has a fine mining plant at Niverton, in Elk Lick Township, opened in 1898. The company, however, had the misfortune to have one of their mines in Elk Lick Township take fire in 1902 and a considerable acreage of coal has been destroyed.

The Ursina Coal Company acquired 7,000 acres of coal lands and mineral rights near Ursina in 1901, and at once proceeded to develop the property. A new town (Humbert) sprang up, which became the center of busy industry until the summer of 1906, since which there have been persistent rumors that that vein of coal worked was a freak in the coal measures, and was showing signs of failing.

It is not to be supposed that Somerset County has been free from troubles incident to disputes between capital and labor. Of these there have been more than enough, but in one way or another they were always adjusted without any serious disturbance of the public peace, until the great strike inaugurated in December 1903. This was the culmination of difficulties between the Somerset Coal Company and the Merchant's Coal Companies. and their miners. Upwards of 3,000 men were involved in this strike, which was marked by scenes of disorder, riot and bloodshed, even to the extent of murder, such as the county had never before witnessed. The centers of these disturbances were the boroughs of Garret and Boswell.

When the coal companies found that their men would not return to work on the terms of the companies, they took steps to resume operations in their mines by bringing men from other places. In doing this, despite the resistance of the men on strike, they were finally successful. On January 17 the town of Boswell was the scene of a riot in which George W. Saylor and John Long, deputy sheriffs, were severely wounded, and William Begley, chief deputy sheriff, was slightly wounded. Four of the strikers were also wounded. Some twenty-five of the rioters were arrested and committed to jail. At Garret and in the region about Meyersdale at least two murders resulted from this strike. After the first six months there was no uncertainty as to what the outcome would be, but the strike covered a period of sixteen months before the union would declare it off, and then only after upwards of $300,000 had been expended in sustaining it.

THE MANUFACTURE OF IRON

In any record of the growth of the iron industry in Pennsylvania, Somerset County must not be left out of the account. Some of the first efforts to manufacture the metal from the raw material were made in this county. While they were not successful in establishing the business on a lasting or even a growing basis, enough was done to prove that we have the resources for one of the most important means of industrial development.

"In 1809 or 1810 Peter Kimmell and Matthias Scott built a forge for the manufacture of bar iron on Laurel Hill Creek, in Jefferson Township, in the western part of Somerset County. Mr. Kimmell shortly afterwards withdrew, and the establishment was run by Mr. Scott. Subsequently it passed into the hands of Henry Benford and Jacob Ankeny, and ceased operations in 1815. Supplies of pig metal were obtained from Bedford County."

"About 1810, Robert Philson erected a Catalan forge on Casselman River, in Turkeyfoot Township. The ore was mined in the immediate vicinity or hauled from Laurel Hill. It made blooms and bar iron directly from the ore—a most tedious and expensive process, as well as a most primitive method. It was the only forge of the kind in the county. The enterprise was a bad investment, ceasing operations about 1823."

"The next furnace in the county was Jackson furnace, near the Pittsburgh Turnpike, on Laurel Hill, Built by Irwin Horrell, Philip Murphy and Charles Ogle about 1825. It was unsuccessful in their hands. About 1833, Joseph and William Graham again put it in blast, only to be overcome by speedy disaster."

In 1832, there were three furnaces and forges in the county. Rockingham furnace, two miles above Shade furnace, on Shade Creek, was built in 1844 by John Foust, and subsequently operated by Custer & Little. Somerset furnace, at Forwardstown, was built by Huber, Linton & Meyers, in 1846, and was afterwards owned by Ross Forward. The Union Coal & Iron Company organized in 1854 built the furnace at Wellersburg in 1855. When in active operation it is said to have had a monthly capacity of three hundred tons. The furnace does not seem to have been operated continuously, and eventually passed to the ownership of Ross Forward, of Somerset, who abandoned it about 1866. Years ago, in localities away from Wellersburg, it was a matter of common report that the immediate cause of its abandonment was that while in blast the furnace had chilled.

Next to coal mining, the manufacture of firebrick is one of the most important industries of the county. The Savage Firebrick Company was composed of John J. Hoblitzell, John Hocking, of Meyersdale, and W. D., John, James and Jasper N. Porter, of Pittsburgh. In 1893, Mr. Hoblitzell and his two sons became sole owners. The first plant of the company was erected at Keystone Junction, ten miles east of Meyersdale. The company has 2,800 acres of land. Its fire clay mines are the most extensive in the United States, the clay in many places being from seven to twenty-five feet in thickness. One of the finest silica quartz quarries in the state is located on the company's lands. The principal plants of the company are located at Keystown Junction and at Williams Station, on the Pittsburgh division of the Baltimore &

Ohio railroad. The Keystone plant, which is the largest, was destroyed by fire May 15, 1898. It was immediately rebuilt and equipped with all modern appliances known to the business, and is now one of the finest plants in the country. It covers 28,00 square feet. The buildings are of brick. There are eight kilns, with a daily capacity of 40,000 brick. The Williams plant covers 8,000 square feet, and has daily capacity of from 16,000 to 20,000 brick. The brick made by the Savage Company are known over almost the entire world. At one time the company turned out millions of building brick, but of late years has confined its product to fire brick. In 1902 J. I. Hoblitzell and others disposed of their interests to Johnstown and Pittsburgh capitalists for a sum approximating $250,000. Scott Dibert is president of the new company.

LUMBER

Before its settlement, except as to those parts known as the Glades, Somerset County was a vast forest, abounding in all kinds of hard and softwoods common to its latitude. The first attempts forward developing the lumber industry on anything like a commercial scale were made in what is now Ogle Township, and in Northampton Township.

In 1848, George D. Wolf and William J. Baer, who had large timber interests in Ogle (then Pain) Township, erected what are known as the Ashtola Mills for the sawing of lumber. For its day it was an extensive plant, and was operated for a number of years. Its owners, however, were greatly hampered from lack of transportation facilities in getting their product to market. About the same time Henry Thomas Weld put up the Southampton Mills, in Southampton Township. The lumber cut here was hauled in wagons to Cumberland, Maryland. These mills have been abandoned for a number of years.

It was not until after the county had been penetrated by railroads that the development of this industry really began. In 1880 the firm of Dill, Watson & Co. began operations as the largest producers of lumber in the county. Their timberlands were in Greenville Township, but their mills were in Elk Lick Township, at Boynton. In 1882 their mills cut over 6,000,000 feet of lumber. The supply of timber becoming exhausted, the plant has long since been abandoned. Large as this plant appeared when it was in operation, it has since been eclipsed by the plants of E. V. Babcock & Co., in Paint and Ogle Townships. This great firm began operation in 1897, after having acquired the Ashtola property of near 7,000 acres, on which it was estimated that there was 150,000,000 feet of timber. The holdings of the firm have since been increased to about 17,000 acres. The mill at Ashtola had a capacity of 4,000,000 feet per month. The mill at Arrow cuts 3,000,000 feet per month. The other mills of the company brought its output up to over 100,000,000 feet per annum.

Charcoal, as produced in Somerset County, may be said to be a byproduct of the lumber industry, as not much timber enters into its production that is fit for lumber. The pioneer in this business was the late David Hess, who began operations near Somerset in 1874. James McKelvey, of Somerset, his son-in-law, succeeded him about 1880, and produced upwards of eight thousand carloads of charcoal.

Samuel Fox, of Somerset, also engaged in the business about 1880. His son, Edward L. Fox, is his successor, and the Fox interests have been large producers of charcoal. Cyrus Berkeybile, of Shade Township, is also a large producer. While this industry had its start in Somerset Township, it has been carried on at so many points along the Somerset & Cambria railroad that they cannot be enumerated.

The manufacture of shook was begun about 1863, and came to be of considerable importance at one time. The persons most largely interested in the business were Lew A. Turner, of Pine Hill; John and William Smith, of Salisbury, and Ezra Dunham, all of whom operated a number of shops in different parts of the county. The market for their products was among the sugar planters of Cuba, and other sugar producing West India islands. The business would have been a profitable one had it not been for the chronic state of war that prevailed in Cuba. As it was, bankruptcy and failure was the outcome of almost every venture made in this field. The industry has long since died out.

In 1899, there were forty-three manufacturing establishments of various kinds that fell within the scope of the factory laws. These employed 711 male and 83 female operatives.

THE BALTIMORE & OHIO RAILROAD

As the Baltimore & Ohio railroad was first projected, it was intended that it should pass through Somerset County in the direction of the Ohio River. In 1828 an act of assembly was passed authorizing the company to construct its road through Pennsylvania to the Ohio River.

The act stipulated that the company should complete that part of its road within fifteen years from the passage of the act. Surveys were made, and the chief engineer of the company reported that it was practicable to build a railroad from Cumberland to Brownsville, and also that it could be built without resorting to the use of inclined planes. Considering the mountainous character of the country to be passed through, this report was looked upon as being very favorable. From Brownsville the road could be extended both to Wheeling and Pittsburgh. That both of these places were mentioned leads to the inference that the Baltimore & Ohio railroad management of that day looked upon Wheeling as being a place of as much importance as Pittsburgh was. Time has certainly proven them to have been in error in this. In the end, Wheeling became the western terminus of the road, yet notwithstanding this advantage, it has remained only a third rate city.

Benjamin H. Latrobe was the engineer who made this first survey for a railroad through Somerset County. But further than securing rights of way from many of the landowners along the route, as surveyed, nothing was ever done by this company toward constructing its road in Pennsylvania. At the time the resources of the company were taxed to the utmost in constructing the road from Baltimore to Cumberland.

Seeing that they could not complete that part of the road that was to pass through Pennsylvania within the fifteen years required by the act of 1828, the legislature was asked to grant an extension of the time. This was granted in a supplementary act which was passed in 1839, and which extended the time for completing the road to February 20, 1847. It was not until 1844 that the road was completed to Cumberland. This left less than three years of time in which to build the road through Pennsylvania. In the then state of railroad construction, this was looked upon as an impossibility, and the legislature, and were compelled to build their road through western Maryland and Virginia.

PITTUSBURGH & CONNELLSVILLE RAILROAD

The Pittsburgh & Connellsville railroad was incorporated by an act of assembly of April 3, 1837, but it forfeited its franchise by reason of failure to begin the work of construction within five years from the passage of the act. On March 18, 1843, an act of assembly was passed, renewing and continuing in force the charter of 1837. It also gave the company the right to extend its road beyond Connellsville to Smithfield, or to any other point on the waters of the Youghiogheny river within the limits of the state of Pennsylvania, but this clause was repealed the next day. This clause, however, was re-enacted in 1846. In 1853 the Maryland legislature passed the needed legislation to enable the company to construct their road from the state line to Cumberland.

About this time it became apparent that if any railroad was to pass through Somerset County it must be looked for in the extension of this road from West Newton eastward. Among other things a supplement to the charter of the company had been passed by the legislature, which made it lawful for county commissioners to subscribe to the stock of the company. Under this law, efforts were made to induce the commissioners of the several counties through which the road would pass to give it needed financial assistance by subscribing to its stock. In Allegheny County a subscription of $1,000,000 was obtained. A heavy pressure was brought to bear on the commissioners of Somerset County to induce them to subscribe $250,000 to the stock of the company. It was represented to them that this was a good business proposition; that it would be giving substantial aid to the road and that it could be done in this way without its costing the county a single dollar; that, in fact, there was a possibility that the county might make some money through the transaction. It was made to appear that if the county issued its bonds to the railroad company in payment of the stock subscribed for, the company could sell the bonds and could complete the road; that the company would pay the interest on the bonds in lieu of dividends on the stock; that long before the bonds fell due, which was thirty years after date, the road would be doing such a business as would enable the company to pay much greater dividends that what the interest would be, and that this would create a sinking fund sufficient to discharge the obligation, without any further expense to the county treasury, after which the county would still have the stock, on which it would continue to receive handsome dividends. The county commissioners at that time were Samuel Bittner, Abraham Brubaker and Abraham Beam.

On Monday evening of February term of court, 1853. A public meeting had been held in the courthouse, at which the proposition that the county should subscribe to the stock of the road was so ably presented that the commissioners were persuaded to agree that such a subscription should be made. Public sentiment favored such action on their part, and they were ready to acquiesce to what seemed a popular demand.

On the next day Isaac Kauffman, a well-known citizen of Conemaugh, appeared on the scene. His own account of what followed is, that on learning of this proposition, and what the probable action of the commissioners would be, he at once appeared before them and remonstrated with them against their bonding the county for such a large sum of money, pointing out to them the hazards and dangers always attending the carrying out of such projects successfully; and that, should there be any road, the county would probably be burdened for years before it could clear itself of the debt, for such it was that they were about to create. As Mr. Kauffamn stated the matter some thirty years later, the bonds were to be signed that very evening. So forcibly did he present his side of the case that the commissioners began to hesitate, and finally Samuel Bittner and Abraham Brubaker, two of the commissioners, promised that they would do nothing toward subscribing for the stock or the issuing of the bonds of the county until after further consideration had been given the matter.

At that time Judge Jeremiah S. Black still held his legal residence in Somerset, but was absent, attending to his duties in the Supreme Court, which was then in session. Mr. Kauffman immediately proceeded to Philadelphia and informed Judge Black of what was going on at home. Judge Black at once took a stand against any subscription to the stock of the railroad company, or the issuing of any county bonds in payment thereof. He also wrote several letters, in which he urged the commissioners of Somerset County not to sign any bonds for such purposes.

These letters were printed and distributed over the county, and were instrumental in creating a sentiment against of the railroad company. Mr. Bittner and Mr. Brubaker remained firm in their refusal to sign the bonds. Abraham Beam, the third commissioner, seems to have been in favor of doing so.

The matter became an issue at the succeeding October election, and the candidate for commissioner who was against county aid to the railroad won by a round majority, although he was in the field as an independent candidate. It may be added that the predictions made by Mr. Kauffman and Judge Black, as to what might happen, were amply verified in the very near future. The people of Allegheny County were compelled to pay the county, and so would it have been here had the counsels of those who desired the railroad, in any way that it could be got, been followed.

The charter of the road only permitted the road to be extended east of Connellsville to Smithfield, or any other point on the waters of the Youghiogheny within the commonwealth. This was a long way from reaching the Maryland Line, and so ultimately securing a connection with the Baltimore & Ohio railroad at Cumberland. The road might be carried to some point on the waters of the Flaugherty Run, east of Meyer's mills (now Meyersdale), but no further. At the time that the public minds was taken with the idea that the plank road was the road *par excellence,* a charter of incorporation had been obtained for the Meyer's Mills Plank Road Company, which would intersect the Cumberland & West Newton plank road somewhere near the Sandpatch. A little later on this charter was amended authorizing the construction of a plank road or railroad to the farm of John M. Buchanan, in Bedford County. This farm lay on the Maryland Line, and the Meyersdale Plank Road Company had the right to build a railroad to it if it was proper to do so.

The Pittsburgh & Connellsville Railroad Company saw its opportunity, and acquired the franchise and rights of the plank road company. In the early part of 1854 Oliver W. Barnes, the chief engineer of the company, submitted to the directors of the company a report on the several routes by which the Maryland line could be reached from West Newton. The board of directors adopted the line on the north side of the Youghiogheny River as the final location of the road between West Newton and Connellsville. From Connellsville the same side of the river was followed until the Turkeyfoot was reached; from this point the route followed the Casselman River on its north side until the Meyer's mills was reached; here it left the river, going toward the Allegheny Mountain until it reached the Sandpatch, where the mountain was to be pierced by a great tunnel. Passing through the mountain in this way, the Wills Creek was reached, and this stream was followed until the Maryland line was reached. The first division was already in operation, and the second division was at once placed under contract.

In 1854 the tunneling of a mountain such as the Allegheny was looked upon as a great undertaking. It was therefore wisely determined that work on the tunnel should begin at once, and that it should be well advanced toward completion before much work should be done between that point and Connellsville. The contract for its construction was let to Messrs. Carr & Gould, and work was commenced immediately. Large numbers of Irish laborers were brought in and quite a village sprang into existence at Sandpatch. Some time after the work was well underway, the head of the firm Mr. Carr, was killed in a hunting accident, after which Mr. John H. Gould, the surviving partner of the firm, continued the work until late in 1857, when, becoming financially embarrassed, he suspended operations. It is more than probable that at least a part of the troubles of the contractor were owing to like troubles on the part of the company. As a matter of fact, a wave of financial distress swept over the country in the fall of 1857, which paralyzed business enterprises of every kind, and brought most of them to a standstill. This certainly was the case so far as this railroad was concerned. Its president, General William Larimer, failed for a large amount of indebtedness, and the fortunes of the road itself sunk to a very low ebb. The road, however, had been completed to Connellsville. As the available funds of the company were completely exhausted, the management was compelled to cease all constructive work, and more than ten years elapsed before it was resumed.

In the meanwhile a spirit of opposition had developed itself against the road. This, in part, was among those who had been its friends, but having become persuaded that nothing would ever be done toward completing it, they were ready to give their support to any other company that would build a road that would reach the Maryland Line. There were also adverse interests that were not slow to encourage this feeling of dissatisfaction that had arisen among those who had been the friends of the Pittsburgh & Connellsville Railroad Company.

By an act of the Pennsylvania legislature passed on April 29,1864, its charter was repealed, and all its rights and privileges were revoked. There was, however, a proviso in the repealing act that the company should be reimbursed for all its outlay on the line south and east of Connellsville by any other company which might be authorized to complete the road. Hon. Christian C. Musselman represented Somerset County in the legislature at that time, and it is due to him to say that he was one of the few who stood by the company and voted against the repeal of its charter.

The repealing act was followed up by the passing of another act incorporating the Connellsville & Southern Railroad Company. But this new company did not comply with the terms of the act by which it was incorporated, which required commencement and completion within a certain specified time.

After four years of waiting, those most interested in the construction of a railroad through Somerset County were willing to give the old company one more chance. By the passing of the act of January 31,1868, the legislature reinstated the Pittsburgh & Connellsville Railroad Company in all the rights and privileges that it had enjoyed prior to the act of April 29, 1864. There was a proviso that the company must commence the work of construction within six months, and complete it within three years from the time of the passage of the act. By a later act the company was also authorized to construct branch roads from such points on its main line as it might be to its interest to do.

At this juncture money was plenty and was seeking opportunities for investment. The city of Baltimore was largely interested in the fortunes of this road. Years before, it had advanced a million of dollars to it, which was secured by a first mortgage. The needed money was secured, and the work of construction was at once commenced. The work was pushed from both ends. The two parties of tracklayers met on April 10, 1871, at a point about three miles west of Rockwood and near the Forge Bridge, where the last spike was driven. The first through passenger train from Pittsburgh to Cumberland passed over the road on the same day.

In 1875 the Pittsburgh & Connellsville railroad was leased to the Baltimore & Ohio Railroad Company, which now operates it as a part of its great system. It is known as the Pittsburgh division. With the completion of the main line, the way was open for the construction of branch lines, and several of these were soon under construction. The means of building them were secured by subscription to their stock by citizens of the towns and landowners that were interested in their construction.

SOMERSET & MINERAL POINT RAILROAD (MERGED IN S. & C. R. R.).

The Somerset & Mineral Point railroad was constructed in 1871. It follows Cox's Creek from Somerset to Rockwood, which was then known as Mineral Point. Here it connects with the Pittsburgh & Connellsville railroad. Its length is a trifle over nine miles. The work of construction was undertaken on the strength of subscriptions to the stock of the company by citizens of Somerset and its vicinity, the shares being of the par value of fifty dollars. Alexander H. Coffroth was the first president of the road. James Parson and John Neff, of Somerset, were the contractors for the grading of the road. The Enough money had been obtained from the stock subscriptions to pay the cost of the grading, but for the iron and equipment the company was compelled to go into debt, with the result that the road was sold to satisfy the claims of the bondholders, the road finally passing into the hands of the Baltimore & Ohio Railroad Company.

THE JOHHNSTOWN & SOMERSET RAILROAD

The Johnstown & Somerset Railroad Company was incorporated in 1868. The road, however, was not constructed until 1881. The road extends from Johnstown to Somerset, where it connects with the old Somerset & Mineral Point railroad. The two roads merged, and were known as the Somerset & Cambria branch of the Baltimore & Ohio railroad. From Benson a branch road four miles long goes to the new town of Jerome.

In the course of a few years after its completion the coal lands along its line began to be developed, and a number of towns and villages have come into existence between Somerset and Johnstown.

THE BUFFALO VALLEY RAILROAD

What is usually known as the Berlin branch was incorporated as the Buffalo Valley Railroad Company, the stock being mostly subscribed by the citizens of Berlin, along with property owners along the line. Samuel Philson was the first president of the company, and it was largely through his efforts that the road was constructed, which was in 1871. Colonel Enoch D. Yutzy and Noah Scott, of Ursina, were the contractors who graded the road. This road affords an outlet for the coal of the Berlin basin, and was owned and abandoned by the Baltimore & Ohio Railroad Company.

THE SALISBURY & BALTIMORE RAILROAD

The Salisbury & Baltimore Railroad Company was incorporated in 1868, under the title of the Elk Lick coal, Lumber & Iron Company. By a later act of assembly its name was changed to that of the Salisbury & Baltimore Railroad and Coal Company. Its chief promoters were Hiram Findlay and Michael Hay, of Salisbury, with John Anspach, of Philadelphia, who had become interested with the two former in a large area of good coal land in Elk Lick Township.

The construction of the road was commenced in 1872, the money being raised by stock subscriptions, chiefly by the citizens of Salisbury and Elk Lick Township. When the great panic of 1873 came on, the road was only about half completed. Work was suspended for several years. We have not been able to learn the precise time of its completion, but so far as we know it was in 1878. The road was completed by Colonel E. D. Yutzy and Noah Scott, who had become owners through a sheriff's sale.

It connects with the Pittsburgh & Connellsville railroad at Salsibury Junction, one mile west of Meyersdale. For many years its southern terminus was at West Salisbury. In 1902 the road was extended to Jennings, in Garrett County, Maryland. This road is the outlet for the entire Salisbury coal basin, also known as the Meyersdale region. It has always had a large coal traffic, and is looked upon as being a valuable property. The road was owned and abondoned by the Baltimore & Ohio Railroad Company.

NORTH FORK RAILROAD

A branch road was laid in 1872 along Laurel Hill Creek to a distance of about three miles north of the village of Ursina, for the purpose of developing the coal and timberlands lying along that stream. After about three years the road was abandoned and the rails taken up.

CONFLUENCE & OAKLAND RAILROAD

The Confluence & Oakland railroad follows the Youghiogheny River from Confluence to Kendall, Maryland. It passes through the village of Somerfield, and has added considerably to the prosperity of that ancient village.

THE CRONEY LUMBER CO. RAILROAD

In 1901 still another railroad was projected, that leaves Confluence, and following the Casselman River for several miles until it reaches the junction of White's Creek with the river, it then follows the creek toward the Maryland line, which it crosses several miles east of Petersburg, in Garrett County. This road is known as the Droney Lumber Company's Railroad, and has a length of about twenty miles, and was built for the purpose of developing large tracts of timber land that are owned by the company in Somerset County and in Garrett County, Maryland. The village of Unamis is on this road, nine miles from Confluence.

THE PITTSBURGH, WESTMORELAND & SOMERSET RAILROAD

The last railroad to come into Somerset County is the Pittsburgh, Westmoreland & Somerset railroad, which was completed and opened to traffic on May 25, 1906. The road extends from Somerset to Ligonier, in Westmoreland County, where it connects with a branch of the Pennsylvania railroad. Among other things, it was to shorten the distance from Somerset to Pittsburgh upwards of forty miles as compared with the Baltimore & Ohio railroad. Immense timber tracts on both sides of the Laurel Hill in Somerset and Westmoreland Counties can now be brought into touch with their proper markets. It also promises the development of the coal beds on the eastern side of Laurel Hill, and in many ways it will mean much for the people of Somerset County.

The last railroad to come into Somerset County has been mentioned, but of the first one to enter the county nothing has thus far been said. To most of those of the present day and generation it will be a matter of surprise to be told that the first town of Somerset County to enjoy railroad communication with the outside world was the village of Wellersburg. Some time about 1855, when the furnace was in operation, a branch road was brought there from a road that came from Cumberland to Mount Savage. This branch road was constructed on account of the needs of the furnace, and when that ceased operations the road was abandoned.

MUNICIPALITIES

ADDISON TOWNSHIP

Addison Township, was formed from a part of Turkeyfoot Township in 1800, was third township created after the organization of Somerset County. It is, however, the eighth township in point of age as the county is now constituted. It was named after Hon. Alexander Addison, the first judge of the courts of Somerset county.

BERLIN BOROUGH

Berlin is the oldest town in Somerset County. It appears to have been founded in 1784. It is, however, to be understood that there were settlers in this locality as far back as 1769, and possibly even a little earlier. The town was laid out on a tract of land surveyed for Jacob Keffer, in trust, on a warrant dated July 27, 1784, and on which warrant and survey the Supreme Executive Council of Pennsylvania on April 4, 1786, granted a patent unto Jacob Keffer and his heirs, in trust, to and for the use of the Lutheran and Calvinistic (Reformed) congregations of Brothers Valley Township and for the use of the schools of said societies, a certain tract of land called Pious Springs, situated on the head spring of Stony Creek, containing forty and a half acres of land, and allowance of six percent, etc. At this distant day it looks as though the male members of these congregations, or certain of them, had chosen this spot as a suitable place for founding a town and at the same time providing a perpetual source of revenue for their respective churches, and that, acting under their instructions, Jacob Keffer had acquired and perfected the title for them. For the carrying out of these purposes they entered into a certain indenture, which they signed and in which they style themselves "the owners of the city of Berlin." This indenture antedates their survey somewhat, being under the date of June 2, 1784. It was, however, not acknowledged until March 21, 1788. It may be looked upon as being, first, an agreement among themselves as to certain things; second, an agreement with certain covenants and stipulations between the owners and the purchasers of the lots.

The first deed recorded in the Somerset County deed record is for lot 56, in the town of Berlin, sold to Adam Miller for fifteen shillings and an annual ground rent of one Spanish milled dollar. Among other thins this deed recites that Jacob Keffer in 1789 conveyed to Jacob Glassner, in trust for Lutheran and Calvinistic churches, on-half of the tract of forty acres, and that they have laid out the town of Berlin on this half, and further that the deed is recorded in Book C, page 226, of the Bedford county records. As Jacob Keffer joined in the deed to Adam Miler, we must assume that he made the deed to Glassner as a co-trustee, who would represent the Reformed church. On this half are platted the seventy lots that are referred to in the indenture. There seem, however, to have been seventy-two lots. The indenture makes no reference to the lots on the eastern half of the Pious Springs tract.

That part of Berlin west of Division Street, being the west end of the town, is on twenty-five acres of land that Jacob Keffer, John Fisher and Francis Hay bought from Joseph Johns and platted into fifty-five lots as the first addition to the town of Berlin. These lots were also subject to an annual ground rent of one Spanish milled dollar, but for the use of the Lutheran church only, with its school and the poor, as per an article of agreement made August 25, 1787, and recorded at Bedford. Here again is an agreement that antedates the deed for the land, which was not made by Joseph Johns until 1796. These ground rents appear to have been for the use of the Lutheran church only, but it is evident that there must have been a misunderstanding of some kind, and eventually there was both contention and litigation about them. In 1809, Francis Hay, Simon Hay and Jacob Keffer, as trustees of the Reformed church, executed a deed to the trustees of the Lutheran church for forty-five lots in the addition, specifying the numbers of the lots, or rather they convey the ground rents on the lots. The deed recites that in order to settle and determine for once and all the disputes and litigation that had arisen from this matter, a suit had been brought in the circuit court of Somerset County, in the name of John Kimmell, in the nature of a replevin, which had been decided in favor of the plaintiff. Such is the history of the founding of Berlin.

Jacob Kimmell made A third addition to the town, about 1838. This is outside of the borough limits, and is known as Vietersburg.

Stores were kept at Berlin as early as 1785, by John Hopkins, John Fletcher and Robert Philson; and by John Kimmell and Adam Miller between 1790 and 1795. The earlier of these merchants received their goods by packhorses. About 1790 wagons began to take the place of packhorses. The first two-story house in the town is said to have been built on the northeast corner of the lower diamond. It was the first occupied as a tavern. Afterwards a store was kept in it.

The first heating stoves for coal came into use about 1832. The first ones were known as cannon stoves. The Hathaway cooking stove was introduced about 1835. This stove burned wood only. It was really a good stove, and for a wood-consuming stove it had no superior. It sold for fifty dollars and upwards. In 1842 Charles Stoner established a foundry in Berlin, and for many years manufactured these Hathaway cooking stoves, which were by means of wagons distributed through Somerset, Bedford and Cambria counties, as well as through the western part of Allegheny County, Maryland. Mr. Stoner also made a coal-heating stove of an egg shape that as a plain heating stove has no superior even to this day. He made stoves that we personally know gave fifty years of service.

Some time after 1850 the Berlin foundry also began the making of the William Penn cooking stove, a coal-consuming stove. Horsepower threshing machines were also manufactured here. The foundry was well equipped for its day, and the name Stoner was a household word all over Somerset County. Frederick Ohley and Josiah B. Lepley became owners of this foundry, and in 1869 it was removed to Salisbury. Some time after this, Charles Krissinger began operating a foundry in the southwest part of the town.

Martin Diveley is said to have first established his tannery by a large spring on the road leading toward Bittner's woolen factory, but if this is correct, he moved it into the town. It is expressly stipulated in the indenture that no tannery but his shall be built at the spring.

The first blacksmith shop in Berlin was probably that of Adam Stull, on the John C. Philson lot on the corner. Stull learned his trade with Philip Wegley, and was in business of himself as early as 1795. Ludwick Baker, a blacksmith of nearly the same period, had his shop of the Brallier hotel lot. There are some, however, who think that the first shop was that of Schmitbarnt, which was about the middle of the square, below the lower diamond, and that it was built long before 1800. If Schmitbarnt built this shop, it must have been between 1784 and 1795, as his name is not found on the assessments after 1795 nor before 1785.

The first brick house in the town was built by Jacob Lowry in 1823, on the lot at the northeast corner of Main and Division Streets.

Henry Floto began the manufacture of cigars about 1845, in a barn belonging to Daniel Heffley. This is an industry that has been kept alive ever since. The Floto family, of Berlin, have always been identified with it from the time it was first started. The manufactory is now operated by Theodore H. Floto. The Berlin "toby" is known all over the country.

A steam grist mill was built in 1872 by Emanuel J. Meyers and Ephraim Cober. This was destroyed by fire, and in 1882 another mill of the same kind was built by Abraham Spangler. In the same year Achison & Pile built a planing mill.

Samuel Philson and Charles A. M. Krissinger established the banking house of S. Philson & Co. in 1866. In 1881 Mr. Philson's sons, Robert and Horace B. Philson, became its owners but retained the old name. This institution was always looked upon as being one of the substantial banking houses in the county, and it successfully weathered every storm that has swept over the financial world since it was founded. In 1902 it was merged in the Philson National Bank of Berlin, with a capital of $60,000. The First national Bank of Berlin was organized in 1901, with a capital of $50,000 and deposits of $225,000.

The Co-operative Mutual Fire Insurance Company, of Berlin, was incorporated in March 1898. It insured town and farm property on the premium note plan. It has been highly successful in giving its patrons cheap insurance. It has outstanding risks exceeding one and a third million of dollars. Its officers were William H. Ruppell, of Somerset, president; C. A. Floto, vice-president; Frederick Groff, treasurer, and Jacob J. Zorn, secretary.

The Farmers' Union Association and Fire Insurance Company of Somerset County is not exactly a Berlin institution. It was organized in 1867 at Pine Hill, in Brothers Valley Township. It insures farm property only, and it is purely mutual, not requiring any premium note. When losses occur an assessment is made on the entire amount of insurance outstanding, in whichever class the loss has occurred, there being two classes—buildings, and contents. It has in force $3,346,000 in the building class, and over $1,000,000 in the contents class.

The Eureka Wood Pulley Company was incorporated in 1892, with a capital of $30,000, subscribed by the D. G. Reitz Company and citizens. D. G. Reitz was president. The Reitz manufacturing Company, whose specialty is the building of roller mills and the manufacture of roller mill machinery, was incorporated in 1890 with a capital of $18,000. D. G. Reitz, president; Albert Heffley, secretary; Jacob J. Zorn, treasurer.

Like every other progressive town, Berlin was not without public utilities. Electric light was first introduced by William Scott Matthews, in 1899. In 1903 this plant was purchased by the borough and greatly enlarged. A public water supply is furnished by the Berlin Water Company. The plant was installed in 1904, and is a gravity system, deriving its source of supply from mountain streams.

BLACK TOWNSHIP and ROCKWOOD BOROUGH

When Milford Township was divided in 1886, that part of it lying east of Coxe's Creek and east of the Casselman River below Rockwood was given the name of Black, in honor of Judge Jeremiah S. Black. It embraces the larger but not the better part of Milford as it was before the division took place. All of Black Township may be said to lie on the eastern flank of the Negro Mountain, and there is considerable rough and poor land. The township is rich in coal and when it is once fully developed will show up well.

As early as 1774 or '75, James Wilson built a cabin about two and a half miles northeast of the present town of Rockwood, and probably was the first settler in the township. He also built the first saw mill in the township. A house used as a church and schoolhouse was built on or near the Jacob Critchfield farm as early as 1800, or perhaps earlier.

Michael Sanner, the ancestor of the Sanner family, kept the first store in Black Township, on the Wable farm. He had settled on this farm and began making improvements. Sanner saw opportunity in the needs of the settlers and began bringing goods from the east into the settlement on packhorses. When Mr. Sanner began this business is not known, but he is known to have been here in 1795—it may have been even earlier. It certainly was before the time that the wagon superseded the packhorse. A store was kept here until 1827, about which time it was sold to John Walter, and removed to Petersburg.

The village of Milford Station, on the northern edge of Black Township, dates from the construction of the railroad in 1871. A small store was opened about that time by a Mr. Long. It has always been a shipping point for lumber and railroad ties. One of the principal industries of Black Township is at the Bare Rock quarries of the Somerset Stone Company, about four miles east of Milford Station. A branch road connects the quarries with the Somerset and Cambria railroad. The company was incorporated in 1891. Its product is spit building stone. Steady employment is given to about one hundred men. The road to the quarries is of a very steep grade, and a terrible accident happened on it April 24, 1893. A locomotive in charge of Engineer Jacob Neff was bringing several carloads of stone to the station. A number of Italian laborers were on the cars. John E. Pile, wife and daughter, had seats in the cab of the engine, and also Russell Neff, a son of the engineer. The train became unmanageable and ran down the steep grade at a terrific speed until near the station, where it jumped the track. In the wreck that followed, Mr. Pile, his wife and daughter, were crushed to death. The boy Neff was so badly scaled that he died the following night. Several of the laborers were scaled to death. Mr. Neff, the engineer, and a number of the laborers were severely injured.

The Somerset Coal Company operated a mine at Wilson Creek. There is also a mine operated at the mining village of Moro, and one other near by. These mines date back to 1902.

The prosperous borough of Rockwood is situated at the junction of Coxe's Creek with the Casselman River. The Pittsburgh division of the Baltimore & Ohio railroad passes through the town, which is also the southern terminus of the Somerset & Cambria branch of that road. The country is about entirely underlain by the lower productive coal measures.

The town is laid out on a part of a tract of 405 ¼ acres of land that was warranted to Moses Rambeau, November 25, 1773. As Rambeau's name appears on the assessment list for 1776, he must certainly have lived on the tract, but perhaps not within that part of it that is the site of the town. There was no survey before 1785, when it was made to John Shoaff, in right of Moses Rambeau. Shoaff, who acquired Rambeau's rights, appears to have been the central figure of this locality all his life. He and his neighbors carried their grain on packhorses to Hagerstown, Maryland; to have it ground into flour. The mill was of small capacity and each had to wait his turn. On one occasion Shoaff and those with him had to wait six weeks before his turn came. Tradition says one of his sisters was made captive by the Indians and remained with them for twelve years. He operated a still in an old log house near the town that up to within a few years was, and may still be standing. Shoaff died in 1816.

A bridge was built across the river in 1816. Seven hundred dollars was raised by subscription, and the county paid the remainder. This bridge was rebuilt in 1843. From the time of the building of the first bridge the locality has been known as Shoaff's bridge, and this was the first name of Rockwood. In 1856 Philip Wolfersberger became owner of the land about Shoaff's bridge, and in 1857 laid out a town, giving it the name of Mineral Point, on account of the minerals abounding in its vicinity. The place, however, was more generally known by its first name. Martin L. Meyers, of Stony Creek, was the surveyor. The first house was built near the bridge in 1856, by Philip and David Wolfesberger and used by them as a store and a dwelling. The first blacksmith was Solomon Bechtel. Benjamin De Haven, a shoemaker, certainly built a house in 1857 or '58. John Poister built a house near the bridge in 1860 that was used as a hotel for a number of years. The post office was established in 1868, under the name of Shoaff's Bridge. Franklin B. Long was the first postmaster.

Aside from this, the town had little or no growth, until the completion of the railroad in 1871, when Mineral Point at once became a scene of bustle and activity. Houses began to be built, stores were opened, and the town has had a steady growth from that day to this. A necessity for a change of name both of town and post office, soon became apparent, that of the post office, because it no longer represented anything but a bridge. There being already a Mineral Point post office in the state, the town could not take that name. After prolonged discussion, it was decided to name the town after about the only thing then in sight—rocks and woods—hence the name, Rockwood. The woods have about disappeared. The rocks still remain. A tannery was established by Henry Weimer in 1869. A Growall & Sons built a planing mill in 1872. A boiler explosion, in this mill in 1900, killed Frank Growall, a son of one of the Proprietors.

Edward H. Werner, of Somerset, installed an electric light plant in 1895. A dam was built across the river and furnished the power. This plant has been superseded by a better one. A fine two-story brick schoolhouse was built in 1905. The town has a good newspaper, *The Leader*, founded in 1905. There are four churches, an Odd Fellows' Lodge, four hotels, one of which the Rockwood House, has been successfully conducted by David H. Wolfersberger for upwards of thirty-five years, without the sale of liquor. The First national Bank of Rockwood was organized in 1900 with a capital of $25,000. Its deposits were $150,000. Since the completion of the railroad the town has always been trading point for a large scope of territory, in 1906 it had twenty-nine stores. Rockwood was incorporated as a borough in 1885. Philip Smith was the first burgess. Succeeding burgesses have been: Philip Smith, Chauncey Forward, Henry Weimer, S. Haines, C. W., Beck, two terms; M. H. Hartzell, S. A. Haines, Albert G. Will, W. E. Baker, E. L. Milliron, d. S. Devere

BOYNTON

The first warrant for land in this area is dated October 5, 1777 to Wilcox and Chew. Another patent, dated 1812, to Joseph Lichty, was in the form of a grant from the Commonwealth. Some time later John Lichty and Jonas Lichty both secured land for farming. Then in 1854 Douglas Boyd purchased the John Lichty farm consisting of 296 acres of land. In 1880 Jonathan Boynton, William Dill, James E. Watson, and Andrew H. Dill purchased timber and located a large steam sawmill near the old sugar camp on the Boyd farm. The first gristmill was built about 1808 by one named Griffith. It was located near the northwest portion of the new cement bridge.

Some lots were sold and fifteen or twenty houses were built of which about six of the original ones are still occupied. The town was named for Jonathan Boynton in the year 1884. He was the largest shareholder in the sawmill and later he sold out to Dill and Watson.

Around this time Dr. William Collins built a draw kiln on the Flog Hill farm and burnt in it the first lime used for fertilizing purposes in the area. Hopes were really high between the years of 1890-92 when some citizens of the township formed a company of which Samuel P. Maust was president and drilled a test well for oil in the meadow of the Frank Livengood farm. The well was drilled to a depth of 2,500 feet when the tools were dropped to the bottom and could not be recovered, thus making the well a failure. Sand bearing some oil was struck at the depth of 1,870 feet, a second sand bearing oil was struck at 1,960 feet and at 1,150 feet two four-foot veins of good coal.

Some time prior to the year of 1895 three Maust brothers; Harvey, Frank, and Aaron started a planning mill. The location of the mill has been the site of several industries through the years. A machine shop was erected for the building of traction engines. This business proved to be very successful for quite some time. A power plant was then built supplying both Boynton and Salisbury with electricity and a powerhouse for the streetcar that ran between Garrett and Salisbury. A large brick building was built for the purpose of making threshing machines. This building for years was known as the 20th Century Building during the First World War, John Wagner built mining cars and had a lumber mill in this building. The Barron Brothers from Somerset had a furniture factory here for a short time. This same building was then purchased by Jess Cramblett and was used as a garage and a storage place for carnival equipment. In 1951 the Champion Pipe Products Co. moved into this same building and employed about thirty employees.

The Champion Pipe Products Company began operation on August 1951, in the enlarged 20th Century building at Boynton. Since its beginning, the number of machines in use has tripled in number and three trucks are needed to transport the products of this plant. The old light and power building was purchased and a new fireproof structure was added for the purpose of storing finished products.

It is not certain what year the first school house was started but it was known as the red school house and still stands today. The teacher was John Lichty. Jonas Lichty then donated land and a new school was built on the farm now owned by Ralph Moser and was closed in 1919.

A four-room building was then built but in 1938 was found obsolete and a new four room brick one was erected and is now used by the jointure.

A consolidated coal company operating a large mine built a store for their employees here. Though it has changed hands many times, this same store is still in operation. This building has been used as a Post Office for many years. George S. Young was the first post master.

In 1899, a group of people began construction of the first church in Boynton. It was of Dunkard faith and services were held in it for a short time but it was never completed. Some time later the citizens of the town gave donations and built and interdenominational church, known as the Church on the Hill. This church is still in use. In 1921 a Mr. Tedrow started the first Pentecostal Church and in 1941 it was organized as the Assembly of God. The present pastor is Rev. McDaniel with a membership of 18. The Church of God was organized on November 14, 1925 by Rev. H. W. Poteat.

Over the years Boynton has seen many disasters. Floods hindered the town so many times that in 1935 a stone dyke was built where the Big Piney Run flows into the Casselman. In 1954 Hurricane Hazel sent high waters into the town again, flooding many homes and claiming one life, George Hillegas, who lost his life after having to evacuate his home. This made it necessary for another much higher flood control dyke. This project was completed in 1955. During World War II ninety-three men were called to the service. Three were killed in action; Hubert Baker, Donald Tressler and Leroy Hotchkiss. Eight homes have been completely destroyed by fire, two of these being burned together in the year 1958. They were two of the original fifteen homes built.

BROTHERS VALLEY TOWNSHIP

The court of Bedford County created Brothers Valley Township during its first session, April 16, 1771, and was the first township formed west of the crest of the Allegheny Mountain in the province or state of Pennsylvania.

Brothers Valley Township, when formed, was larger than any of Pennsylvania's present counties. It included all of the region lying between the crests of the Allegheny Mountain on the east and the Laurel Hill Mountain on the west, from the mason and Dixon Line on the south to the divide between the waters of the Susquehanna and the Allegheny River on the north. This divide was known as the Old Purchase line or the Old Huntington County Line.

Brueders Thal is German, meaning Brothers' Valley, given earlier to the area by the Indians, who called it the Valley of the Brothers.

Some of the first settlers of Brothers Valley were George Dibert (1739), Christian Blough, Frederick Cefar, Simon Hay, John Glassner, Valentine Lout, Henry Rhodes, Abraham Cable, Michael Cefar, Jacob Rhodes, Gabriel Rhodes, Philip Wagerline, George Countryman, and Frederick Altfather.

Philip Wagerline arrived from Germany in 1768 and docked at Philadelphia. He made his way up the old route that is now U. S. 30. He cleared some land and built a log cabin for his family in the township of Brothers Valley in Bedford County. The original cabin was built on the farm of John O. Stoner.

In 1771, while riding along the countryside, Harmon Husband approached the plume of smoke that arose from the clearing near the headwaters of the Stony Creek River. Husband was hailed in broken English with, "Welcome, broder, where you come?" Husband replied, "From Hagerstown." Said the settler, "Come along, you be hungry, you be tired."

This was the welcome of Harmon Husband to the Stony Creek Glades by Philip Wagerline and his family in the late evening of June 5,1771. After a night's rest under Wagerline's roof, Husband explained during a breakfast of venison, boiled rye, and boiled potatoes that he was looking for a man named Isaac Cox. In turn, Philip informed Husband that his nearest neighbors were five or six miles away.

The Wagerline farm came into being when Philip Wagerline, Sr., took a patent for a land which was situated in Brothers Valley Township. This tract of land was called the "Pyramid" in the Buffalo Creek in the county of Bedford. This took place on October 5, 1789, and the land included 155 ½ acres. On the same date, Philip Wagerline, Jr., obtained a tract of land called "Doves Harbour" in the Buffalo Creek in Brothers Valley Township. This land contained 289 ¾ acres. The three sheepskin patents are were in the possession of Paul E. Pritts, who received them from the original family of Philip, Fred, and John Wagerline.

John Wagerline built a cabin and barn in 1809. In 1824, a log springhouse and a weaving mill were built for the purpose of making the Wagerline coverlets. This building now stands in fine condition.

The farm cemetery is located at the West End of the Paul E. Pritts farm along the township road. There are nine Wagerlines buried there, and the cemetery has been well maintained with sawed locust posts and 1 ½-inch galvanized pipes for a permanent fence.

In the 1830's and the 1840's, Charles Stoner built a foundry in Berlin. He made the first wood- and coal-burning stoves in this area. The coke that was used in the foundry was made on the Philip Wagerline, Jr.'s farm, now owned by John O. Stoner. It was called the Coke Oven Woods. This is where they opened a mine and hauled the coal out with a wheelbarrow that was made into coke. Mr. Chancey Long hauled the coke to Berlin by horse and wagon for the Stoner foundry.

The construction of the Buffalo Valley railroad in 1874 was an enterprise undertaken by the citizens of Berlin and Brothers Valley Township. The road connects with the Pittsburgh division of the Baltimore & Ohio railroad at Garrett. Its length is eight and a quarter miles. The contractors, Yutzy & Scott completed its grading within eighty days from the time of commencement.

Brothers Valley Township is rich in mineral resources, yet while the construction of this short line of railroad brought them in touch with the outside world, their development has been rather slow, or was so up to 1902. So far as has been ascertained, the first mining in a commercial way began about 1875, when the Berlin mines were opened by Thomas Price, and the Standard or Adams mine about 1876. That neither these nor any other mines were operated very extensively may easily be seen from an examination of the figures of the several census reports since the completion of the railroad. From 1870 to 1880, the township gained but fifty-seven in population; from 1880 to 1890 the gain was only fifty. These figures alone would go to a show that during this period the mining industry was so small a factor in the growth of Brothers Valley Township that it barely sufficed to keep pace with the losses sustained by emigration. The decade between 1890 and 1900 makes a better showing. More mines were put in operation, either by individuals or by small companies that did not have sufficient capital for very extensive operations, but still the township made a gain of 227 in its population, showing that the dawn for a more extensive development had come. The real advance has been made since 1900.

Berlin always has been the real business center of Brothers Valley Township. There are, however, other points that are central in a smaller way. Of these, Pine Hill has always been considered as a good business location, but it has never grown to be a village of more than eight or ten houses. Lewis A. Turner kept a store here fully fifty years ago. A post office was established about 1857, known as Turner's Store, until 1874, when the name was changed to Pine Hill. Judge Turner was the first post-master. The place is somewhat off the railroad, which militates against much greater growth.

Hay's Mill is a scattered hamlet in the southwest corner of the township. Long before 1800, Simon Hay, one of the tow pioneers of that family in Somerset County, built a gristmill here. It is on the old Cumberland Road, over which there always was much travel in early days. Thomas Short, an Irish stonemason, built the mill for Mr. Hay. A carding and fulling mill were also built here by Mr. Hay, and about these mills a small collection of houses has been built.

Jacob Glessner laid out a town called East Liberty, about one mile east of Berlin. The exact time we are not able to give, but it must have been nearly a hundred years ago. The attempt to start a town at this place proved a failure, as only a few houses were ever built in it. The place has become known by the somewhat euphonious name of Hinkelstadt, or Chickentown.

Beachdale is a railroad station on the Berlin branch road. It consists of a store and a couple of dwellings, but there has been a post office there since 1891, or perhaps earlier.

Althouse is a small mining village at the Althouse mines. Its post office was established about 1901.

McDonaldton is a new town near the old Altfather mill that promises to be of considerable importance. It was laid out on a rather large scale by the William K. Niver Coal Company in 1902. There are 484 lots in the plat of the town as it is recorded. One of the principal mines of the company is within the limits of the town. The Niver extension branch of the Baltimore & Ohio railroad also passed through the town.

COAL RUN

Coal Run is a mining village on the old Samuel C. Lichty farm. From its start it grew along with the mines that were opened along the Grassy Run. It was made a post office in 1894 with Samuel R. Hare as postmaster. The post office was later discontinued due to rural free delivery.

At one time it was approximately four times its present size. Many of the people then lived in company houses, which are almost all gone now. There were probably four or five stores there. One of the most popular of these stores was that of K. K. Malcolm who died May 19, 1913.

CONFLUENCE

Colonel George Washington and a small party were sent to the junction of the Youghiogheny and the Casselman Rivers to survey the area. He was probably the first white man in the area. After looking the district over, he decided that it would be a good place for a fort to be established.

An Indian guide told him to notice the way the three bodies of water, the Youghiogheny, the Casselman, and the Laurel Hill Creek joined together to form the shape of a turkey foot. Thus the name of the area probably originated in this manner. General Braddock, however, referred to it as the "Crows-Foot". The name of Turkeyfoot remains today as the name of the valley, and two of the townships there: Upper Turkeyfoot Township and Lower Turkeyfoot Township.

Washington and his Indian guide arrived at "Turkeyfoot" October 20, 1754, and remained here over night. In his diary he speaks of it as a suitable place for a fort. It is a well-authenticated fact that it was also the site of an Indian village. At the organization of Somerset County in 1793, Turkeyfoot Township embraced fully one-sixth of the entire county.

Confluence is located in the southwestern part of Pennsylvania approximately twenty-six miles southwest of Somerset. It is situated in the extreme southwestern part of Somerset County, at the confluence of the Casselman River, Laurel Hill Creek, and the Youghiogheny River. It is located between the Laurel Hill Mountain, elevation of 1,300 feet, on the west and the Negro Mountain on the east.

Confluence takes its name from its location, which is at the junction of three streams – the Youghiogheny, Casselman and Laurel Hill Creek. It is the historic Turkeyfoot of the county's early history.

This area owes its historic growth to its location in the Appalachian coal region. The use of coal as the primary fuel of American industries sustained the county's economic growth until the middle 1940's. Immediately following World War II, other fuels began to supplant coal and the population began to decline.

A temperate climate prevails in the area providing warm summers and cold winters. During the course of the year, normal daily temperatures in this area range from the high teens (Fahrenheit) in the winter months to highs of 70 and 80 degrees (Fahrenheit) in the summer months. This produces an average annual temperature of about 40 degrees Fahrenheit. The last killing frost in the spring is about May 24 and the first killing frost in the fall is about September 21. The average rainfall is near 45 inches, with precipitation highest in the spring and summer season. Winter snowfall provides a considerable amount of moisture.

Fertile soils, moderate mineral deposits, and excellent timber acreage were responsible for the early economic development of this area. This development of the bituminous coal fields, the expansion of the mining industry in the region, and the construction and development of railroads and housing for district residents, were contributing factors to economic progress during the latter part of the nineteenth century and the early part of the twentieth century.

During the early part of the nineteenth century, Confluence was a growing, prosperous town, and its commerce was constantly increasing in extent and importance. It was the largest shipping point on the Pittsburgh division of the Baltimore & Ohio Railroad, between Cumberland, Maryland, and Connellsville, Pennsylvania. Its situation at the confluence of three important streams rendered it the natural outlet for the business of a wide extent of country. A great deal of timber was brought down the river to this point whence it was shipped by rail to various markets.

James Spencer, one of the earliest settlers in the Turkeyfoot, first surveyed the townsite of confluence between the North Fork (Laurel Hill) and the Casselman River. Spencer eventually sold this site to William Tissue about 1798. The smaller part of the town, between the Casselman and Youghiogheny Rivers, was the farm of Henry Abrahams (Abrams), who so far as documentary goes to show was the first settler in this region, although James Spencer can at most be only a year or two later.

William Tissue, who owned the Spencer tract, platted the town of New Boston thereon in 1800. His charter to the prospective purchasers of lots, which is on record, indicates that he proposed selling the lots at public sale. A "Coal Bank" on the West Side of the North Fork was granted to the use of the inhabitants. The charter was not placed on record until 1815. It is not known that Tissue never sold any lots, and it may be looked upon as being a paper town.

In 1869 A. Newlon Tissue, the then owner, sold 103 acres to Peter Meyers, from whom it passed to the Confluence Land company, who laid out the town of Confluence in 1870. A large number of the lots were sold at public sale, others at private sale. Hon. William H. Koontz and Cyrus Meyers were the attorneys of the Land Company, and as such signed the deed for all the lots sold, Mr. Koontz alone signing them after the death of Mr. Meyers. Andrew Bowlin built the first house in the new town. Van Horn & Liston opened the first store in 1870. A . G. Black established an extensive pottery in 1872. Another early industry was a tannery, operated by Joseph Cummins. The town had a healthy growth from the start, and soon became an important shipping point. It is also the northern terminus of the Oakland & Confluence railroad. It was incorporated as a borough in 1873.

The greatest industry that the town has ever had, and the one that has contributed most to its prosperity, is the tannery, established in 1894, by T. G. Beggs, of Woburn, Massachusetts, and W. S. Cobb, of Malden, Massachusetts. The cost of this tannery and its equipment was $50,000. It had a daily output of four hundred cowhides, and employed to a large number of men.

A fine electric light plant, owned by the municipality, was completed July 29, 1904. The capacity was 1,200 incandescent lights, besides the arc light needed for street lighting. The municipal officers who carried the installation of this plant to a successful conclusion were Earl Beggs, burgess: D. H. Brown, Elisha S. Bowlin, George E. Cunningham, William Heinbaugh, Thomas Flannigan, J. M. Dodds and Rovill M. Fike, town council. In 1905 a private corporation installed a good system of water works. The town had twenty-nine stores and business houses, and four hotels. There are also three churches, a large five-room schoolhouse, and a public hall with a seating capacity of 600. The First national Bank of Confluence, was incorporated in 1900, with a capital of $25,000. It has loans of $125,000, and deposits of $120,000. The first burgess of Confluence was D. W. Patton; his successors have been: G. G. Groff, Daniel Mickey, two terms; J. E. McNut, Daniel Mickey, four terms; Simon Groff, two terms; A. R. Humbert, W. R. Mountain, A. R. Humbert, two terms; R. R. Sanner, J. A. Bradley, J. w. Brown, three terms; M. Henry, A. N. Atchell, Earl R. Beggs, Ross Bowman.

ELK LICK TOWNSHIP

Elk Lick Township, the fifth township in order of formation, was formed by the Bedford County Court out of the southern part of Brothers Valley, about 1785. The exact time cannot be told on account of defective records. Neither of its ancient boundaries known. After the formation of Greenville Township, in 1811, its eastern and western boundaries were the summits of the Allegheny and Negro Mountains. Its northern boundary was Flaugherty Run, and the Casselman River, from the mouth of Flaugherty to the present Black Township line. The formation of Summit Township, in 1842, reduced its area. The township line was so changed about 1895 as to add the Peck School district of Addison to Elk Lick

Township. In connection with the early boundaries of the township, the reader is referred to Greenville Township.

The names of the first settlers have been given in the history of the first settlements. Well supported tradition says that a small grist mill of the tub-mill pattern was built by William Tissue, on Tub Mil Run, somewhere between its mouth and the Cox farm, about the close of the Revolutionary War. One of the millstones may still be seen on the Beachy farm. The stream must take its name from this early mill. The old Hochstetler mill was built by Ebenezer Griffith, probably before 1790. It stood until 1868, when it was rebuilt by Samuel Compton. Livengood's mill, now abandoned, was built by John Fike about 1800. Engle's mill was built by Clement Engle in 1807. As early as 1802, and perhaps even earlier, there was a gristmill on Laurel Run, in the southwest corner of the township, owned by Adam Weaver. Christian Forney built a fulling and carding mill at Livengood's mill in 1813. Jacob Livengood was the last to operate it. It was, for its day, a well-equipped mill. Thomas McCloskey built the fulling mill that was the last to operate on the upper waters of Tub Mill Run. David Sweitzer built a mill of this kind in 1854, on a small stream that empties into the river a short distance above the Moser Bridge. In 1812 there were not less than eighteen stills operated in Elk Lick Township. All of them have been abandoned many years ago, and there is not one in the township.

In 1799 the Yost Zook farm (the old Jacob Lichty farm), had eighty acres of cleared land, the Casselman River is the West Salisbury Bridge at Livengood's mill, built by John Ming, contractor, in 1836, stood sixty-six years without the county having to expend any money in its repair more than once. Such bridges are no longer built.

The barn of Joseph Fike was struck by lightning and burned on August 14, 1844, as was also the barn of Jacob Keim, near St. Paul's church, August 20, 1853. Peter Beachey, the ancestor of the well-known Beachey family, was found dead.

Probably the greatest industry the township ever had, aside from coal mining, was the Standard Extract works, built in West Salisbury, in 1888. The plant cost upwards of $60,000. Their business was the extraction of certain properties from chestnut wood that is used in tanning. It was a thoroughly equipped plant for its business, and gave employment to a large number of men, both in the works and the cutting and hauling number of men, both in the works and in cutting and hauling the chestnut timber used. The works were destroyed by fire in 1892, and were never rebuilt.

Boynton, on the old Douglas Boyd farm, dates from 1880, when Dill Watson & Co. located a large steam saw mill near the old sugar camp of this farm. Some lots were sold, and fifteen or twenty houses were built. The mill had long since been abandoned, but the town is there to stay. The Maust Lumber Company has a sawmill, but it is not the large plant that the first one was. A plant for the manufacture of traction engines has been operated in the village by a company of local capitalists, of which Harvey Maust is president. A post office, store, church and schoolhouse are in the village. The post office was established in 1884, with George s. Young as the first postmaster.

Coal Run is a mining village on the old Samuel C. Lichty farm, and grew up with the mines that were opened along Grassy Run. It was made a post office in 1894, with Samuel R. Hare as postmaster. In 1880 a post office was established at Savage, with Solomon Harshberger as postmaster. The post office at Tub (now known as Springs) was established about the same time. Keim post office was also established at St. Paul's church, but with Rural free delivery, it has been discontinued. The Coal Run post office has also been discontinued for the same reason.

A test will for oil was drilled to a depth of about 2,500 feet in the meadow of the Frank Livengood farm, near Boynton. The tools dropped to the bottom and could not be recovered. Necessarily this made the well a failure. Samuel P. Maust, the president of the company, which was composed of citizens of the township, made a report of this venture in which he said that sand bearing some oil was struck at a depth of 1,870 feet. A second sand also bearing a small quantity of oil was struck at a depth of 1,960 feet. At 1,150 feet two four-foot veins of good coal, with eight feet of rock, were passed through. The mountain limestone was found at 1,500 feet. We cannot give the exact time, but it was about 1892. In 1890, the

Standard Oil Company laid a pipeline through the township. It may be said that this pipeline passes through the entire tier of southern townships, on its way to the seaboard. It skirts Mason and Dixon's Line, keeping a uniform distance of about two rods to the north. A second line was laid In 1904.

The town of Salisbury was founded April 15, 1796, by Joseph Markley, on a part of tract of land known as "John's Fancy." This tract was surveyed to John Markley, father of Joseph Markley, and was the first farm in Elk Lick Township that was settled on as Markley platted the town, there were 56 quarter-acre lots, laid out in a somewhat singular manner. His main street is now Ord Street. On the south side of the street are four blocks of ten lots each; four lots of each block front on the street, and four on the rear. If they front on anything, it is on an alley that was never opened. On the north side is a single tier of sixteen lots, in blocks of four lots. These extend back eight rods to an alley 28 feet wide, that he calls Middle Alley. According to the deeds, Markley sold fifteen of the lots, in 1798, at the uniform price of three pounds per lot, without regard to their situation. Two lots belonging to the Simpkins were sold for three pounds, seven shillings and six pence. Although the town has grown to have a thousand inhabitants, twenty-four of the original fifty-six lots have never been built on. An examination of all the Markley deeds on record shows that the highest price he received for any one lot was ten dollars. This was for the present Jere J. Livengood lot. The Markley plan provided for three streets extending north and south. These are now known as Gay and Grant Streets, and Smith Avenue. It is said that the road from Berlin to the Maryland line was not then located, and that Markley, not knowing where this would be, provided these streets to meet the road on any route that might be chosen. The road entered the town on market (now Grant) Street, and became the main thoroughfare. Peter Shirer built the first house on lot No. 32, on the corner of Grant and Ord Streets, where Michael Hay afterwards built the brick house. Mathias Markley built on the old Brewer lot; Adam Glotfelty on lot No. 33 (Silas A. Wagner, present owner), and Martin Weimer, Jr., on the Simpkins lot. All of them were built from 1798 to 1801. The Brewer and Martin Weimer houses were also taverns at one time.

LOWER TURKEYFOOT TOWNSHIP

When Turkeyfoot Township was divided in 1848, the southern part took the name of lower Turkeyfoot. It is the central part of what in the early history of the county was known as the Turkeyfoot. It is the central part of what in the early history of the county was known as the Turkeyfoot region. Its early history has already been dealt with elsewhere. The township is separated from Addison Township by the Casselman River. The flourishing boroughs of Confluence and Ursina are within its limits. The other villages are Draketown, Harnedsville and the new town of Humbert.

Draketown is situated about two and a half miles north of Confluence, and grew up about a grist mill that Oliver Drake, a pioneer settler, had built on the waters of Drake's run, about the close of the Revolutionary War. This mill was rebuilt by his son, Jonathan Drake, in 1812. It was destroyed by fire a few years later, and rebuilt in 1819. From Drake the mill passed to Thomas Ream, who was killed by a falling tree. A fulling and carding mill was also built here by Jonathan Drake at a very early period. About 1815 it was operated by John McCartney. These were the first industrial establishments in the township. The only other one the village ever had was a tannery established in 1854 by Hendrickson and Welsh. The Jersey church, the first Baptist church west of the Allegheny Mountains, is less than two miles west of the village.

Harnedsville, in the southern part of the township, was laid out by Samuel Harned about 1847. Its location is in a beautiful valley and near the point where the first Jersey settlers are supposed to have crossed the river as they entered what to them was "the promised land." The original plat of the town shows that fifty-three lots were laid out, of which about twenty-five up to the present time have been built on. The village nurseries, which lie just outside of the town, were first started by Harrison H. Kemp in 1857. Under the management of his sons, who were brought up in the business from childhood, they have gown to be of considerable importance. Over sixty acres of land are set out and are stocked with upward of a million and a half of all sorts of trees.

At Kutztown, a small village near Ursina, the house of a man named Lytle was destroyed by fire march 20, 1902, and two children were burned to death.

The site of Ursina is a farm that was improved by Andrew Ream, one of the first Jersey settlers. Arrows and spearheads and other evidences of Indian occupation are found here to this day. There is also evidence that a stockade for defense against the Indians was built on this farm.

The town was laid out in 1868 by Hon. William J. Baer. The surveyor was R. J. Botzer, a civil engineer. Its name is a derivative of the word "bear" in Latin. The town is located in the narrow valley of the Laurel Hill Creek, about tow miles above its junction with Casselman River. The town was platted on both sides of the stream, and on the original plat there are 1,464 lots and out-lots—enough for a fair-sized city. The town, however, never attained the size its projector had hoped for, although while the railroad was building and for several years thereafter the town grow quite rapidly.

The first house was built in 1868 by Ephraim S. Kregar as a hotel, known as the Sycamore House. The first store was also built and opened in 1868 by Isaac A. Jenkins. An extensive foundry was also built by Alexander Stutzman and Noah G. Keim, but was only operated a few years. A gristmill was built in 1871, and the same year a stave factory was put in operation by Norman B. Lichtiler; this was afterward converted into a keg or barrel factory. A railroad was built along the north Fork in 1872 for the purpose of reaching coal lands along that stream, but the enterprise was abandoned and the track torn up. It was rebuilt in 1902 and a second attempt is being made to develop this coalfield, which lies partly in Upper and party in Lower Turkeyfoot Townships.

A two-story brick schoolhouse was built in 1872 at a cost of $7,000, which at that time was probably the best in the county. The place has a thriving Odd Fellows' Lodge and a Grand Army Post. There are also two churches and one hotel.

The present residence of Noah Scott, in the northern out-skirts of the borough, was the scene of the famous battle between Major Alexander Hanna and five of the McClintock boys, which took place at a mustering in 1828. Major Hanna was a man of prodigious strength. His assailants, all-powerful men, but knowing they could not cope with him single-handed, all attacked him at the same time. During the fight John McClintock cut Hanna across the abdomen with a knife. With his bowels protruding so that he had to hold them in with one hand, he still beat off his five assailants until rescued by his friends, and eventually recovered from his injuries. Some of the McClintocks were arrested and imprisoned, while others fled the country.

Ursina was incorporated as a borough in 1872. The first burgess elected was Abraham S. Levy. His successors have been A. S. levy, M. L. Keim, w. H. Berger, William Shaw, S. Bockman, B. F. Boyd, a. Hilliday (three terms), b. F. Boyd, J. B. Jennings, P. H. Sellers, William Shaw, J. B. Jennings, c. F. Robinson, Andrew Holliday, J. B. Jennings (two terms), M. Andrew, J. B. Jennings, G. w. Anderson, J. B. Jennings (two terms), M. King, J. M. Marshall, J. B. Levy, B. F. Firestone, H. B. Altfather, C. Cunningham.

MIDDLE CREEK

Middle Creek Township was created in 1853 from a part of Milford Township. The township takes its name from the stream of the same name, which in its turn seems to owe its appellation to the circumstance that its course is near the middle of Milford Township as it first existed. Coal, limestone and iron ore are known to abound in the township, but thus far there has been no development of them other than for local use. The clay or mud pike, at one time a highway of considerable importance, passes through the township.

Among the early settlers in this township were Casper Harbaugh and Andrew Putnam, who settled on adjoining farms in the northeastern part about 1790. Elijah Lyons and Daniel Moore were also early settlers. It is claimed that Philip King Built the first grist and saw mills on Middle Creek, in this Township, not long after the close of the Revolutionary War. John Kooser built a gristmill in 1806, on the same site now occupied by Barron's mill. Peter Kooser began operating a carding mill in 1808. A woolen mill was established at a later day and rebuilt by Jacob Baker in 1876.

The village of New Lexington, in the southeastern part of the township, was platted by David Tedrow, September 14, 1824. The site of the town is on the lands that were surveyed to James Wells and Richard Brown, in 1792, and included Brown's camp. The lands were patented to John Wells. After several transfers the title became vested in Michael Tedrow, who was probably the father of David Tedrow, in 1808. The first store in the village was opened by Elias Stahl, about 1840, who sold it to Henry F. Schell about 1854. Horace Ludington established a tannery about 1844, which he sold to Jacob R. McMillan in 1847, who operated it for more than thirty years, when he turned it over to his sons. The first physician to locate in the village was Dr. Harmer D. Moore.

MILFORD TOWNSHIP

Milford, the fourth township of what is now Somerset County, is supposed to have been formed by the Bedford County Court out of a part of Turkeyfoot Township, about 1780, but neither the exact time or its original boundaries are known. It must, however, have included in addition to its present limits all those parts of Somerset and Jefferson Townships that lie south of the old Glades Road, or the pike, and also the present townships of Middle Creek and Black. Even after Middle Creek Township had been detached in 1853. Milford was still a large township. But with the division of the township in 1886, when Black Township was created, it has lost its place as a large township both in area and population. But, while it has been greatly reduced in size, it still retains most of the fine farms for which the township has always been noted. Milford was settled almost as early as the present township of Somerset. In fact, it was considered as being a part of that settlement.

Among the early settlers of Milford township were John Weimer, who lived on the Peter Putnam farm as early as 1772, Francis Phillippi, John Chorpening, Casper Pile, ------Wable, Frederick Weimer, John Dull, Michael Walter, Adam Flicke and Adam Hoove, all of whom were here before 1782. The first blacksmith in the township was a man named Kitzmiller, whose shop was on the John Weimer (Putnam) farm.

Prior to the construction of the railroad, the village of Gebhartsburg and the adjacent borough of New Centreville were the business center of Milford Township, even before its final division. The village takes its name from George Gebhart, a blacksmith, who opened his shop here and was the pioneer settler; later he kept a tavern in a log house on the east side of the single street of the village. In 1822 he built a brick tavern on the opposite side of the street, which is still standing. The brick were from the first kiln ever burnt in the township. Gebhart's post office, the first in Milford Township, was established in 1808. John and George Gebhart were the first postmasters. John Webster was postmaster in 1832. In 1834, Gebhart laid out a few lots. The first house on any of these lots was built by Henry Walter, which has since been used as a store and dwelling. A cheese factory was built in 1877 by Charles A. Walter.

This village of New Centreville was laid out by Michael Frease, in 1834, John Witt of Somerset being the surveyor. John Frease built the first house, known in later years as the McMillan property. Michael Frease built a hotel in 1836, and Francis Phillippi erected the first store in 1835. Michael Frease, the founder, was a blacksmith and operated the only shop in the town for many years. Josiah Miller established a tannery in 1843, which he and his son William operated for more than forty-five years, after which it was abandoned. Dr. William S. Harrah was the first physician, located here in 1847. A log school house with slab seats was built within the town as early as 1800, with henry Weimer as its first teacher. There are three church edifices, two of which (the Lutheran and Reformed) are among the finest in the county. The town owed much of its early prosperity to the fact that its location was on the clay or mud pike, which was laid out about the same time that the town was.

New Centreville was incorporated as a borough March 6, 1854. Its first burgess was Aaron Will, Esq., his successors are as follows: Aaron Will, Isaac Philippi, Wm. S. Harrah, Isaac Miller—William Flick (tie), William Flick, Samuel H. Dull (two terms), William Scott, William M. Schrock, Isaac Miller, William Scott, Michael Frease, Daniel Dull, F. B. Long, Jesse C. Sweitzer, isaac Miller, John Stahl, Josiah Miller, Jacob Sipe, Josiah Miller, John Stahl, George Brant, W. H. Gardner, Aaron Miller, George Knepper, Daniel W. Will, Josiah Miller, Jacob Sipe, Aaron Will, W. H. Walter, Aaron Will, D. W. Will,

W. H. Gardner, W. W. McMillan, R. McMillan, William Flick, D. W. Will, R. McMillan, John H. Hay, Peter Pile, S. P. Tedrow, J. W. Hanna, John H. Benford, H. S. Boucher.

SOMERSET BOROUGH

Somerset Borough is the county seat of Somerset County. Its position, as determined by the Coast and Geodetic Survey in 1902, is 40 degrees .02 minutes north latitude and 79 degrees .05 minutes west of Greenwich. The magnetic declination is 4 degrees 36 minutes west.

The town as we now know it was laid out by Adam Schneider and Peter Ankeny, September 12, 1795. Josiah Espey was the surveyor. The town, however, was laid out on the site of an older town, that, when mentioned at all, is spoken of as Brunerstown. Its real name was Milfordtown. This older town was laid out by Woolerick Bruner and Peter Ankeny. Parts of three different surveys appear to be within the limits of the present town. Peter Ankeny owned all that part of the town on the south side of Main Street, and from Rosina Street west he owned it on both sides. Bruner owned the land on the north side of Main Street as far west as West Street, and probably also the north corner of the present borough, he having purchased from Harmon Husband. Woolerick Bruner had purchased from George Bruner his rights in the survey of 300 acres warranted to George Bruner (probably his brother), that lay on both sides of what is now Main Street, of Somerset Borough, and the same had been patented to him. That part of it on the south side he sold to Jonathan Buck. In 1787, Woolerick Bruner entered into an agreement with Adam Snyder for the sale of such part of this land that he still owned.

It will be noted that the agreement makes explicit reference to a town, which Bruner laid out some years before, and that he excepts from the sale of the land the second lot on the plan. Bruner nowhere gives any name to this town which he says he had laid out. The agreement sets forth that Harmon Husband is yet to make Bruner the deed for the hundred acres bought from him when he received his patent. Husband having executed the deed to Snyder as called for, and it is recorded on page 270, book C, deed records of Bedford County. Filed in the prothonotary's office of Somerset County is a plat of lots, marked "A Plan of Milford Town, by Harmon Husband." There are 144 lots and 36 block. Two streets are marked No and So Streets (North and South), and two others E and W Streets. There are twelve-foot alleys running east and west, one on each side of Main Street. There is no date on this plat. But that it is the plat of the town laid out by Woolerick Bruner cannot well be doubted. Harmon Husband, whose name is on it, was a surveyor and simply wrote his name on it as having made the plat. Bruner, in the agreement, gives no name for the town. It is true that the place came to be known as Brunerstown. This can easily be explained. When it became known that Bruner had laid out a town the people naturally spoke of it as the town Bruner had laid out, or Bruner's Town. In many instances they probably did not know what name had really been given the place, and so the name given by the people prevailed. There are other towns in the county that got their names in the same way. The town now known as Summit Mills was laid out by "Axie" Yoder and given the name of Mechanicsburg, but one may still find old people in the south of the county who will readily tell where "Yotter Sthettle" is. Many people know Salisbury as Shirertown.

But to return to the plat. There are a few names written on some of the lots and a great many have a circle marked on them; whether this means that they were sold we do not know. If Bruner sold any of the lots himself we find no record of them in the recorder's office of Somerset County. Such deeds would have been recorded in Bedford County. We do find deeds on record for lots, which Adam Schneider sold in the town of Milford, and one or more that Peter Ankeny sold in the same town.

When the site of Somerset was replatted in 1795, it was done differently from the plan of Milfordtown. On the east side it was extended from Spring alley; to Pleasant Street on the west side it was extended from Water Alley to Rosina Street. The width of the lots was widened two feet and their length was increased eight feet, the alleys being taken out and wide streets laid out instead. All of the lots on both sides of Main Street between Spring and Water Alleys have the same numbers on the plan of 1795 that they had on the plan of Milfordtown, but on all others they are numbered differently, besides the other changes noted.

In 1793 Adam Schneider sold lot No. 6, on the north side of Main Street, in the town of Milford, to Peter Ankeny. The house of James B. Holderbaum is now partly on the south end of this lot. In 1794, he sold lot No. 9 in the town of Milford to James Smith, and lots 101 and 103 to John Armstrong. In the same year he sold lot No. 108 in the town of Milford to Peter Bowers. The deed describes the lot as being on the north side of Main Street and as having a depth of 256 feet to an alley. In 1795 Peter Bower sells this same lot No. 108 to Jacob Schneider, but instead of the town of Milford the deed says it is in the town of Somerset, but in describing the lot it gives the same description as that given in the deed from Adam Schneider, "being on the north side of Main Street and extending back 256 feet to an alley." There are no lots on Main Street that extends to an alley, because there is no alley on the north side. They extend back to Union Street. This lot can be traced from 1795 to the present time. It fronts on the Diamond, and the Somerset Trust Company's building is on the north end.

It is equally clear that Peter Ankeny was a partner in the laying out of the town of Milford, just as he was in laying out the town of Somerset on September 12, 1795. In January, 1795, he sold a lot of ground in the town of Milford to George Tedrow, the deed reciting that Abraham Miller's tanyard joins it on the east side. Abraham Miller's tanyard was the same as the old Cunningham tanyard at the corner of Main Street and Water Alley, where the house of David F. Brallier now is. We here have what seems to the writer to be conclusive evidence that the name of the town first laid out on the site of Somerset was Milford, which afterward was known to most of the people as Bruner's Town, that it was laid out about 1784 or 1785.

The second lot on the plat, which Bruner had reserved for himself was the same lot on which the main part of the Hotel Arlington and the Commercial Hotel now are. Mrs. Susan Ferner was a daughter of Abraham Good and was reared on a farm within two miles of Somerset. She once informed David Husband that when she first remembered of having gone to Brunerstown there were but four cabins there. These were Armstrong's, Rickard's, Snyder's and Weimer's. These must have been the first dwellers in the place. While near by, Peter Ankeny did not live in the town. Mrs. Ferner's recollection could easily have been as far back as 1791 or 1792.

Here is the proper place to refer to the laying out of the lots fronting on West main Street and West of Rosina Street. Adam Schneider's land did not extend any further than Rosina Street. Peter Ankeny alone laid out that part. The original plan of this part is lost, but it is known that Ankeny took up the numbers of the lots where those on the joint plan ended. The lot on the northwest corner of Main and Rosina Streets, where J. C. Lowry now lives, is No. 193. The lots were laid out in regular order on the north side of the street until No. 224 was reached. This is eight lots beyond Franklin Street, the present borough line, and near the house of George H. Tayman. The pike is then crossed and the south side of the street is laid out until the Herr lot, on the southwest corner of Main and Rosina Streets, the number of which is 254. The Herr lots, and probably the two below, are only half lots, as Ankeny's land then did not extend quite back to where Patriot Street now is. This also accounts for Patriot Street being only thirty-three feet wide for a distance of several hundred feet. The distance from Rosina Street to Franklin Street is about 1,8000 feet. In laying out these lots Mr. Ankeny did not provide for a single cross street, there being nothing but a sixteen and a half foot alley between the squares—an unwise act on his part that will cause much future trouble and expense.

While the exact time is not know when this part was platted, it is supposed to have been done at the same time that the remaining part of the town was laid out. Ankeny certainly sold lots in it before 1800. As nearly as can be ascertained, the town contained perhaps fifteen or twenty houses late in 1795. In a journal of a missionary tour made to the west in 1797, Rev. Heckwelder, speaking of his return, says: "And several miles farther on we breakfasted at Snyder's Inn, Somerset. New town, two years old, on a dry, elevated situation; twenty or thirty houses, mostly two story."

We are not able to say whether there was a post office at Milford or Brunerstown or not before its name was changed to Somerset, nor when a post office was first established here. Josiah Espy was appointed postmaster of Somerset October 1, 1797, which is the first appointment of record. It is known that James Clark was postmaster in 1807, and continued as such until about 1820. In 1819 he advertised 131 unclaimed letters, many of them living as far away as Salisbury and Draketown. It cost anywhere from six cents to a dollar for postage in those days, which is probably the reason so many were not lifted. Captain John B. Webster became postmaster about 1820.

After being made the county seat, Somerset for some years had a fairly rapid growth. In the fall of 1807 there were 61 houses and cabins, and 87 in 1820. Somerset was incorporated as a borough by an act of assembly passed March 5, 1804, under the name of "the Burgesses and Town Council of the Borough of Somerset."

SOMERSET TOWNSHIP

Somerset Township was formed in 1796, out of parts of Milford and Quemahoning Townships, the part north of the old Glades Road (The Pikes) being taken from Quemahoning. When first organized it contained 250 taxables, about thirty of whom lived in the town of Somerset.

There were in the township at that time three gristmills—Christian Ankeny's, Frederick Mostoller's and Henry Shaffer's; three sawmills, two stores and four taverns, exclusive of those in the town of Somerset. Almost from the start it was the most populous township in the county. Even after Jefferson Township was taken from it in 1847, and Lincoln Township in 1890, it still maintained its lead until 1900, when it was distance by Paint Township. This, however, was due to the abnormal growth of Paint, owing to the coal developments there. Now that the two boroughs of Paint and Windber have been created, it has probably again regained the lead it has always had.

The early history of the township has already been related in the account given of the Cox's Creek Glades, or the Somerset settlement. From the beginning most of its people were devoted to agriculture. There were, of course, the usual number of artisans to be found in every community, and except along the Somerset & Cambria railroad it is still a community of farmers. Along the railroad, while it cannot be said that there has been any diminution of the farming interest, the greater number of the people are engaged in the mining of coal. A large part of the township consists of good farming land, and it contains many fine farms in a high state of cultivation. But the southeastern part of the township, lying between Cox's Creek and the crest of the ridge, is one of the roughest and most broken sections that can be found anywhere in Somerset County. So thickly is the surface covered with rocks in some parts, one may walk over many acres without his feet once touching the earth.

One of the wildest and most picturesque spots in Somerset County is the locality known as Break Neck, about a mile and a half southeast of Somerset. A stranger, after passing over the beautiful country to the north, south or west of Somerset, and seeing the many beautiful farms that dot the landscape, stands amazed at the view which on all sides meets his gaze within a half hour's walk of the town of Somerset. Here are great ledges of rocks, high precipices and immense boulders of all sizes and shapes piled upon each other, making it a scene of wild beauty and grandeur. The Kimberly Run, a stream sparkling in the brightness, breaks its way through the ridge here, and flowing down the narrow valley near the base of Break Neck, tumbles over the no less famed "stepping stones" before mingling its waters with those of the larger stream of which it is a tributary.

Break Neck is not without its stories and legends. From one of which it derives its name. The old Cumberland Road, long since abandoned, passed near by. As the story runs, belated traveler passing over the road was overtaken by night, in the dense darkness of which his horse wandered from the road, and, plunging over one of these precipices, both rider and horse fell to death at its bottom. Found after some days, the body of the unfortunate traveler was interred on the spot where death overtook him.

In 1875, the large and well-stocked barn of Philip H. Walker, about a mile and a half north of Lavansville, was consumed by fire. The fire was at night and the horse and cattle in it were burned to death. A man named William H. Miller was arrested on the charge of having set the barn on fire, was tried, convicted and sent to the penitentiary, where he served his tem of imprisonment. He returned and remained about the neighborhood for several years. On a Saturday night, date not remembered, Mr. Walker was alarmed by some one trying to enter his house through the front door, which was locked. Armed with a revolver, Mr. Walker was in the hall when the front door was violently forced opened. As it fell to the floor, he fired on the intruders, who ran away, one of them being a very tall man. There was no further disturbance, nor was any investigation made, but in the morning William H. Miller was found lying dead in the yard, Mr. Walker's shot having taken effect. At the inquest Mr. Walker was exonerated from all blame.

In 1877, the barn of Harrison Gohn was burned down at night. Seven horses and thirty head of cattle perished in this fire. A man living in the neighborhood was charged with the burning, but on trial was acquitted.

Some time about 1835 Isaac Husband put in operation a paper mill about two miles south of Somerset, but after a few years the business was abandoned. The mill was in a large stone house, which was afterward converted into a dwelling. Some time ago, when it was unoccupied, it was set on fire and destroyed. In 1880 a young man named William Terrell, from Orange County, Virginia, died in it from smallpox, Somerset borough having made a pesthouse out of it.

The Ankeny gristmill was a large log structure, built by Christian Ankeny, one mile south of Somerset. After passing through a number of owners it became the property of Conrad G. Lint, who equipped it with steam power. About 1876 it was destroyed by fire. Near the mill Mr. Ankeny built a fulling mill. In time a woolen factory was connected with this fulling mill. In 1842 the property passed into the ownership of John F. Kantner, who from 1836 until that time had operated the woolen factory at Kantner, near Stoyestown. His son, John H. Kantner, succeeded him and was in turn succeeded by his sons. The Kantners successfully operated this woolen factory until 1905, when they sold it to Cook, Emert & Co., of Somerset. The new owners have enlarged the plant to twice its capacity when they bought it, and it promises to be the most important plant of the kind in the county.

Lavansville is on the turnpike, four miles west of Somerset. The first building where the village now is was a hotel, built by John Tantlinger in 1803. About 1812 David Lavan, who was a blacksmith, built a dwelling and a shop. Mr. Lavan, becoming owner of a tract of land, laid out a part of it in lots, giving the place the name of Lavansville. It is not definitely known when he laid out the town. It is also said that a Mr. Ross, who owned some land here, laid out a part of it in lots several years after Mr. Lavan had laid out his land. About 1830 Isaac Friedline and Frederick Neff opened a store here. Samuel Walker kept a store here for some years after 1850. David Lavan began keeping a tavern in 1835. His tavern ranked among the best along the road, and he did a prosperous business while the travel remained on the turnpike. This tavern was at one time the relay house for the stage lines. A tannery was established by James McVicker in 1850. While the travel continued on the turnpike Lavansville was by no means a dull town, but with the decadence of the road it lost much of its bustle and activity.

Listie is situated on the Somerset & Cambria railroad, five miles northeast of Somerset and near the Listie mines. The place was never regularly laid out, but has grown up since the opening of the Listie mines in 1893. There is a hotel, post-office and four or five stores in what is known as Listie, which, of course, includes the miners' houses near the mines.

Friedens is in "the Chewink Corner," about six miles northeast of Somerset. A Lutheran church had been built here long before 1800, and a few houses were built near it. As nearly as can be ascertained, Gabriel Walker laid out the town as it now is. It did not have a post office until 1864, when Harrison Casebeer was appointed postmaster. The first stores were kept by Eli Heiple and Josiah.

SUMMIT TOWNSHIP

Summit Township was formed in 1843 from parts of Brothers Valley and Elk Lick Townships. Its present area is somewhat larger than when it was first formed, a small part of Elk Lick having been taken in by a change of the township line about 1884. Some of the finest farming lands in the county may be found in this township, but there is also a good amount of poor mountain land to be found, as the township extends from the summit of the Allegheny to that of the Negro Mountain. The township is rich in coal; except the rider over the great Pittsburgh seam, every bed in the coal measures underlies at least a part of it.

The township was settled nearly as early as the rest of this part of Somerset County. Its early history, however, has already been given in another chapter. Up to the time of the completion of the railroad, in 1871, the people were mostly devoted to agriculture. As soon as the Salisbury and Berlin branches of the railroad were constructed, in 1876 and 1874, the work of developing the mineral resources of the township began in good earnest. Mines were opened and villages sprang up along the railroads, and the township became a scene of busy industry and its population has much more than doubled. The village of Summit Mills was laid out in 1830 by Joseph J. Yoder, the famous ax-maker. Only seventeen lots are on the original plat. John Will, of Somerset, was the surveyor. Near by were a gristmill and a woolen mill owned and operated by William Miller. The only other industry was Yoder's blacksmith shop. The founder bestowed the named of Mechanicsburg on his new town, but it soon became known as "Yottersthettle." When the post office was established it took the name of Summit Mills, by which name it is now known.

The first store was kept by McCleary & Arkley in 1844. Andrew Arkely was the first post-master. The store and post office later on passed to Ephraim Miller. Mr. Miller, and after him his son, U. M. Miller, carried on the business here for upward of fifty years. In April, 1839, a company was formed among the farmers and others of Summit and Elk Lick Townships for the purpose of boring for salt water. From the old books, shown the writer by the late Ephraim Miller, there appears to have been $2,150 worth of stock subscribed. Joel B. Miller, of Elk Lick Township, was president of the company. A well was drilled in thee bottomland of Elk Lick run to a depth of nearly 700 feet, but proved a failure so far as obtaining salt water was concerned. There is a flow of water from the well that, so far was our information goes, has continued to flow ever since. The water is impregnated with minerals of some sort and is not fit for domestic use. It is not known that any analysis was ever made to determine its properties. This well may be said to have been the cause of great loss to a number of persons long years after it was first drilled. One Dr. W. J. Radcliffe and William D. Humbert undertook to build a large hotel here as a summer resort, to be exploited on the strength of the virtues of the mineral water flowing from this well. Much of the money they expended was borrowed, with other persons as surety. But they were never able to complete their undertaking. They themselves were ruined financially, as were a number of their friends, and the hopes of the village to become a summer resort went glimmering. The time that this occurred was about 1873.

Joseph J. Yoder, or "Axie Yoder," as he was more generally known, was in many respects a remarkable man. He was of Amish parentage and also a member of that church all of his life. He was born about 1790 on the farm on which Yoder Station now is. Having learned the blacksmith trade, he thoroughly mastered the art of tempering steel. An expert workman, he was able to make edged tools, such as were in use in those days, equal to the best that could be procured anywhere. But his special work was the making of axes. So good was the product of his smithy that it became famous, not only in Somerset County, but in the neighboring counties of Pennsylvania and Maryland. His books show that up to 1857, when he was compelled to quit work on account of failing eyesight, he himself made 4,550 axes. Off and on he had a dozen of apprentices. After they were able to forge an ax he gave it the final tempering. Some of these apprentices, ever after they had gone elsewhere and set up shops of their own, were in the habit of taking their axes to him to temper. In all he tempered 7,805 axes for his apprentices. The highest number (2,200) were tempered for Michael Koontz. All his axes had his name and number stamped on them. It is to be remembered that all this work was done by hand, in a country blacksmith shop, and most of it while he was still a comparatively young man. He had inherited some property from his father's estate, and may be looked upon as having been fairly well off for those days. Believing that gold and silver must exist among our mountain, he spent much time and about all he had in a vain search for these metals, but not for buried money, as some of the legendary stories about him have it. Although reared in the primitive days of the county, and of a good German-speaking family, he had a fair English education and was an intelligent man and far in advance of his day and generation. He was something of a chemist and had a tolerably well equipped laboratory. Naturally this was kept under lock and key, and his researches were prosecuted in seclusion. This is what gave rise to the legends that became current among the more ignorant of his neighbors that he dealt in the black art and had entered into a league with the evil one. In 1816 Mr. Yoder spent a year in Philadelphia, learning the art of watch making and repairing. On his return he brought with him a quantity of fancy goods, which he sold and peddled over the county. An old account book shows that he sold good ton credit to 132 persons living in Somerset Township, all of which accounts were paid save two. These, living somewhat out of the way, were never asked to pay. This is certainly a tribute to the integrity of our ancestors. He invented a nail-feeding machine that probably revolutionized that business. But, being of a confiding nature, he exhibited the working of his machine to several nail-makers at Pittsburgh, and when he came to take out his patent found himself forestalled. Such is a brief sketch of a man who, notwithstanding his plain garb, so far as his education and natural abilities were concerned, was a superior man, of more than ordinary intelligence. Mr. Yoder died in Conemaugh Township in 1863.

The little village of Romania, on the Salisbury railroad, near the Shaw mines, was laid out by Peter Meyers some years in advance of the building of the railroad.

The mining village of Keystone, in which there are perhaps fifty houses, is about one mile further up the river, where the first mine was opened, and dates back to 1872.

Berkley is a small hamlet about four miles north of Meyersdale. John Berkley built a fulling mill here before 1820. Jacob Berkley built a gristmill about 1821, and about it grew up a little village of a dozen dwellings, which took its name from the owners of the mills. There has been a post office here for probably sixty years, and most of the time a store. The most notable event in the history of the town was the burning of the grist and woolen mills about 1868. The gristmill was rebuilt, but the other was not.

The site of Meyersdale Borough is on land that was originally included in the surveys of Andrew Burntrager, John Olinger and John Berger, or Burger. The Burntrager survey lies on the north side of the Flaugherty run, the Berger survey on the south side of it, while the Olinger survey lies between the Burntrager survey and the river. It will thus be seen that the Flaugherty run divides the town into two parts, which are known as the north and south sides. According to David Husband, the run takes its name from an early hunter who had his camp somewhere along it. The same authority says that the run had the earlier name of Wolf Creek, or run, and, further, that there were land surveys which described the lands covered by them as lying on wolf Creek, and that afterward there were other surveys of the same lands as being on the waters of Flaugherty run.

When lawsuits were finally brought to settle the conflicting claims, no one then living in the vicinity had ever known or heard of any other name for the stream than Flaugherty run, and the second survey stood. Of these three, Olinger was already settled here in 1779. He is assessed with two horses and two cow, or, rather, cattle. There is no acreage given of his land, and the word "concealed" is written after his name. Burntrager and Berger were certainly on the ground in 1782. In 1784, there were in Burntrager's family five persons, in Berger's six and in Olinger's family seven person. About 1785 Burntrager sold his improvement, or land, to Jacob Meyers, Sr., of Lebanon County. John Berger sold his farm to Abraham Beachley in 1814. The Olinger farm remained in the hands of his descendants up to 1870. Of the other two families we know of no descendants living in Somerset County.

The first house in what is now Meyersdale was built by Andrew Burntrager. While we do not know its exact site, it was somewhere near the old gristmill, which itself is very near the Olinger line, as the mill is mentioned here. The very earliest traditions are that the first mill in this vicinity was built on the south side of the Flaugherty run and some distance above the present mill; that a stranger had come into the settlement about 1777 or 1778 and offered to build a mill if given the site, which being granted, he took a race out on the south side at a place where he got a fall of about three feet and built a tub mill. This is the Husband tradition. It would look more reasonable to suppose that the mill would have been on the north side of the stream, and the word south in the account we have may be an error. Another tradition is that Adam Cook built the original mill near where the present one is. There is abundant evidence that a man of that name was somewhere in Brothers Valley Township in 1779, but while he has not been located on any land near the town, he could easily have built this mill long before 1800, but it is probable that he did so for Burntrager, or perhaps for Jacob Meyers.

Jacob Meyers, the elder, never lived in Somerset County, but the Meyers family traditions are that his son, Jacob Meyers, Jr., built the gristmill, a sawmill and later a fulling mill and a distillery about 1803. This gristmill was destroyed by fire in 1827 and was rebuilt by Peter Meyers. While the mill was being rebuilt Jacob Meyers was drowned while assisting in bringing a load of lumber to the mill. It is said that a sudden storm of wind and rain, or, rather, a cloudburst, came up and Mr. Meyers was engulfed in its flood.

It is said that John Berger was a blacksmith and worked at his trade, being the first one in the town. As he owned the farm on the south side, it is to be presumed that his shop was on the same side of Flaugherty. It has already been stated that he was here in 1782. It is very probable that the blacksmith shop that used to be near the German Baptist church, in which Gillian C. Lint worked for many years, was the successor of the Berger shop. A tanyard was started by Daniel Beachley on the south side of Flaughtery run in 1825. It stood between the old Salisbury road and the run. William Beachley succeeded his father and operated it until 1870. The last owner was Michael Hady. Peter and William Meyers started a tannery on the north side, probably about 1840.

After Jacob Meyers became owner of the Burntrager property the locality began to be known as Meyers' Mills. There were a few houses built in an irregular manner about the mill. in 1831 Peter and William Meyers opened a store in a large building that fronted on the present Diamond, somewhere near where the present Hocking brick house now stands. A part of the house was used as a dwelling. The Meyers family carried on this store until 1871, when it was sold to C. H. Baugher. Peter and William Meyers inherited a large amount of real and other property from their father's estate. While both the brothers lived they kept all their property interests in common. These included the mills, tanyard and one or more farms and the store, each drawing therefrom what he needed to live on. Peter was the business man, while William, being by natural inclination more of a farmer, gave more attention to that part of their interests.

This continued until the death of William Meyers in 1853. By his will, among other things, William Meyers made known his wish that their property should be appraised and divided between his brother Peter and his own estate in the ratio of seven dollars to Peter and five dollars to his estate, although their interests were equal. It is said that William Meyers was moved to have such a division of their joint property made for the reason that his brother Peter had much the larger family of the two to provide for. Peter Meyers, who died in 1870, was in his day one of the most active and influential business men of this part of Somerset County, and always took a leading part in every movement tending to the welfare of the community. Besides his interests in his home community, he was one of the founders of the town of Confluence. A zealous worker in the interests of the Pittsburgh & Connellsville railroad, of which he was for many years a director, it has always been a matter of regret to the writer that neither he nor his relative, William M. Beachley, who also fell a victim to an epidemic of typhoid fever which then prevailed, lived to witness its completion.

In 1844 Jacob Olinger laid out that part of his land nearest the Meyers property, or "the mills," into lots, Alexander Philson, of Berlin, being his surveyor. Mr. Olinger gave the name of Fairfield to the town as he laid it out. In 1852 he appears to have laid out additional lots. On a wall map of Somerset County, published by Edward L. Walker in 1858, there appears a plan of Fairfield that was probably furnished by Mr. Olinger. This plan shows sixty-five lots. While Mr. Olinger gave the name of Fairfield to his town, the older name of Meyers' Mills could not be displaced.

The first house in the new town (of Fairfield) was built by Godfrey Bittner in 1845. It stood where the Hartly store now is. The first store was in the building on the corner of Main and Center Streets, that in our time is known as "the Old Salamander," because of its having escaped so many fires that destroyed other properties around it. Conrad M. Hicks and Alexander Stutzman kept a store here about 1847. Gabriel Miller, and after him his brother, Manasseh D. Miller, and Gabriel D. Lichty, about that time, was also the post master of Meyers' Mills. It may be added here that there was a post office at Meyers's Mills as early as 1830, of which Peter Meyers was the post-master.

The first house used as a hotel was built by James Maguire in 1848. This house was occupied as a dwelling by the late Dr. U. M. Beachley for many years. Jacob Welfley, of Salisbury, established a branch pottery here in 1846. Only the common red eathenware was made. It stood near where the Metthodist church now is. A large house owned by Daniel Suter stood on the opposite side of the street on the lot where the Hotel Klare now is, or perhaps on the lot below, in 1846. Mr. Suter was a cabinetmaker and used a large room on the first floor in which to display his furniture, living on the second floor. This house burned down about 1849, and was probably the first fire that the town had. What is now known as the

Hotel Klare was built in 1855 by or for the estate of William Meyers. As first built it was one of the best buildings for the hotel purposes in Somerset County, and was known as the Dale House. Walter W. Gaither was the first landlord. Barnet Picking kept the house in 1856. At different times lawyers have located here. James B. Gaither, of Somerset, was the first, in 1870, remaining four or five years.

The old Olinger farm consisted of two hundred and sixty acres. In 1869, the early completion of the railroad being about as certain as such a thing well can be, the Olinger heirs laid out the most off the farm into lots, Kenneth McLeod, a civil engineer employed on the railroad, doing the work for them. The Olinger heirs gave their plat of lots the name of Coaldale, thereby adding another to the many names this town has had. This name will be found in the deeds for the first lots sold. About the same time Peter Meyers laid out a part of his land into lots. Meyers Avenue, Second Avenue, Large, Keystone and other streets are included in this plan. In 1870 Daniel Beachley had his farm (the old Berger farm), on the south side of the Flaugherty, laid out into lots, by James B. Gaither as surveyor.

It was now that steps were taken to incorporate the town into a borough. But here so many conflicting interests clashed with each other that much troubled grew out of the matter. This was primarily due to differences between the Beachley and Meyers families. Among other things there was trouble over the name that the new borough should have. The Meyers interests were not willing to agree that their name should be eliminated. They claimed that their name had been identified with the locality for seventy years, the first forty of which were before any one ever seems to have suggested any other. The Beachley interests would not have it so, the Olinger interests, as now remembered, siding with them. In the end they prevailed and the town was incorporated in 1871 under the name of Dale City Borough. D. A. Brubaker was the first burgess of the borough under that name. The Meyers interests remained on the outside. Cyrus Meyers was a member of the board of director of the railroad company, and when the road was completed his influence prevailed with the company to give the name of Meyers' Mills to the railroad station. This, along with the same name for the post office, gave him two points in the game. There was a great deal of bad feeling over the matter and the people of the town necessarily were split into two parties.

The town, notwithstanding these troubles, entered upon a career of growth and prosperity. The Meyers interests were quite willing to come into the borough, but not under the name of Dale City. In the meanwhile, having gained adherents within the borough, they renewed their efforts in the matter of changing the name of the town. The matter finally got into court, and after several years of litigation a compromise was reached, under which it was agree that the name of the town should be Meyersdale, and that the names of the post office and railroad station should be changed to correspond. This was late in 1874. It is probable that at this day there are but few who will question the wisdom of this compromise.

Dr. Wilson C. Hicks, a dentist, became postmaster of Meyers' Mills about 1872 and retained the office until his death, February 21, 1885. So rapidly did the business of the post office grow that it had already become a presidential office. Dr. Hicks' successors in the post office have been Martin A. Rutter, appointed 1885; William H. Sufall, appointed 1889; William H. Hay, appointed 1893; and James F. Naugle, appointed 1897.

The first industries to come into the town after the new departure had been taken, that employed more or less labor, were the foundry and machine shop of Alexander M. Paul, about 1869, and the planing mill of Lorren Morrell, in 1870, which was more for the manufacture of furniture than anything else. Both this and the foundry were on the south side. The planing mill of John H. and Herman I. Friedline was built in 1873 at a cost of about $8,000. This mill, then owned by John H. Friedline alone, was destroyed by fire in September, 1882, and was rebuilt on a larger scale in the same year by Mr. Friedline and D. S. Cober. The Shultz planing mill, which was built in 1870, was also destroyed by fire in 1903, and was not rebuilt.

Another of the early industries, Black's Brick and Tile works, was one of the oldest of the larger industries at Meyersdale. In 1872 George J. Black came from Somerfield and embarked in the manufacture of all kinds of stoneware, continuing until 1885, when the business passed into the hands of Frank B. Black, who continued to make stoneware a few years and then installed machinery for the production of drain tile. He later added another important branch to his business, in the way of making a very superior building brick by means of the latest machinery. Misfortune came to him by fire in 1891, destroying all of his main buildings. He, however, rebuilt the plant, and about 1903 sold it to George Duncombe

As far back as 1894 Meyersdale had come to be a noted cigar manufacturing borough. Factory No. 470, of the twenty-third district of Pennsylvania, owned and operated by W. H. Floto & Brothers, was established there in 1889. In 1891 they were forced to build larger buildings, and two years later first occupied their own spacious two-story building at the head of Meyers Avenue. As an index of the volume of business transacted the following statement is appended, showing the output of cigars and "tobies" for a number of years: Total output, 1889, 657,000; 1890, 1,200,300; 1891, 1,324,000; 1892, 1,454,375; 1893,1,501,800; 1894, 1,520,800. The average annual product is greater than all other cigar factories in Somerset County, and their goods go to half the states in the Union. A steam gristmill was built by A. F. John, about 1883, on Main Street about the railroad. This was an up-to-date mill of large capacity. It was destroyed by fire after being in operation for several years. In 1887 the mill was rebuilt by the Deal Milling Company, who still operate it. It had a capacity of seventy-five barrels of flour per day.

In 1891 William S. Miller put in operation a plant for the manufacture of Cyclone dust conveyors for threshing machines, grain registers, and washing machines. It is one among the important industries of the town.

An electric light plant for street and commercial lighting was installed by Samuel D. Livengood, in the spring of 1892. This was the first enterprise of the kind in Somerset County. Mr. Livengood did this entirely with his own capital, and operated it for a number of years. The Sand Spring Water Compnay constructed its system of water works in 1888. Alonzo Chamberlain was the first president of the company. John S. Graves & Co. were the contractors who constructed the water works.

William Slicer and A. H. Glotfelty built an opera house in 1883, at the west end of Main Street. It had a floor space of something over two thousand square feet of floor space. It was the first public hall in the town with anything like a seating capacity. It is no longer in use as a hall. Some years after 1883 Mr. Glotfelty was accidently killed near this house, while a looker-on of the blasting of stumps by dynamite, having been struck by a flying fragment. A very fine opera house was built by George Donges on the west side of the Diamond in 1904. The Meyersdale Brewery went into business in 1901, with a capital of $50,000. An artificial ice plant is connected with it. A tubular lock factory was established in 1902, under the name of The Meyersdale Manufacturing Company. Its principal promoters were Levi Deal, H. G. Will and E. G. Boyles. It employed about twenty men. In 1905 the plant was destroyed by fire. It was rebuilt almost at once, but has not been in operation for some time. A commercial and business college was founded in 1903. It was placed under ways by citizens of the town.

Two annual meetings of the German Baptist Church have been held at Meyersdale. The first in 1873, the second in 1904. On both occasions the tabernacles were built in the Flaugherty bottom, below the old opera house. There was also such a gathering held at Summit Mills in 1859.

At one time Meyersdale had five good hotels and 67 stores, representing all lines of business. The first banking house was established in 1868, under the style of Philson, Black & Co. Samuel Philson, of Berlin, was the head of it. James S. Black, a member of the firm, was the manger. Mr. Black retired in 1882, and Samuel B. Philson became manger. The name of the bank was also about that time changed to that of the Citizens' Bank. This, however, may have been several years later. In 1901 the Citizens' Bank was changed to the Citizens' National Bank of Meyersdale, with a capital of $65,000. In 1905 its loans were $350,000, and its deposits $375,000. Samuel Philson was its first president. In 1875 this was succeeded by the First National Bank of Meyersdale, with a capital of $50,000. (Mr. Livengood acted as president until 1880, when its affairs were wound up.) The Second National Bank of Meyersdale was organized in 1901, with a capital of $65,000. C. W. Truxel is president, and E. M. Beachley is cashier. Its loans and deposits were about $275,000.

For several years more or less work has been done in the construction of sewers. While Meyersdale has not been visited by any such extensive conflagrations as the county seat, still it has been severely scorched on several occasions. The first was in 1873, when the building in which the Livengood and Olinger Bank and Hocking's store were was destroyed. In 1874 Hartley's store and building, Shipley's hardware store and building, the Welshons' property and the residence of Martin Sayler, were all destroyed, and possibly one or two other buildings, now forgotten. The stores were well stocked and the losses were heavy. In 1875 a fire started in the large store of C. H. Baugher, on Centre Street, near where the P. J. Cover hardware. The store was in a large frame building which, with the large stock of merchandise in it, was speedily licked up by the flames.

From the Baugher building the flames spread across the street to the residence of Gillian H. Walter, which, with the saddler shop, were also destroyed. Mr. Baugher had insurance on his property amounting to about $15,000. This money he received at Pittsburgh, and, placing it in a satchel, started home with it. On the train, as he stated, some person succeeded in stealing it from his seat. The money was never recovered. In 1902 the splendid Hotel Stein, owned by John Stein, fell a prey to the flames in an early morning blaze. The house was a three story brick building that stood on the old Miller lot on the north side of Main Street. Its tenants were Knapp and Kyle. The loss on the building was from $20,000 to $25,000, with insurance of about $15,000. On the furniture belongingg to the tenants there was an insurance of $7,000.

The time of the incorporation of the Borough, both under its first and second names, has already been given. Its burgesses have been: As Dale City: D. A. Brubacker, G. H. Walter, O. S. Porter, H. J. Blough. As Meyersdale: James B. Gaither, H. Eisfeller, John C. Hostetler (two terms), Dennis Murray, Martin H. Miller, Albert Graves, Jacob J. Holtsheue, J. A. Graves, P. Y. Kimmel, M. A. Rutter, K. Price, Ed. Beal, E. J. Hutson (two terms), Fred Groff, J. W. Bell, H. S. Dull, E. J. Hudson (four terms), W. H. Floto (two terms), A. E. Finegan, J. T. Shipley, J. C. Reed.

Garrett Borough, also in Summit Township, is four miles west of Meyersdale. The town was laid out in 1869, by John Jacob Schell, Isaac Hugus, John D. Roddy and George D. Wolf, on land that was at one time owned by Peter P. H. Walker. This was before the completion of the railroad. The town did not build up very rapidly for some years, but eventually became the southern terminus of the Berlin branch, and also the shipping point for the product of several steam sawmills. Several coal mines were also opened in its immediate vicinity, since which time the town has had a more rapid growth. A considerable part of the population were miners. They mostly owned their own homes.

The first house in the town was built by Moses Burkholder. The first store was opened by Franklin Enos and E. P. Younkin. The first hotel was kept by Joseph Ringer, in 1869. Dr. Prices was the first physician, locating there in 1881. Dr. Richard T. Pollard located here a few years later, and is still in practice. The first industries were a planing mill built by William B. Shaffer, in 1870, and a large steam sawmill that was put in operation in or near the town by Samuel Fox about the same time. These have long since been discontinued.

Esquire Samuel J. McKinzie, a well known citizen, was killed in 1892 while walking on the railroad track. Florian Husband was also killed, under similar circumstances, on August 30, 1903. Mr. Husband was a great-grandson of Harmon Husband, the pioneer of the Somerset settlement, and the last surviving male member of the family who continued to reside in Somerset County.

The only serious visitation by fire occurred in 1893, when a good hotel property and one or two other buildings were destroyed. During the night of April 19, 1904, the house of Jeremiah Meyers, who lived just outside of the borough, was burned. Mr. Meyers and a boarder named Sullivan were the only persons who escaped from the burning building. His wife, Mr. Rosa Meyers, three daughters and two grandchildren perished in the flames. At the time it was charged that the house was set on fire from the outside, but this has never been definitely settled. At the same time Garrett was the storm center of a bitter and prolonged strike on the part of the employees of the Somerset Coal Company, during the progress of which there was much violence, lawlessness and even bloodshed.

Garrett was looked upon as being one of the most prosperous towns of the county. At one time it had three hotels and nineteen stores. The First National Bank of Garret went into business in 1903, with a capital of $25,000. William A. Merrill was president, and H. B. Philson was cashier. Garrett was incorporated as a borough in 1900. Franklin Enos was the first burgess, his successors were L. A. Maust and A. J. McKinzie.

ST. PAUL

The village of St. Paul, in Elk Lick Township, is located two miles north of the Borough of Salisbury. It occupies a small portion of tract warranted July 7, 1785 to William Dwire, one of the earliest settlers whose name appears in the first tax list in the year 1771 (then Bedford County).

Being so near the Packers Trail, later Turkeyfoot road to Cumberland, which crossed the Casselman River at West Salisbury, it gave the settlers an outlet to eastern markets.

This advantage attracted the pioneer families looking for a homestead site on the frontier. The Dwire family had numerous neighbors nearby including Jacob Smith (1785), Peter Livengood (1785) Joseph Forney (1774), John Hendricks (1786), William Sinkler (1789), John Christner (1775), John griffith (1785) and others.

Christian Wilhelm and family came here form Maryland in 1789 and purchased the Smith tract consisting of 301 acres, adjoining the Dwire property. In 1830 Wilhelm purchased the Dwire tract consisting of 246 acres.

Peter, youngest son of Christian Wilhelm, born July 8, 1799, was baptized November 27, 1799 in the Salisbury Reformed Church.

A union church building was erected in 1859 at a cost of $535, "near Jacob Keim's", used jointly by the Mennonite, Lutheran and Reformed people. In this building St. Paul's Reformed congregation was organized October 26, 1860, by Rev. A. B. Koplin; and St. Paul's Evangelical Lutheran congregation was organized December 10, 1865 by Rev. John Forthman.

St. Paul's Reformed church was dedicated in October, 1869. It cost $14,000; of this the Wilhelm family contributed over $11,000.

For many years Keim post office was located here and the village went by that name. William Nicholson and Herman Lepley were the postmasters. After the post office was discontinued, the name St. Paul was adopted.

About 1887 a one-room school house was built in the village. Some of the first people to teach school in the building were William Nicholson, Leonard A. Maust, Charles Dickey, Dan Bauman, Maude Statler, and Mary McClintock. Later two rooms were added to the one room building and this building is still being used at the present time.

Herman Lepley, school teacher and printer, operated a store in which the Keim Post office was located from 1902 to 1911. A shoe shop was once located on the south-east corner of the church property; Josiah Engle, church sexton, later operated a store in the building. Other local merchants were John Zimmerman, W. W. Nicholson, Harvey Enjgle, Charles Engle, George Beal and Roy Sipple. John Bodes operated a barber shop in the village from 1921 until his death in 1959.

TURKEYFOOT TOWNSHIP (UPPER TURKEYFOOT)

Turkeyfoot Township was formed by the Bedford County court out of a part of Brothers Valley Township at its July sessions of 1773. Its original metes and bounds were described as follows: "Beginning where the Chestnut Ridge (the Negro Mountain) crosses the line dividing this province from Maryland, thence along the summit of the said Chestnut Ridge to where it crosses the Great road (Forbes), leading from Bedford to Fort Pitt; thence along the said road to where it crosses the Quemahoning creek; thence down the said creek to its junction with Stony Creek, to the mouth of Little Conemaugh; thence down

Conemaugh to where the lines dividing Bedford county from Westmoreland County crosses it; thence along said line to the provincial line; thence along the provincial line to the place of beginning."

This included all of the presents townships of Addison, Middle Creek, Milford, Somerset, Black Jefferson, Lincoln, Jenner, Conemaugh and nearly all of Quemahoning Township, as well as the southwest corner of Cambria county. By the creation of these townships it was in time reduced to the present limits of Upper and Lower Turkeyfoot Townships. The Casselman River forms the southeastern boundary of Upper Turkeyfoot Township, which extends in a southwest direction to the summit of Laurel Hill. The Laurel Hill Creek flows through the middle of the township.

Among the early settlers in the township were John Cunningham, a native of Ireland; Frederick Weimer, John Weimer, Jacob Younkin, Frederick Younkin, Henry Whipkey and Henry Grove. Some of these were here as early as 1770. Peter Gary and James Knight settled here about 1800.

A number of early settlers were Irish, and from this circumstance we have the name of Paddytown, which is more a locality than a village. A post office has been here since about 1820, but under the name of Turkeyfoot. John K. McMillen is said to have been the first postmaster. David King was the postmaster in 1832. The first and probably the only tanyard in the township was operated here by John K. McMillen about 1820. The first grist mill in the township is supposed to have been built by Matthew Pinkerton, but we have no date. About 1840 it became notorious as the haunt of a gang of counterfeiters, some of whom were brought to justice.

Among other incidents in the history of the township was the drowning of four men in the Casselman River, near Fort Hill, some time about 1837. John Heinbaugh, Jacob Vought, John Case, and two others named Baer and Lindeman were at a sale somewhere in the township. The men were all young, and remained at night to attend some gathering of the young people of the neighborhood. There was a deep snow on the ground, and the day being warm it melted very rapidly. The parties lived in Addison Township, and had crossed the river in the morning in a canoe. When they came to the river on the following morning, on their return home, they found it a raging flood. Some of their friends at the river attempted to dissuade them from attempting to cross the river when the water was so high, but they were strong and fearless, and made the attempt in their boat. When they were about three-fourths of the way across the boat was caught in an eddy, and the five men were thrown into the water. All of them were drowned except Lindeman, who was fortunate enough to reach the shore. The bodies of the unfortunate young men were recovered miles below, and buried on the Addison side of the river.

In 1855 a young man named Levi Wilkins, living on the famous Fort Hill farm, while attempting to cross the river on horseback from the Turkeyfoot side, after night, was swept from his horse and drowned. The horse, whose bridle had caught on a bush about a mile further down, was found in a starving condition some days afterwards, and the body of his rider was found still further down. A year later a Mrs. Bird and two children were drowned near the same place. When found the unfortunate woman had her babe clasped to her breast in death's embrace.

Kingwood is a small village of perhaps a dozen houses, that up to the time of the completion of the railroad along the river was the business center of the township, and in a certain sense it is so yet. The first dwelling house was built by Alexander W. Walter, in 1854. Two years later he erected a store building, and in time the village grew up around it. A. J. Shultz opened the first blacksmith shop about 1868. Jacob Kregar succeeded Mr. Walter in the store. The village has been a post town for about fifty years, and has two churches.

The village of Markleton is a small village on the railroad, seven miles west of Rockwood. It probably derives its name from the Markleton pulp works, which were established near by in 1880, and which promised to develop into a great industry, but was abandoned at the end of two years. This little village nestles between the hills in one of the most picturesque spots along the Baltimore & Ohio railroad. It owes its chief importance to a large sanitarium. This institution is probably the second largest building of any kind in Somerset County. It is thoroughly equipped for its intended purpose, and certainly is a place where invalid and seeker after health may find rest and quiet. This sanitarium has from its first opening, in

1890, enjoyed a high degree of prosperity. There is an electric light plant attached. This, on the night of November 21, 1903, was destroyed by a fire in which M. O'Brien, wife and child were burned to death.

Casselman Borough was laid out in 1869 by L. L. Wolfersberger and David J. Phillippi, who owned the site of the town. The town was platted on a large scale, there being 385 lots, besides twenty-eight large out-lots between the railroad and the river, intended for manufacturing sites. A public sale of lots was held, and a considerable number were disposed of, but the town has been very slow in building up. The first house was built by Levi L. Wolfersberger in 1869. The first store was opened by John R. Weimer in the same year. The town is a point from which considerable lumber, railroad ties, bark and charcoal are shipped. The land about it is also underlain with coal. A mine was opened four or five years ago, miners' houses were built, and it looked as though the town would at last take a start. But the work suddenly stopped. The present population is estimated at 200. Casselman was incorporated as a borough in 1891. Charles Barnes was the first burgess. His successors have been: H. H. Wilt, William D. Zufall, C. C. Wilmot, L. Lx. Weimer, Charles Barnes, J. C. Liphart, William D. Zufall.

VILLAGE OF SPRINGS

The village of Springs is located on Highway Route 417, about midway between Salisbury and Grantsville, and the boundary of two original large tracts of land of Peter Bitsche (now Beach) and George Folk.

Peter Bitsche was the pioneer immigrant in this general area who came from Switzerland to America in 1776 and sometime prior to 1785 settled on the farm now owned by Amos Yoder. The warrant for the survey of this tract was granted March 10, 1785 and the paten for this farm of 417 acres is dated April 25, 1788.

George Folk, also an immigrant from Switzerland, settled in this same area in 1788 or '89, whose tract of land bounds that of peter Bitsche on the east. Mr. Folk built his log house near where the present home of Mark Otto stands on the edge of the village, and is the ancestor of all the Folk kinship in this area.

The exact date when Mr. Folk settled here is not certain but his oldest son, Jacob, was bore here on December 6, 1790. George Folk was born on October 25, 1761 and died December 25, 1825 and is buried in the little family graveyard on the farm formerly owned by his great-grandson, Ellis Shoemaker.

At the time when these two families settled in this area, a heavy forest covered the entire region. The meadow and bottom land of the George Folk tract was a dense pine swamp with a heavy growth of white pine and hemlock, and is said to have been a favorite haunt of wildcats, bears and panthers.

George Folk is looked upon as the father of Springs. For twenty years his family and the Peter Bitsche family were the only ones living near the present site of the village. The first log school house, which was the first building to be erected in what is now Springs, was known as the Folk School and the first church, which was built in 1878, was known as the Folk meeting house.

With the building of several houses and a store, the village was in need of a name. An excellent spring with a sheltering chestnut tree became the suggestion for a name and the village became known as "Chestnut Spring".

This name was interrupted for some time by the name of Tub which was the official title of the postoffice, which was first located about a mile from the village, and when the postoffice was moved to the village in 1894, the name of Tub became the official title. The strange name for the first post office was derived from its location, which was in the shoemaker shop of Daniel J. Otto and near Tub Mill Run. This small stream received its name when a grist mill of the tub-mill type was built along its waters. This was taken from the construction of the wheel which consisted of an upright shaft with wings attached which was encircled by a tub into which the water rushed from a chute, striking these wings and putting the wheel in motion and the water being discharged through an opening in the side of the tub.

This name caused no small amount of agitation among the citizens who preferred to have their village named Chestnut Spring or Springs. In 1902 a petition to have the name changed was drawn up and circulated by S. S. Miller which the Post office Department granted and on January 1, 1903 the new name of "Springs" went into effect. For many years a sign over the spring read: "The water that makes Springs famous. It's free."

For many years there were no roads in this area but only mere trails through the weeds from one farm to another.

The famous Turkeyfoot Trail, which was opened as early as 1784, passed within on half mile of the present site of Springs. This trail crossed the Casselman River at West Salisbury and passed just south of the residence of Walter C. Otto and the Otto Brick and Tile Works.

There is some difference of opinion as to the exact location of the first building in Springs. This was a log school house and is generally thought to have stood in front of the Bittinger garage which is now owned by the keystone lime Co., and on the leading to Upper Springs.

Welfley in his history of Somerset County states that Benedict Miller built this log schoolhouse in 1836. Peggy Witt and Jack Griffith are known to have taught in this building and from all accounts, Griffith was a man who believed in imparting the three R's to the rising generation by vigorous applications of the rod. As the population of the community increased, the old school house was found to be too small and a new log schoolhouse was built and the old used for dwelling house.

The late Mrs. Elizabeth Shoemaker had given the following names of families who lived in this house: Jerry Hershberger, Sam Miller, Mort Moyer, John Gang, (a German cobbler) Reuben Fok, Fritz Kolb (Edwin Wolb's grandfather) Jonas Folk, William Hahn, Jeff Tressler and Henry Bachman. Some of these old-timers have left descendents among us, but others have entirely disappeared and their names are strange to us of the present generation.

The second log school house was built in 1884 as confirmed by an entry in Joel Miller's account book, a school direction at that time. The entry reads as follows: "June 29, 1884, credit to John Folk for hewing school house loges, 6 days @45c per day -- $2.70" Welfley's history of Somerset County also gives the same date of the erection of this building. The location of this second building was described by Mrs. Henry Bittinger, who remembered seeing both buildings, as being so close that only a four-horse load of hay could pass between them.

The late Mrs. Shoemaker had also given the following names of teachers who taught in this school from 1852 – 1862 when she went to school: John Hershberger, Henry Blauch, Daniel Beachy, Elizabeth Newman, George Graymiller, Samuel Miller, Jacob Swartzentruber and Samuel Glingerich.

For 32 years the two log school houses were the only buildings on the present site of Springs. In 1876 the Mennonites built the first church and it was known as the Folk meeting house. This building is now used by the church as a fellowship center for various activities of the church and community needs.

The first house was built in 1886 by Jonas Keim, located on the west side of the new church and was purchased by the church in 1958 for a parsonage. The second house was built in 1887 by Henry Blauch and stood just across the road from the Keim house. This was razed buy Jacob Swartzentruber in 1959 when he built the present brick house. In 1894 F. W. Bender built the house which is now occupied by his two daughters, Rhoda Bender and Mrs. Lucretia Maust.

The first store in Springs was opened by E. K. Blauch in about 1893 in a small room of his father's (Henry Blauch) home and in 1894 was moved into a small building on the south side of the Blauch residence. In 1895 the store business was discontinued. In the same year F. W. Bender in partnership with Eli M. Miller opened a store in a small (16x20) building under the title of F. W. Bender and Co. It was located in the front yard of the Bender residence. The two men had only $250.00 between them, but they borrowed another $250.00 with which to purchase stock. On the opening day the store took in 25c, but at the end of the week they had a rousing day with $5.00 in the money drawer. This was considered big money.

In the same year Mr. Bender purchased his partner's interest in the business, but in 1806 sold out to his brother, Charles and returned to the well-drilling in which business he was engaged prior to the store business. However, at the end of six months he brought back the store and disposed of his interests in the drilling business. The Bender store opened after the Blauch store discontinued business but after the opining of a new store, Blauch resumed the mercantile business for a while.

In 1881 the third school house was erected and used until 1899 when a fourth school house (two-story) was erected on the site of the present Cleman Folk residence. This building and lot were purchased by Mr. Folk in 1938, when the new brick school house was built along the highway, and the former building was razed and the lumber was used in the erection of the Folk home.

In 1899, Mr. Bender purchased the little red school house, which was built in 1881, and after remodeling it, moved his merchandise into the former school house which houses the present Springs Store. Today the original blackboard can be seen behind the shelves of the store.

Springs boasts of having the Post Office with the highest elevation in the State of Pennsylvania. The first Post Office in the Springs area was established on May 31, 1880 with Daniel J. Otto the first post master, named Tub and located in Mr. Otto's shoemaker shop. This building stood near the Lloyd Otto residence and Tub Mill Run from which the post office took its name.

The Post Office remained at this place until 1893 when Mr. Otto moved his shoemaker shop near the present Ray Maust residence. On April 5, 1894, E. K. Blauch became post master and the office was moved to the Blauch store. He served as post master until July 1, 1905 when John Folk became post master and the office was moved across the road to a small building, which housed only the Post Office.

On October 26, 1909, F. W. Bender became post master and the office was moved to the Bender Store and has remained there to the present date. On January 23, 1935, Florence Bittinger was appointed acting post mistress and on March 7, 1936 she received her commission as post mistress. On April 1, 1948, the post office was reclassified from fourth class to third class and again Florence Bittinger was appointed acting post mistress until August 1, 1949 when she received her commission as post mistress. On January 1, 1962, John Stangarone was appointed acting post master with the office remaining in the Springs Store. Miss Bittinger retired December 31, 1961.

The village of springs has three additions or suburbs, which lie within a one-mile radius of the village proper. The first was known as Upper Tub. The first settler in this area was G. D. Miller who in 1893 and '94 built a house and machine shop. In 1899, Daniel P. Miller and Henry Bittinger both built houses in the new area. During the next few years the upper village grew rapidly and in 1913, C. F. Killius opened a store with the name, Monte Vista (Mountain View) Store.

In 1902 D. D. Otto built a brick and tile plant about one mile from springs and like Upper Tub which was built in the general area of the machine shop, this has also become a general housing area. Twenty-two houses have been built since 1931.

In 1939, Ralph and Alton Miller established an implement business on the new highway just west of Springs which was the first building the that area. Fourteen new houses were built in this area in a 15-year period.

Springs was the first area in Somerset county to have a telephone system. It is quiet evident that G. D. Miller, with his skill and ability, was the first one to establish a telephone system with a few neighbors for their personal benefit.

In 1897, the Springs Mutual Telephone Co. was established and in 1900 the company had 70 miles of line in successful operation with offices at Tub, Savage, Niverton, Elk Lick, Keim and Summit

Mills in Somerset County, Pa., and at Grantsville, Little Crossing, Bevansville and Bittinger in Garrett County company at the Maust Exchange and Gnagey Exchange.

In 1900, the company went on record that much of the success of the company was due to the efforts of the former manager, G. D. Miller, who had at the expense of considerable time and money made a study of the subject and was diligent in promoting the interests of the company.

After many years of service the company began relinquishing their service to the more distant points to other companies that offered their service and in 1959 the Springs Mutual Telephone Co. sold their interests to the General Telephone Co. in Pennsylvania and to the Chesapeake and Potomac Telephone Co. in Maryland.

It is quite evident that many of the early settlers were men and women of ability and skill. This was true of Benedict Miller who took up residence on the Peter Bitsche farm in 1821. It was here that he built a carpenter shop and a blacksmith shop, being skilled in both wood and metal.

It is thought that Benedict was largely responsible for the training of his son Joel Miller, who became a very fine craftsman. In 1828 he took over the shops of his father and conducted a blacksmith and general repair shop and also did skilled work in the carpenter shop. Along with this he also operated a distillery which was common in those days. From his account book is the following entry: May 1849, Daniel Hershberger debtor to 17 gallons of brandy @ 31c per gallon -- $5.27. The regular price for brandy was 40c but Mr. Hershberger was an Amish minister and was charged a reduced rate. At that time it was common practice to keep some liquor in the homes for a medicine and tonic but the Amish later banned both the distilling and the use of liquor.

A machine shop was also established on the farm of Daniel J. Miller, which is now the Norman Bender farm, in which articles of both wood and metal were manufactured. It was in this shop that G. D. Miller, son of Daniel J., built his first steam engines, which were used in both well drillers and saw mills. Mr. Miller operated a well driller for several years, which he built, and in 1894 built a machine shop in upper Springs which is now the Mill Machine Works.

Other businesses that flourished in the early history of Springs were: A tannery, owned and operated by Jonas Keim from 1886 to about 1895 which was located on the Earl Rodamer property. Six vats were used for curing of the hides. A large stone table used in tanning can be seen at the home of Clarence Rodamer. A wagon shop was located across the highway from the new church and employed three men. A saddlers shop located by Jonas Keim in a room of his house. D. P. Miller operated a planing mill and cabinet shop in Upper Springs.

WEST SALISBURY & SALISBURY

The village of West Salisbury is located on the west bank of the Casselman is much older than Salisbury. It was there that the first mill was located and the first business activities transacted. The first settler, John Markley, built his home on the east side of the Little Yough River his reasons for settling here were the various streams entering the river near West Salisbury which would afford water power for future needs and growth.

That part of West Salisbury from the bridge south to the mouth of Tub Mill Run and west along Tub Mill Run to Compton's Mill is the old and original part if West Salisbury which according to Welfley's History of 1906.

That part of West Salisbury north for the bridge and including the area along the railroad tracks toward the Milt Bowman farm was laid out and plotted into lots by the Salisbury Railroad Company in 1871, which later became the Baltimore Railroad Company and again later being sold to the Baltimore and Ohio Railroad, the company now serving the community. The land for this part of the town was purchased from the farm of David Livengood and was called Long Meadow. Some lots were sold and homes built between 1871 and 1876, but not much progress was mad until the completion for the railroad in 1876. Very soon after this date 75 houses were built in this area.

The business part of West Salisbury has always been in the oldest part of the town above the bridge south. It is believed from old records that the original plot was laid out by John Markley, Ebenezer Griffith, William Tissue, Peter Livengood and others, about the time of the Revolutionary War.

William Tissue, the first settler on the Jerry Beachy farm, built and operated a small grist mill on Tub Mill Run between the mouth of that stream and the old Cox farm.

The first hotel was built by Thomas William. It burned and was rebuilt by John R. Fair and stood for many years across from the present bridge, being torn down within the last 20 years.

The West Salisbury post office was opened in 1904 with Joseph Patton as the first post master. It was first located in an old building to the right of the road by the bridge on the west bank of the river.

West Salisbury has had several mills and manufacturing units during its long history. Among them was the Standard Extract Works built in 1888 at a cost of $60,000, fully equipped to extract certain properties from chestnut wood used in tanning of hides. This concern gave employment to large numbers of men and was an asset to the community. It burned in 1892 and was not rebuilt.

The old tannery, established by George Newman about 1820, was located on the west bank of the river a short distance below the present iron bridge. It was very active for a period of years. The last manager or owner was a Mr. Buchanan who operated this plant some time in the early 1904 or 1905.

Compton's Mill is on of the very old mills located on Tub Mill Run, dating back to 1790. At that time it was known as Hostetler's Mill and was originally built by Ebenezer Griffith. The present mill was rebuilt by Samuel Compton about 1868 and has been owned and operated by the Compton family since that time.

Michael Knecht first opened a blacksmith shop in 1880 near the present Roy Kinsinger residence. This evolved into the old Salisbury Foundry which was sold to Michael Knecht and moved to West Salisbury about 1893 and started the manufacture of iron and machine products. The firm name was M. Knecht & Sons Foundry. William Knecht and brothers followed their father in this business and in 1912 William Knecht bought the others out and continued the plant under the same name.

The West Salisbury Garage was built in 1909 by the late John Knecht. He sold and serviced Reo and Maxwell automobiles. In 1914 he secured a Ford dealership and sold a full line of model T Fords along with Reo and Maxwell. In 1918 John Knecht sold his garage building, equipment and stock to his brother, Harry F. Knecht, who discontinued selling Reo, Maxwell and Ford automobiles, and handled Chevrolet during the years 1918 and through 1920—As a sub dealer under Alvin Stark of Somerset. In 1921, he became a Studebaker dealer and is one of the oldest in the Pittsburgh district. The first Studebaker delivered was to the late Roscoe Welfley of Salisbury. Since that time over a thousand new Studebakers have been handled by the West Salisbury Garage. An Addition to the building was made in 1924 and again in 1946. In 1946 he entered into a partnership with his son, Lee J. Knecht, which continued until January 1, 1957 when Harry F. Knecht retired and Lee J Knecht became sole owner, continuing under the same name, West Salisbury Garage.

Robert Brandler operated a General store for many years in West Salisbury. First he managed a company store for Columbus Shaw across the street from the present Trent Feed & General Store. Later he opened his own store in a room located just north of the present Counihan residence which he operated at that place until 1929, when his home, now the Post Office. He served as Post Master for 13 years. He continued on in the store business until 1936. When he retired this building was used by his son, Joseph Brandler as a barbershop for a number of years until 1943.

The Trent Feed & General Store is one of the older businesses in West Salisbury. It was probably started by the Newman's and Maust's in connection with the lumber business as a company store about 1895. Later Richard Newman was vice president of West Salisbury Feed Company. His son Harvey E. owned and operated this store for many years until his death in 1959.

Schools

The old school house at West Salisbury was located on the North bank of Tub Mill Run in the vicinity of the residence of George Keim Jr. The old school house about the railroad tracks was used about the same time but was added to from time to time until it had three rooms. This school house was used until 1946 as a township school and from 1946 to 1955 as a part of the Salisbury-Elk Lick School System. After the new Junior-Senior High School was completed, this building was of no further use and was sold at public sale.

West Salisbury Built Automobiles

Two autos were built in Elk Lick Township by the late John Knecht and his brother, Harry F. Knecht in 1905. This car was built completely in the M. Knecht & Son Foundry (except wheels) and operated successfully for a long time. A Mr. Swank assembled a car about 1928.

GREENVILLE TOWNSHIP

Greenville Township was formed in 1812 and is considered by its citizens as being part of Salisbury. Especially so when one considers that the petitioners for the forming of the township set forth that they were citizens of Elk Lick Township. The Elk Lick taxable list of 1796 does contain a number of individuals living within what is Greenville Township.

When first formed, the township included a considerable part of that which is now Larimer Township. Early records would indicate that Martin Weimer settled in this area about 1785 on a tract of land that was located near a small branch of Pine Run. Other settlers in the area were the Hutzels, Garlitzes, Findleys, Warners, Beals, Deals, and a little later the names of Klingaman, Lint, Miller, Shultz and Hochestetler appear on the records.

The only village in the township is Pocahontas. It was laid out in 1845 by Daniel Yutzy. The first house was built in 1844

SALISBURY POST OFFICE

On April 14, 1812, Peter Welfley was appointed as the first postmaster of Salisbury. It is said, that according to an old account book, the postage rates ranged from 51/2 cents to $1.26. He served as postmaster until December 31, 1822, when John Keagy was appointed.

Your committee has had the pleasure of seeing the Certificate of Authority given to Peter Shirer, the third postmaster of Salisbury. It is dated January 5, 1825, and signed by John McLean, Postmaster General and Thomas Arbuckle, Clerk.

Suuueeding postmasters are as follows: Phineas Compton, June 3, 1839; Christian C. Livengood, June 18, 1841; Gabriel Miller, August 11, 1843; Peter S. Hay, March, 26, 1856; William Smith, July 29, 1861; Samuel M. Saylor, January 14, 1867.

S. J. Lichty, January 6, 1869; Arthur McKinley, August 31, 1870; Stephen R. McKinley, April 24, 1882; Silas Wagner, October 27, 1885; Mortimer Welfley, May 11, 1889; Peter L. Livengood, December 24, 1898; Albert B. Lowry, December 26, 1906; C. S. Lichliter, April 28, 1913; and again on February 1, 1941; D. H. Broadwater, October 1, 1946; J. H. Leckemby, March 16, 1949; Freda L. Riley, October 26, 1950; Joe S. Monn, Sr., September 30, 1953; and our present postmaster, Earl C. Glotfelty, appointed March 22, 1957.

The first Post Office was opened on April 14, 1812, and named Salisbury. This name was retained until January 9, 1828. At that time the federal government changed the name of the post office to Elk Lick. The reason, another post office named Salisbury, located in Lancaster County, which has prior claim to the name. Ninety-nine years later the post office in Lancaster County was discontinued, and on January 1, 1927, the name of our post office was changed again to Salisbury, Somerset County, and so it remains.

INDUSTRIAL DEVELOPMENT

FIRST TINNER

The first tinner in the town was Phineas Compton. This occupation was a very important one in these earlier years. Tradition relates that he was a maker of squirrel rifles. However, records would indicate that the rifles he made were for his own use and much time had been spent perfecting them

TANNERY

The first tannery was operated by Michael Diveley. He was born in Berlin, Somerset County in 1783. He learned the tanner's trade in Berlin with his father, Martin Diveley. In 1806, Michael Diveley, settled in Salisbury. He entered the war of 1812 as a sergeant and served one year. From that year until 1821 he received several military promotions. In that year he was elected brigadier general of the 12th division, composed of the Bedford, Somerset and Cambria Counties.

HATTER

George Bealor, a Revolutionary war soldier, who shortly after the war, came to Salisbury, and entered the business of making hats.

HARNESSMAKING

Arthur McKinley, was born in Hancock, Maryland, in 1809. He came to Salisbury in 1844, and engaged in harness making, which occupation he followed for a considerable number of years. He was appointed postmaster in 1870, but resigned in 1872, in favor of his son.

THE SHOOK INDUSTRY

This industry flourished in this area from 1860 to 1880, and brought with it a number of people from the New England States. The industry consisted of cutting the choicest oak timber that grew in the areas, sawing it into regulation lengths and then splitting it into staves of the proper thickness for huge casks. The staves were shaved to a uniform thickness by machinery, then shaped. The heads for the casks were made elsewhere. After a cask was properly shaped, it was "knocked down" and the staves were packed together in the order in which they were to end. Each bundle of staves contained enough for one cask and was called a "shook."

The staves were shipped to Cuba and Puerto Rico, where they were assembled for use in transporting molasses and rum. The red oak was used for molasses cask, and the white oak for rum cask.

As said before, only the choicest and the straightest timber could be used in this industry. History suggests that at the height of this industry, as many as fifty individuals of the area were employed in cutting, hauling and fashioning the staves.

On the map of 1876, a shook shop is recorded as being located on Union Street at the intersection of Smith Avenue. There were several shops in the township area.

M. KNECHT & SONS

This is one of the oldest establishments in this vicinity, having been started in 1880 by the late Michael Knecht when he migrated to West Salisbury and purchased a Blacksmith Sop. Having been a good mechanic, through hard work and good management, he built up a lucrative business. Wanting to increase his business and branch chased what was then known as the Salisbury Foundry from the owners, j. N. Hay, Howard H. Keim, Samuel Gipe and Elias Hershberger.

The business grew to such extent he had to have larger quarters, so, in June 1901, he bought and additional plat of ground from Peter S. Hay.

Mr. Knecht had five sons, John, William M., Joseph, Frank and harry, all of whom worked in the shop, under their father, and became expert mechanics.

In 1905 Mr. Knecht and two of his sons, John and William M. formed a partnership, under the trade name of M. Knecht & Sons. This partnership continued until March 18, 1912, when it was dissolved by mutual consent, and William M. Knecht became the sole owner, having bought the entire interests of his father and brother, as to land, buildings, machinery, stock and equipment.

William followed in the footsteps of his father by training his sons, Francis J., Carl L. and Martin to become highly skilled mechanics. He continued operation of the plant from the time he purchased it until his death, May 1, 1956. In 1936 he suffered a heavy loss when the building burned to the ground, and a lot of valuable machinery, tools and equipment were ruined by fire and water. However, knowing the need of a plant of this nature, and the demand for his type of work, he rebuilt the plant on a large scale, and installed more and larger machinery and equipment.

Upon the death of Will Knecht, the plant came into the ownership of his three sons and one daughter, who operate under the firm name of M. Knecht & Sons.

In addition to serving the local community, the firm has customers over a large part of Somerset County, Pennsylvania, Maryland, West Virginia, and Ohio, and has done repair work for firms in Texas and Oklahoma, and also built a sanding machine for a refectory plant in Mexico, Missouri.

SALISBURY NEWSPAPER

In 1871, George H. Suhrie and Luther A. Smith, established the first newspaper in the town. It was known as The Salisbury Independent. A considerable number of copies of this paper are in existence today. Needless to say, these copies are treasured by their owners.

About a year after being established, The Salisbury Independent was moved to Meyersdale, where it was printed under a different name. Finally, it was succeeded by another newspaper.

During the later "80's Daniel F. Coleman, established The Salisbury News Letter, William Petry also conducted a newspaper in Salisbury for a short time. However, both of these newspapers were short-lived. Your Committee has not had the pleasure of seeing copies of these two newspapers.

On December 10, 1891, The Somerset County Star was established by Peter L. Livengood. On May 1st, 1909, he sold the paper to Robert H. Johnston of Salisbury, who conducted it for a number of years until 1928.

SALISBURY AND THE MAPLE INDUSTRY

Salisbury is actually the heart of the Maple Industry of the Somerset County, Pennsylvania-Garret County, Maryland area. Two third's of the maple syrup and maple products produced in this area comes from camps within a ten-mile radius of the town. The greatest concentration of trees in the area lies in the Tub Mill Run Valley, just west of the town. The whole area except for a few small groves lies between

Laurel Mountain and the Allegheny Mountain, and extends northward to the Lincoln Highway and southward through Garrett County, Maryland into West Virginia.

At on time Garrett County, Maryland produced more maple syrup than Elk Lick Township camps, but now the Salisbury area leads the way. The Somerset County part of this area does not produce as much as the northwestern part of the state.

In a peak year of 1931, the J. C. Lichliter & Co., of Salisbury handled more that 17 carloads of syrup and maple sugar.

The Salisbury-Elk Lick Area is a strong supporter of the Somerset County Festival sponsored each year by the neighboring town, Meyersdale, Pennsylvania.

THE COAL INDUSTRY

Regarding the development of the coal industry in the Salisbury community, it is not known definitely when or where in the area coal was first discovered. We do know that one John Stump had a survey made near Keystone, in Summit Township, that is referred to as "Coal Bank: in the survey. About the same time "stone coal" openings in this area were made on the Brown farm, now owned by Mrs. Harry Tressler of Boynton. The farm is located about two miles north of Little Meadows in Garrett County, Md. This land was patented in early days by a Philip Hare. Hare conveyed the land to Samuel Brown in 1812. Tradition would have it that coal was discovered on this farm as early as 1796. Incidentally, a saw mill was erected in this area about the same time.

The first use of coal was to supercede the use of the charcoal by the local blacksmiths and furnaces where iron was manufactured. Prior to the use of coal, charcoal was used by the smiths and forges.

The first direct reference to the use of coal in the area was in the Glotfelty blacksmith shop. It was carried in sacks on pack horses from the mine located on the Hare Farm. The first known opening of a coal mine in Elk Lick Township was on the Fadeley Farm.

The first coal tracts of land purchased for speculation or investment in the vicinity of Salisbury were made by Jacob Brown for J. Philip Roman and Norman Bruce, of Cumberland, Maryland. Purchases of coal lands continued for some years. Then, with the completion of the Pittsburgh & Connellsville Railroad in 1871 and of the Salisbury and Baltimore Railroad in 1876, development began on a larger scale.

Prior to 1878, Salisbury was much like any agricultural community without a railroad during that period of our history. But with the completion of the railroad and since the town was in the midst of the Elk Lick coal Basin, operations in the "Big Vein" or Pittsburgh vein began, bringing miners and workmen form many sections of the country.

The area of coal measures mined in the Elk Lick Basin around this community was about twenty square miles, with an approximate tonnage of over 300,000,000 tons of coal.

We are told that when the coal industry was at its peak, the mines in the Elk Lick Basin employed from 900 to 1000 miners.

The town itself grew slowly, but the villages and population around it grew rapidly as Salisbury remained the trading center. Over the years, as the mining centers have disappeared, as have some of the mining villages, Salisbury has continued to grow, continually adjusting itself to the industrial and economic changes over the years.

True, "the big vein" is about exhausted, but there are thousands of acres of the lower coal measures, all of which have been mined in the northern section of the county. A test hole along Piney Run, drilled by a company in search for oil, went through a number of veins of good quality coal.

THE STANDARD EXTRACT WORKS

The Standard Extract Works, built at West Salisbury, in 1888, at the cost of $60,000 was probably the second greatest industry in the community in the late 1800's. Their business was the extraction of certain chemical properties from the chestnut wood that was used in tanning. It was one of the most modern plants of its kind, and gave employment to a large number of individuals in cutting and hauling the timber to the plant as well as employment in the plant itself. The plant was destroyed by fire in 1902 and was never rebuilt.

THE SALISBURY FOUNDRY

Among the early industries that employed more than the members of a single family, was The Salisbury Foundry, which was located on the plot of ground now occupied by the McClure Service Station. It was established in 1868 when the plant of the Berlin Foundry was moved to the Salisbury. From an old account book, there were twenty-one stock holders, all residing within the community. This would indicate wholehearted cooperation on the part of the local community.

THE OTTO BRICK AND TILE WORKS

The Otto Brick and Tile Works near Springs was founded by D. D. Otto in 1902, and came about as the result of a community need and popular demand.

In the late eighteen nineties there had been several brick factories in the southern half of the county. The Keystone plant, and that of the late Frank Black Sr. in Meyersdale: the Statler plant west of Garrett, and the Miller plant near Rockwood. All of these had closed down by 1900—a fact that suggests that brick-making was not too prosperous a business in those days.

John and Joe Knecht of West Salisbury purchased the Back brick machinery when it was dismantled, and undertook to make brick, but soon gave it up because the clay of that locality was not suitable for making brick and for a time there were no brick plants in the vicinity.

When the Knecht brothers gave up making brick, they, as well as many others encouraged Mr. Otto to try his hand at it, who at that time owned a small farm and was also in partnership with Samuel Baker in cutting a tract of chestnut timber for delivery to the dye plant at West Salisbury.

Among those who were especially interested in having this enterprise started were Gideon Miller, local minister and machinist, F. W. Bender, merchant, and Henry Bittinger, stone mason.

Thus encouraged by his friends, Mr. Otto decided to investigate the clay – possibilities on his little farm. Finding a very good grade of clay, he purchased the brick machinery briefly used by the Knecht Brothers, and proceeded to build a brick factory.

By 1903 Mr. Otto had his small factory ready to operate. As he knew very little about brick making, he secured the Knecht brothers, whose experience was also limited, to help him get started.

He soon found that the business of making brick and tile was no easy task. There was much to learn in the processing and burning of the clay. Also, in those days everything was don the hard way, with only a few machines in use, and most of the operation done by hand labor. For many years the road was rough, and often he felt discouraged enough to give up.

The founder's sons, who now own the business, would like also to pay tribute to their mother who not only gave encouragement and moral support during those trying times, but also worked in the brick plant doing jobs equal to that of a man. Mrs. Otto was a small woman, but mighty. The Otto children remember their mother as being perhaps the one that gave the spark of encouragement that kept the plant going. It was after Mr. Otto had worked all week, almost day and night, getting only naps of sleep while firing the kin at night, and coming home almost completely exhausted, that he broke into tears, saying, " I guess we'll have to give it up". It was then that Mrs. Otto, with her courage and determination replied, "Let's just try a little longer", and with this kind of encouragement being constantly offered, the business survived.

In the early days of the operation of the plant, the clay was mined with pick and shovel. Molded brick and tile were place on pallets in long corridors for drying, which required from one to two weeks, with some of the ware stacked on what was called a 'hot floor', which was merely steam from the exhaust of the engine passing through buried tile covered with cement and ashes, which accelerated the period of drying.

There were no instruments to determine the degrees of heat applied to the ware in the kilns when burning and many times a kiln was over-burned with the loss of becoming very great.

A book could be written on the hardships and misfortunes Mr. Otto experienced in the first ten years of the brick business. However, he stuck to it, weathered the tough times bravely, and in time was rewarded to find his business on a paying basis.

In 1912, with a better understanding of brick making, and seeing the need for better and modern equipment, the small plant was completely rebuilt with the installation of new and modern machinery, and the obsolete dryer system replaced with modern dryer kilns and cars. This proved a great step toward success, and was the means to better and finer quality brick and tile.

In 1915 the manufacturing of tile silos was added and for 30 years hundreds of silos were erected in a 100-mile radius, with some silos shipped as far as Delaware.

In 1950 the demand for brick became so great that the silo business was discontinued and in recent years, building tile and drain tile, are available only at certain times.

In 1928, with the increased business and responsibilities, Mr. Otto took his sons into the business as partners and for a number of years operated under the title of D. D. Otto and Sons.

From 1942 to '54 the plant was again enlarged and completely rebuilt to make it one of the most modern plants of the day, with facilities to operate all twelve months of the year.

During this period, modern machinery replaced the old with electric power taking the place of both gasoline and diesel and the use of modern lift trucks to convey the finished ware from the kilns to both storage and trucks for delivery.

In 1945, D. D. Otto, founder of the Otto Brick Works, retired from the business and the partnership with his sons was dissolved and Roy and Walter C. Otto, who were partners with their father, then formed a new company, known as the Otto Brick and Tile Works.

SALISBURY UNDERGARMENT COMPANY

The Salisbury Undergarment Company, Inc. came to Salisbury in 1948, as the direct result of contacts made by the Industrial Committee of the Salisbury Lions Club. A pilot plant was established in the Grange Hall on Ord Street, in which new employees were instructed in the use of the company's machinery.

The Lions club members sold bonds to build a plant for the company, and then organized the bondholders into the Salisbury Industrial Association, Inc. to carry out the construction plants. The new building on Union Street was completed and turned over to the company on December 7, 1949. The mortgage term was ten years, and in less than ten years it was paid in full, retiring all bonds.

The plant has been in continuous operation since that time manufacturing ladies; undergarments. The company has employed over a hundred men and women continuously since 1949.

SALISBURY BANKS

In 1871 Silas C. Keim and Jacob D. Livengood opened and operated a private bank on Ord Street located just above the present residence of Mr. and Mrs. Wilbur B. Lichliter. This bank closed in about 1879 due to long continuance of hard times after the panic of 1873.

Valley Bank was established in 1889 by John l. Barchus and Jacob D. Livengood on Grant Street. This institution prospered and continued in operation until 1902 when a charter was devised and a permanent bank was established.

In 1898 Albert Reitz became a clerk in the Valley Bank and later became cashier of the new First National Bank. The new bank grew out of the Valley Bank.

First National Bank was chartered and nationalized in 1902 with the following named persons as officers and directors; John L Barchus, president; Harvey H. Maurst, vice president; Albert Reitz, cashier; John L. Barchus, Ernest E. Livengood, Lloy Beachy, Dr. A. F. Speicher, Dr. A. M. Lichty, Frank A. Maust and Harvey H. Maust, directors.

The First National Bank continued giving full and complete banking services to the community from 1902 to 1939. This institution prospered and became one of the leading and strongest banking institutions in southern Somerset County. In 1939, due to the effects of the depression years, the wishes of the officers and directors to retire, and the lack of younger trained personnel to take over the reins of the bank, they (the directors) decided, after long and continuous consultation with the Citizens National Bank officers and directors, to merge the First National Bank of Salisbury with the Citizens National Bank of Meyersdale.

This merger was affected in 1939 and Salisbury was without its own banking facilities until October 5, 1959. Mr. John L. Barchus continued as president from 1902 until the merger. Of the original directors, Ernest E. Livengood and Harvey H. Maust continued as directors for the entire life of this bank. Robert H. Johnston was the last cashier. This bank was located on Grant Street

Citizens State Bank of Salisbury was chartered and opened for business in 1917 in a new building built for the bank and post office by the Lichliter heirs. This building was located in the Lichliter block and the present Salisbury post office occupies the entire building which was formerly used by both the bank and the post office. The officers were John C. Lichliter Sr., president; John Miller, cashier; John C. Lichliter Sr., Frank F. Petry, Russell Hay, David H. Keim, John Wright and John Knecht, directors.

This bank continued in operation from 1917 to 1933 giving full and complete banking services to the community and was an asset to southern Somerset County as well as to Salisbury. John C. Lichliter Sr. continued as president of the bank during its entire life and Frank F. Petry, Russell Hay, David H. Keim and John Wright continued as directors until 1933.

Mark T. Bender became cashier after John Miller resigned to become an officer in the bank at Biglerville, Penna. Mr. Bender continued as cashier until 1933.

In early march 1933 President Franklin D. Roosevelt ordered all banks closed (for the bank holiday) to be examined and certain standards to be complied with before reopening. After much discussion, a decision was reached by the officers and directors to close the bank rather than to attempt to raise the capitol stock from $25,000 to $50,000 and the reserve by $25,000 additional. At that time the country was in the midst of one of the greatest depression in history and any attempt to raise an additional $50,000 out of the community would have been an impossible task in those days. The closing of the bank at that time should not be understood to mean that the institution was weak in any way. Proof of this statement is that every one who had an account in the Citizens State Bank was paid 100% on the dollar and no losses were suffered by the depositors.

The Salisbury branch of the Second National Bank of Meyersdale, Penna. was opened October 5, 1959 in the building formerly occupied by the First National Bank before its merger with Citizens national Bank of Meyersdale in 1939. The Second National Bank of Meyersdale was chartered to open for business in 1901.

PHYSICIANS

The first physician who practiced in Salisbury was D. Fetter, who settled here about 1835. Dr. Gabriel Kimmell, son of Dr. John Kimmell, of Berlin, practiced at Salisbury for several years between 1835 and 1840. Dr. Jacob G. Bruckman located at Salisbury in 1841. He was of German birth and was a graduate of the University of Prague. It is said his education covered a period of nine years. He settled in Salisbury because it was largely a German-speaking community. In the earlier part of his career in Salisbury, he was very successful. However, as other doctors located here he lost much of his practice. In later years he moved to Bedford.

THE GREAT FROST OF 1859

On the night of June 4th, of 1859, there was a very heavy frost that destroyed the crops and vegetation. The fruit was killed and the leaves fell from the tress as though it was autumn. The rye was in blossom and it with the wheat crop, was all but destroyed, as was the corn and even the hay. The sugar and maple trees shed their leaves as though winter was approaching.

With but slow means of communication, there was no immediate means of determining how extensive the frost had been. As a result, the people became panic stricken and dreams of famine became the chief topic for discussion. This was intensified since the frost had occurred on Saturday night. On Monday morning the farmers made every effort to get to Frostburg and Cumberland to purchase flour, corn, wheat. The stock on hand in the stores of these two communities was soon exhausted, and within a few days the prices rose from seven dollars a barrel to eighteen dollars for flour.

Within a week people began to weigh their situation with more serious though, and one other crop was decided upon. This was buckwheat. The ground was rapidly prepared and every effort made to grow as much as possible. The results were phenomenal. Elk Lick Township produced 9000 bushels. The county as a whole produced 171,104 bushels.

SALISBURY BRANCH BECOMES A PICKET FENCE NEAR BOYNTON

Few people can comprehend the force flood waters exerted in Boynton in October, 1954. Pictured here is the Salisbury branch of the Baltimore and Ohio Railroad. Flood waters rushed over the river's banks and tore the railroad bed to pieces. It lifted the heavy railroad tracks and ties, and stood the ties on end to form a virtual picket fence to sight-seers that traveled along route 219 to the right of the railroad. In Boynton many homes were under water, and George Hillegas, 80, died from a heart attack provoked by the flood.

In the James Roberts garage 27 inches of water was measured in the office while the rear of the building it rose to a depth of 37 inches. Fences were torn down and trees uprooted as the water covered many first floors of the community's homes. Piney run added additional fury as it rushed to meet the Casselman River. Five men were trapped in Lishia's Tavern by high water. Blacktop paving on each side of the highway bridge over Piney Run was torn up or buckled so as to appear like a wash board. In Elk Lick Township, Piney changed its course and supervisors have appealed to the Department of Forests and

Waters for help in correcting the situation to prevent further floods. Salisbury firemen were kept busy pumping out cellars in Boynton.

The rising flood waters in the Salisbury-Boynton section Friday made it difficult for those forced to travel and those residing in low areas. The damage in Boynton was particularly high.

The waters of the Casselman River began flowing over the road at West Salisbury about 3 p.m. and shortly thereafter Tub Mill Run began to flood across the Springs road near West Salisbury.

Several near tragedies occurred in the Salisbury section but were averted by heroic volunteers who aided the stranded

About dusk, Lloyd Hinebaugh and his son, Fay, slid off the road at West Salisbury in their truck as Mr. Hinebaugh, an employee of the State Highway Department was attempting to check conditions of state roads in his territory.

Salisbury firemen were already out to place flares in dangerous spots at the time, and aided the West Salisbury garage wrecker in rescuing Mr. Hinegaugh and his son from their pickup.

After the men were rescued, an attempt was made to pull the pick-up out of the water, but the attempt failed because the bumper would not stand the strain of the fast rushing waters against the truck, and pulled off. The truck was shoved sideways about 50 feet from the road by the water before it was pulled out after the water subsided.

In the meantime the rising waters of the Casselman and Piney Run were flooding the low lying areas of Boynton, and residents were getting their belongings out of basements and in some cases to the second floor of their homes before evacuating them.

Actually, the waters were covering roads at Boynton much earlier that at West Salisbury, and Dr. B. H. Hoke, Jr. decided that if he continued on to Meyersdale in the face of rising waters, he would probably have no patients there, and Salisbury would be without a physician in an emergency.

He turned back, and thus was available to attend Mr. William A. Petry about a half hour after he collapsed with a heart attack. However, Mr. Petry died from the attack brought on by the excitement of the flood.

THE OLD SALISBURY CEMETERY

The old Salisbury cemetery on the hill east of town, though often neglected, is a hallowed spot. There are many graves in that cemetery that has been filled for almost two hundred years. For a long period of time it was the only community burial ground. When that tract of land was set aside by the town fathers as cemetery, burial lots were not sold, but people were free to bury their dead in it in such location as most appealed to them.

However, in the 1880's there arose a need for additional land for burial purposes, and we find that on April 7, 1887, the Salisbury Cemetery company was formed. On June 6, 1887, we find the officers of that company purchased three acres of land that adjoined the old cemetery, which satisfied the needs of the community for many years.

The old burial ground holds the mortal remains of such venerated men as Jost J. Stutzman, The Grammar King, Christian Shockey and David Kreider, soldiers of the American Revolution, and many others who did a noble work for country and community, Peter Welfley, to whom the community also owes much, rests in the old cemetery overlooking the town where he labored so well.

DISASTROUS FIRES IN SALISBURY

The first dwelling known to have been destroyed by fire in Salisbury was a newly built house owned by Benjamin De haven, which burned in December, 1848. About two years later, a dwelling owned by Jonathan Kelso and two carpenter shops burned. In 1851, a hotel owned by Benjamin De Haven was destroyed by fire. In 1868 the homes owned by Peter S. Hay, Ambrose Breig and Peter Welfley and a carpenter shop burned.

On the night of March 18, 1895, the town suffered its most costly fire insofar as property loss. It originated in the office of Peter L. Livengood and spread to the Henry Leochel hotel, the Livengood & Saylor store on the west side of the street. Then crossed the street to the east side to Doctor Speicher's dwelling and drug store, a harness and barber shop. The total property loss was estimated to exceed $40,000.00

On April 8, 1895, the large hotel owned by Drusilla hay was destroyed by fire. Also, a wagon-making shop, a meat market, the Hay block contained the general store of George Walker, and a hall for public meetings.

The large hotel of Dennis Wagner was destroyed by fire sometime during 1884. The last of the disastrous fires occurred on September 16, 1924. Lost in this fire were the McKinley Building, the Loechel Hotel, frank Keefer's grocery, a pool room, a restaurant and the Hay Hotel. A number of other buildings were damaged.

In recent years, the John Smith dwelling was destroyed by fire. A most disastrous fire occurred Christmas morning of 1954 when R. A. Kidner perished when his dwelling burned. The greatest property loss in recent years occurred when the Salisbury Fire hall suffered a partial loss.

SALISBURY WATER WORKS

From the time of the early land grants to our area a very strong spring was known to exist along Piney Run, approximately three miles from the present borough limits of Salisbury. Later it became known as "Finley Spring," for the man who owned the surrounding land. For more than a century people frequently visited the spring and the surrounding area was the site of many picnics and "gala roasts,' as cookouts were then called.

As early as 1895, the late Livengood predicted in his newspaper column, that some day Finley Spring would be the source of water supply for Salisbury Borough. Nothing happened until 1919, when a survey was being made for U. S. 219 through Salisbury. The late J. L. Barchus and H. H. Maust asked the engineers, Frank Hunter and W. D. Weise, to run a level from the spring to Salisbury. It was learned that the water from the spring would run to Salisbury by the gravity flow.

Until 1933 nothing more was done, but the citizens of the borough became increasingly aware of the need for a water system as individual wells were not sufficient to supply the increasing demand for water. In November of that year, S. E. Engle and Charles Gartner were discussing the pros and cons of the W.P.A program. They agreed that it was a good idea to get a project for the water works and did something about it. They contacted Master Plumber Frank Gartner and Civil Engineer J. Herbert Leckemby, and the four agreed to make a study of the possibility of bringing water from Finley Spring to Salisbury. On Thanksgiving Day 1933, they checked the bench mark at the post office and the level at the spring with an altimeter owned by Mr. Leckemby and found a difference of 127 feet, with readings of 2133 at the post office and 2260 at the spring.

A survey for a gravity grade was completed and tracings and blue prints were made. The findings were checked and double-checked by engineers. J. H. Leckemby and James Hoblitzell of Meyersdale, and Frank Gartner. Billing for all materials was worked out, and everything was eventually approved by the Pennsylvania Department of Health.

The members of the Salisbury Borough council in 1936 were Mark T. Bender, Charles B. Dickey, J. H. Leckemby, Thomas Clark, M. Frank Statler, Rev. Samuel D. Sigler and S. E. Engle, with Robert H.

Johnston as secretary. The Council approved the plans and submitted them to a Mr. Rodgers, director of the Works Progress Administration office in Johnstown. There the plans were again approved, but the $30,000 needed for purchase of materials, rights-of-way and the spring itself was not available to the Borough because it had reached its legal debt limit. So the project was held up in Washington for lack of our share of the money.

Composition of the Borough Council changed in January of 1937 to John C. Lichliter, Sr., president, C. B. Dickey, Thomas Clark, M. F. Statler, J. H. Leckembey, Dr. A. G. Livengood and Rev. Sigler was elected to the School Board, resigned, and Samuel E. Engle was appointed to serve his term.

At that time, the chances of securing the water system project appeared to be hopeless, because the borough could not furnish its share of the matching funds. Then, one of our native citizens, H. H. Statler, stepped forward with the statement that he would furnish the money if he had to sell everything he owned. Council immediately arranged to send members Lichliter, Leckemby and Engle to Harrisburg once more, with Mr. Rodgers from the Johnstown W. P. A., office. A Mr. Walker, head of the Pennsylvania W. P. A., stated that without the borough's share of the funds, the project was lost. But, assured of Mr. Statler's financial responsibility, and of his willingness to furnish the financing, he felt the project would be approved in Washington. It was, and from that time forward progress was rapid.

Finley Spring and two acres of surrounding land were purchased from the owners. Albert E. and Walter S. Johns, for $1000.00. Three miles of right-of-way, ten feet wide, with ingress and egress for water purposes only, were purchased from owners Albert E. and Walter S. Johns, Maust Lumber company, Harvey H. Wright, William G. Lowry, Mrs. Jennie Smalley, John M. Wright and Elijah Newman, at a cost of from $25.00 to $30.00 based on the length of right-of-way and damage done. The reservoir site in Salisbury, 50'x50' with ingress and egress for water purposes only, was purchased from Elijah Newman for $300.00.

In late fall of 1938 the Water Works became a reality, after dedication in August of the same year. Following are some pertinent facts. The spring flows 90 gallons per minute or 5400 gallons per hour. According to the Department of Forests and Waters of Pennsylvania, this is enough water to supply 1000 people at 200 gallons per day per person. According to the Pennsylvania Department of Health and the U. S. Department of Agriculture, the water is the purest on record, east of the Mississippi River, as to bacteria count and inorganic content. The plant is completely underground so the water is never exposed to daylight nor to any foreign matter until it comes from the spigots in our homes, businesses and industries. The small reservoir that caps the spring is six feet square and is completely sealed. Three miles of Johns Manville asbestos pipe, six inches in diameter, were used to bring the water to Salisbury.

The storage reservoir in Salisbury is 40'x40'x10' with a division in the center so half can be drained and the remaining half be held for use. Capacity of the reservoir is 87,000 gallons. It is from seven to thirteen feet underground. There are more than five miles of 8", 6", 4", 3" and 2" Johns Manville asbestos pipe lines beneath the streets and alleys of our town. In most instances, three quarter inch copper pipe leads from the mains to the properties. The system operates by gravity with the exception of ten homes located east of Rock street which are supplied by a pumping system. Elevation at the spring is 2260 feet and at the reservoir 2234 feet, a difference of 26 feet.

The flow from the spring does not change with the seasons and the temperature never changes at the spring. According to the U. S. Dept. of Agriculture, the source of the water must be a very large underground lake or seasons would change the flow and temperature.

With the exception of a borrowed cement mixer and an air compressor, the Water Works was built entirely by hand labor, because the purpose of the Works Progress Administration was to employ men not machines. This was a $300,000.00 project under W. P. A.

Service has been interrupted only twice during the life of the system. The first one occurred on October 17, 1954 as a result of Hurricane Hazel. Four sections of feed line were washed out. Temporary repairs were made at the time, and the second interruption came when the line was relocated for a permanent repair.

After completion of the water system, bonds were sold with the Water Works as collateral, and Mr. Statler was repaid. The Bigerville National Bank, bond holders, required that the Borough Council appoint Commission of Water Works, approved by the County court, to administer the water system. The first Commission was H. H. Statler, S. E. Engle and M. T. Bender. Mr. Bender resigned after one three-year-term and H. L. Newman was appointed.

From 1942 to 1960 the Commission members remained the same, H. H. Statler, S. E. Engle and H. L. Newman. They supervised the building of the pumping station at the corner of Corliss and Rock streets at a cost of $3000.00. This was necessary to furnish water to property owners east of Rock street, above the level of the reservoir. In 1956, eight more acres of land surrounding the spring were purchased for $1500.00, as an added measure of protection to the spring.

Mr. Statler died on November 8, 1960, and before his successor could be appointed, Mr. Engle resigned in order to bring a younger man to Commission. The present Commission is Huber L. Newman, president; Walter D. Weise, secretary and homer C. Gnagey, engineer.

THE FIRST ROAD

The disastrous ending of Braddock's ill-fated expedition, upon which such high hopes had been built, left the French in complete possession of the country beyond the Allegheny Mountains, which thus became the frontier for the English settlement. It was a barrier beyond which they might not pass, and which they could not pass during the French occupation, which continued for a period somewhat over three years. For the French to have maintained this barrier here and elsewhere would have been to confine the English settlements between the mountain and the Atlantic Ocean.

So far as the English were concerned this was an intolerable situation. On their part, the next three years were years of preparation to break the power of the French and their savage allies. As to the French, they were by no means idle. They sent out their war parties, made up of French and Indians, who, following Nemacolin's Trail, or the Braddock Road, crossed to the eastern side of the mountain, and having Fort Cumberland, Maryland (which was now the nearest English outpost), to the right or left, as best suited their purpose, they harassed and ravaged the border settlements of Virginia, Maryland and the adjacent parts of Pennsylvania. The houses of the settlers were burned, and they themselves and their families were killed and scalped, or carried off into hopeless captivity.

Early in the year 1758 an army of almost six thousand men were assembled at Raystown (Bedford), for a second campaign against the French. This force was organized and commanded by General John Forbes, with Colonel Henry Boquet as second in command. It was made up of a detachment of three hundred and fifty Royal Americans, twelve hundred Scotch Highlanders, sixteen hundred Virginians, and two thousand seven hundred Pennsylvanians, also a detachment from Maryland. The Virginia regiments were commanded by George Washington and Colonel William Byrd, the former being the ranking officer.

While Raystown (Bedford) had been made the general rendezvous for the army, the route had not been determined by which it was to march for its objective point. This was Fort Duquesne, which had been erected by the French at the junction of the Allegheny and Monongahela Rivers. At that time the Braddock Road (but seven miles of which pass through the southwest corner of Somerset County) was the only one that had at all been opened in the direction of the forks of the Ohio River. The question before the commanding general was whether the army should march to Fort Cumberland, nearly thirty miles away, and take that road, or whether a new road should be cut through what, admittedly, was a region mostly covered by dense forest. It would seem that the original plan had been to make the campaign over the Braddock road, and that it was Sir John St. Clair, quarter-master-general of the army, who suggested to General Forbes the idea of making a new road across Laurel Hill.

Later on he again sided with the Virginians. But General Forbes was now not easily to be turned from the fullest investigation before determining his route. It is to be remembered that in 1755, the year of the Braddock expedition, Colonel James Burd had laid out a road from Raestown to the Turkeyfoot and had cut it as far as the top of the Allegheny Mountain, when it was abandoned. General Forbes wrote to Colonel Boquet that he should reconnoiter this road also. John Walker, a guide, claimed to know the country between the Allegheny Mountain and the Great Crossing, and said that a road could be maid in that direction, but that it ought to be done in the fall after the leaves were off the trees. The report that Boquet received of this route was unfavorable. Acting under orders of General Forbes, Colonel Boquet seems to have investigated every possible route westward from Raestown (Bedford).

General Forbes' final decision was in favor of a new road. The Indian trail presented so many advantages over the rival route that the scale was turned in its favor. It is to be remembered that in 1755 Colonel James Burd had commenced the cutting of a road toward the Turkeyfoot and had carried the work well on toward the top of the Allegheny Mountain. Colonel James Burd was one of Colonel Boquet's right-hand men in making the road. Some working parties were also sent out on the Braddock road, who made at least a show of repairing it. This was done to deceive the French and making them believe that the coming army would march over that road.

As time passed, many parties seemed willing to admit that Colonel Washington had been telling some plain truths when he urged General Forbes not to try the route. The road finally reached Ligonier to which place the army was brought and a fort erected. From Fort Ligonier a party of 1,500 carried the road forward toward Fort Duquesne. Some authorities claim that up to this time the enemy had not suspected the opening of this road, but confined his attention to the defiles and passes on the Braddock road. That the progress was slow, and with it that of the army, is quite certain. General Forbes arrived at Fort Ligonier, to which the entire army had now come up. He was a sick man, and was borne across the mountain in a litter. He must, indeed, have been a man of grim determination to have kept in the field when he was not able to ride on horseback. The road in Somerset County is known under two names. By some it is called the "Forbes Road", because it was by his orders that it was cut through the wilderness, by which all that part of Somerset County was then covered. Others called it the "Boquet Road" because Colonel Boquet had been in charge of the opening of it.

ROADS

Without a doubt the first attempt at road-making in the territory now embraced by these counties took place during Washington's brief and disastrous campaign in the Youghiogheny valley in 1754. The following year Braddock's troops passed over nearly the same route. Hundreds of his soldiers on the outward march were daily employed in the work of buildings roads for the purpose of moving forward the artillery and ammunition and supply trains.

Meanwhile, during the year of Braddock's disastrous campaign (1755), the authorities of Pennsylvania began the work of cutting out a road from Fort Loudon to the Turkey-Foot, or Three Forks of the Youghiogheny. It was intended by means of this road to throw forward succor and supplies to Braddock's army. But after a road had been opened nearly to the Alleghenies, the project was abandoned by reason of the strength and hostility displayed by the Indians under pay of the French. From Col. James Smith's account, we learn that in may 1755, three hundred men were sent out by the provincial authorities to cut out a wagon road from Fort Loudon to the Three Forks of the Youghiogheny. The advanced party of wood choppers was in charge of William Smith, Esq. (a brother-in-law of James Smith, of Conacocheague). James Smith who was but eighteen years of age, was sent back to hasten forward the wagons there halted. He was captured by the Indians and held as prisoner for five years.

THE DIBERT MASSACRE—1739

George Dibert, his wife, and five children had settled on a small clearing on a tract, just a mile from present Berlin, Pennsylvania, now owned by John O. Stoner. Dibert was burning some stumps at the edge of his clearing. He had no gun with him and was at the mercy of the wilderness, for he did not believe in carrying a gun, except for obtaining meat for his family. He heard his wife screaming and the children crying. He heard a shot and his oldest son fell dead. Dibert, from the bushes, saw before him the most horrible sight of his life. Two Indians were dragging his wife out of the cabin by her hair. Amid the struggling and agony, he saw the scalping knife lift her beautiful hair from her still struggling body. An Indian brought the mercy blow with his tomahawk. With extreme horror, George Dibert saw all his family scalped before his very eyes. He would have rushed to their aid except he reasoned that it would have been suicide to move form his hiding place. Two Indians were ransacking his cabin and he spied two others in the woods searching for him. He managed to elude them by running toward the pines in the hollow below the clearing.

For a terrible night and a day he occasionally caught glimpses of the braves on his trail. He hid by day in thick laurel masses of the mountain above Berlin. For three days and nights, Dibert traveled in a broad circle around his clearing and his massacred family. When he was entirely satisfied that he was safe from the Indians, he moved back toward cabin. In the darkness he knew he was safe from the Indians, for they would not venture near the dead after the dark, for the spirits of the dead were nearby.

He crawled to where he remembered he last saw the body of his wife. He took his belt from his waist, a rawhide string that he had used for his possible bag and a combination belt. He tied it around the feet of the swollen and partly decayed body and dragged it in a deep ditch. One by one he dragged his children to the same ditch. By use of stones and sticks, he managed to cover his family in a shallow grave. Almost exhausted from fatigue, sorrow, and lack of food, he sobbingly left the White Horse Mountain and stumbled toward Carlisle, some 139 miles away. After a week of hiding and walking across almost exhausted, into the fort and told his pitiable story. In 1768, George Dibert remarried and settled in Bedford Township.

THE GREAT BUFFALO KILL

The last large herd of buffalo vanished from the area by 1809. Dr. E. C. Saylor, the Honorable Jacob B. Schrock, and Mr. Elmer Walker told this story. It was on a hot summer morning in August that someone in Berlin discovered that a large herd of buffalo had move into the buffalo wallows, located in the flats below the present site of the old railroad station. These flats or wallows covered the glades over the Buffalo Lick Creek—that is how it got its name, from the sulfur springs in the glades where buffalo came to lick the salt deposits brought up by the spring water that came from down deep in the bowels of the earth. This accounts for the humid and foul odor. Even to this day, one can detect the odor of salt and sulfur that has come to the surface as he goes to give off the sulfur odor.

On this particular hot August morning, the men and boys of Berlin fell upon the buffalo while they were still in the wallows and slew them by the dozens. They removed their hides, took the humps, the tongues, and the favorite cuts, and left the carcasses to waste in the hot sun. The stench was so terribly depressing in Berlin that people had to keep their doors and windows shut until the cold weather and snows covered up the remains of the beasts.

TELEGRAPH AND TELEPHONE LINES

The first telegraph line that was constructed in and through Somerset County was along the National Road. The first telegraph office ever established in the county was located in the village of Petersburg, also known as Addison. The exact time is not known, but it was about 1850. This was at a time when all the appliances pertaining to this business were of the crudest kind. Al that is now known about this first line is, after a year or so it was abandoned, the one or two lines of wire were broken up and carried off by people who passed along the road. Later, probably about 1860, poles were again planted and wires strung along the same road, and this new line had about the same ending. There seems to have been very poor management in keeping it in repair. Much of the line passed through woods, overhanging branches of trees would break and, in falling, would carry the line with it, and the people living along the road, as before, did the rest. It was no uncommon thing to find a mile or two of wire at country farm houses.

It was not until about 1868 that a permanent line was established along the National Road. This was a Western Union line. A few years later the Postal Telegraph Company also carried a line along the road, its poles being on the north side. The term "line" is to be understood as including whatever number of wires were strung on the poles. The Postal lines were afterwards absorbed by the Western Union Company.

In 1870 a loop of the Western Union Company was extended from the Stone House on the National road to Salisbury, and an office established there, being the fourth town in the county to have such a convenience. Western Union lines, or what afterwards became such, were extended along the pike between Bedford and Greensburg prior to 1860. The second office in the county was established at Stoysetown. The Western Union lines came to Somerset in 1865, being along the pike between Bedford and Mount Pleasant. Somerset was the third town in the county to have a telegraph office. The lines along the several railroads came with the roads.

TELEPHONE LINES

Probably the first telephone line in Somerset County was a mutual line, in the southwest part of Elk Lick Township, its owners being farmers residing in the vicinity of Springs, and its main purpose being to relieve the isolation and monotony of farm life. The promoters were Messrs. Bender and Blough. This private line afterwards was merged in the Somerset Telephone Company.

The first telephone line established on a commercial basis was owned by Edwin H. Werner, of Somerset, and his associates, under the name of The Somerset County Telephone Company. It began business in 1892. Its owners disposed of their interests to the Somerset Telephone Company, which was chartered in 1903. A. Frank John was the first president, and Harvey M. Berkely first treasurer. This company had pay stations or offices at Boswell, Hooversville, Jenners, Stoyestown, Somerset Bakersville, Berlin, Rockwood, Trent, New Lexington, Garrett, Ursina, Confluence, Meyersdale and Salisbury. Through connecting lines outside of the county, communication may have been hard with Pittsburgh, Cleveland, Indianapolis, Baltimore, Philadelphia and hundreds of other towns.

The Central District and Printing Telephone Company (Bell) came into the county about 1899. There were also eight or ten unincorporated telephone companies in the county. These were mostly owned by associations of farmers, and usually extend from some small village to some central town like Somerset or Berlin.

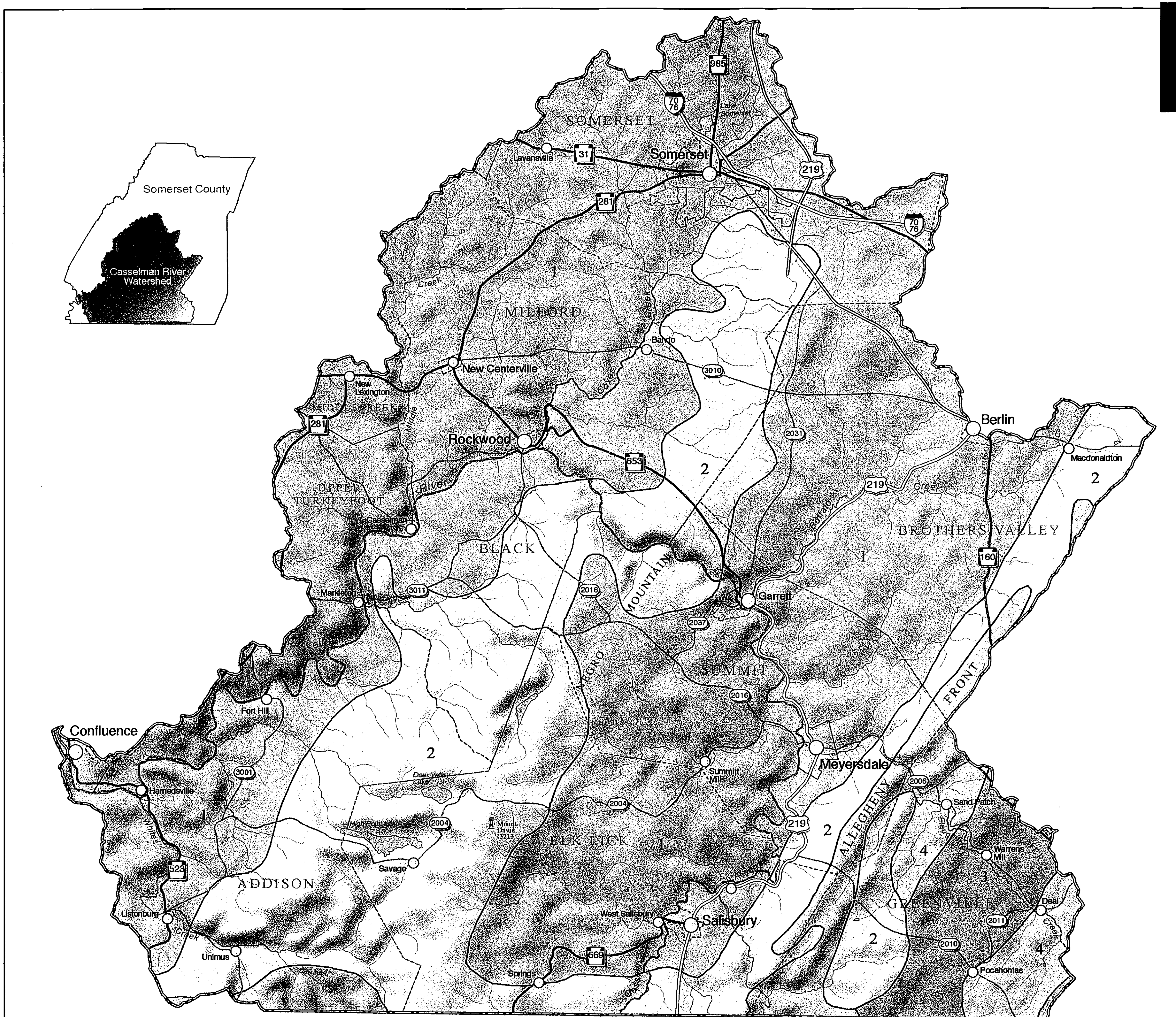
Somerset County Timeline

June 1771	: Harmon Husband arrives at Cox's Creek Glades while fleeing a bounty placed on him North Carolina
Oct. 1772	: First permanent family settlement. (Harmon Husband, Cox's Creek Glades)
Spring 1776	: Rifle company under Captain Richard Brown enlisted to fight the British
July 1782	: Destruction of nearby Hannastown by Indians and renegade whites prompts evacuation by settlers.
Spring 1784	: Settlers return to area, many new arrivals as well.
Oct. 1794	: Harmon Husband arrested for his part in the Whiskey Rebellion, and taken to Philadelphia for trial.
1795	: Husband dies while awaiting trial.
Apr. 17, 1795	: Somerset County formed from Bedford County

June 20, 1795	: First deed recorded in Berlin
Aug. 20,1795	: First will registered - Harmon Husband
Sep. 12, 1795	: "Summerset Town" selected as county seat
Oct. 29, 1795	: First county building : log jail in the area of South Center Ave. & Patriot St.
Dec. 21, 1795	: First term of Somerset County court, Alexander Addison presiding
1795	: First criminal case : One member of first grand jury became intoxicated during a session and was fined $5
Apr. 17, 1798	: Contract let for first courthouse, completed in 1801
Mar. 5, 1804	: Somerset incorporated as a borough
1804	: First newspaper, the *German Farmer*
1804	: first county school
1813	: First Bible west of Alleghenies printed by Frederick Goeb
Oct. 16, 1833	: First of Somerset's three major fires
1838	: First state appropriation for Somerset Borough School district - $43.18
Jan 9, 1847	: County Home Farm purchased for $5000
1853	: Completed second courthouse
May, 1854	: Joseph J. Stutzman appointed 1st Supt. of Schools
June 4 1859	: Great Frost : crops / vegetation obliterated in most of the country
June 1861	: Co. A, 10th Regiment organized to fight in the Civil War
May 4 1872	: Second of the three major fires
May 9 1876	: Third great fire
Sep 17 1888	: Civil War soldiers' monument presented at county courthouse
1893	: Electric street lighting adopted
June 1894	: First water works
1895	: County centennial
July 8 1898	: Co. I, 5th Regiment departs for the Spanish-American War
1900	: Last visit of Pres. William McKinley to Somerset
June 18 1903	: First street paving
Feb 6 1907	: Completion of present county courthouse

Sep 7 1917	: Co. C, 10th Pa Infantry leaves for WWI
1940	: PA Turnpike
Feb 17 1941	: Co. C, 110th Infantry, 28th Div. leaves for WWII
Jan 27 1953	: Somerset Communtiy Hospital Building fund drive reaches goal of $400000
Mar 5 1954	: Somerset County Sesquicentennial

General Soil Map
Casselman River Watershed



LEGEND

1	Rayne-Gilpin-Wharton-Cavode: Nearly level to very steep, deep and moderately deep, well drained to somewhat poorly drained soils; on hills and ridges
2	Hazelton-Cookport: Nearly level to very steep, deep well drained and moderately well drained soils; on foot slopes of hills and on mountains
3	Berks-Weikert: Gently sloping to very steep, shallow and moderately deep, well drained soils; on hills and ridges
4	Leck-Kill Albrights: Gently sloping to moderately steep, deep, well drained to somewhat poorly drained soils; on hills and ridges

EACH AREA OUTLINED ON THIS MAP CONSISTS OF MORE THAN ONE KIND OF SOIL. THE MAP IS THUS MEANT FOR GENERAL PLANNING RATHER THAN A BASIS FOR DECISIONS ON THE USE OF SPECIFIC TRACTS. OBTAIN CASSELMAN GIS SOILS DATA FOR DETAILED SOIL ANALYSIS.

SOURCE: Soil Survey of Somerset County, Pennsylvania

North

1:12000

0 6.5 Kilometers
0 4 Miles

Mapping & GIS Compiled By:

LandVision
Planning and Mapping Services

LAND RESOURCES

Land use along the river is one of the major considerations of this report. Land use affects the quality and quantity of water in the river, the economic opportunities that exist within the study area, and the quality of life for watershed residents.

Most of the land within the study area is currently undeveloped, as a result of the numerous steep slopes that occur along the river and rural nature of the area. These slopes are mostly forested, which creates a natural buffer that helps protect the river from excessive runoff and the shoreline from flood damage. The forested condition along the river also creates the impression for river and trail users of an undeveloped, pristine valley.

Prime agricultural soils were also identified as important resources. There are an estimated 147,234 prime agricultural soil acres identified within the watershed. Approximately 22% of the land in the watershed is considered prime agricultural soil. 5% of the land in the watershed is considered urban, 64% is forested and 9% is listed under other uses. Another source of development potential is the reuse of abandoned mining and industrial sites, or 'brownfields'. There are more than 66 abandoned mine land or industrial locations, totaling over 3,000 acres, within the watershed.

Finding the best locations and establishing the appropriate character for new development within the study area is one of the most important steps in reviving the economy of the region. While the quiet and charm of the natural environment will attract people, it is the expansion of commercial and residential development that will contribute most to community development.

Soil Survey

1. Rayne-Gilpin-Wharton-Cavode

Nearly level to very steep, deep and moderately deep, well drained to somewhat poorly drained soils,- on hills and ridges

This map unit makes up about 52 percent of the county. It occupies nearly level to very steep tops and side slopes of hills and ridges. The areas are dominantly on broad uplands on hills and ridges that are dissected by streams.

Rayne soils make up about 26 percent of this map unit. They are deep and well drained. Gilpin soils make up about 14 percent. They are moderately deep and well drained. Wharton soils make up about 13 percent. They are deep and moderately well drained. Cavode soils make up about 9 percent. They are deep and somewhat poorly drained. Minor soils make up 38 percent. They include Armagh, Brinkerton, and Ernest soils and Udorthents on uplands; Allegheny, Chavies, Purdy, Tyler, and Monongahela soils on terraces; and Atkins, Pope, and Philo soils and Fluvaquents on flood plains.

Most areas of this map unit are cleared and used for crops, hay, and pasture. Some areas are wooded, especially areas of steep and stony soils. A few areas are used for urban and industrial developments and for surface mining of coal. The soils in this unit are the most extensive in the county and are some of the best soils for farming. The moderate depth to bedrock, the slope, and the seasonal high water table are major limitations for most uses.

2. Hazleton-Cookport

Nearly level to very steep, deep, well drained and moderately well drained soils,- on foot slopes of hills and on mountains

This map unit makes up about 28 percent of the county. It occupies the nearly level to the very steep tops and side slopes of hills and mountains. The areas are dominantly on broad mountains and hilly valleys between the mountains.

Hazleton soils make up about 60 percent of this map unit. They are deep and well drained. Cookport soils make up about 16 percent. They are deep and moderately well drained. Minor soils make up 24 percent. They include Nolo, Ernest, Dekalb, Rayne, Gilpin, Brinkerton, Berks, Weikert, and Leck Kill soils on uplands.

Most areas of this map unit are wooded, except the areas that are cleared for crops, hay, and pasture. A few areas are used for home sites and recreation. The soils are mostly too stony for farming. In addition to stoniness, slope and a seasonal high water table are major limitations.

3. Berks-Weikert

Gently sloping to very steep, shallow and moderately deep, well drained soils on hills and ridges

This map unit makes up about 1 0 percent of the county. It occupies the gently sloping to very steep tops and side slopes of hills and ridges. The areas are dominantly on broad uplands that are highly dissected by streams and drainageways.

Berks soils make up about 48 percent of this map unit. They are moderately deep and well drained. Weikert soils make up 16 percent. They are shallow and well drained. Minor soils make up 36 percent. They include Blairton, Ernest, Hazleton, Rayne, Gilpin, Leck Kill, and Brinkerton soils on uplands, and Atkins soils on flood plains.

Most areas of this map unit are used for cultivated crops. The soils on steep areas are wooded. Some areas are in pasture. A few areas are used for surface mining of coal and for home sites and recreation. The slope and the shallow and moderate depth to bedrock are major limitations.

4. Leck Kill-Albrights

Gently sloping to very steep, deep, well drained to some- wl7at poorly drained soils on 17ills and ridges

This map unit makes up about 8 percent of the county. It occupies the gently sloping to very steep tops and side slopes of hills and ridges. The areas are dominantly on broad uplands that are dissected by streams and drainageways.

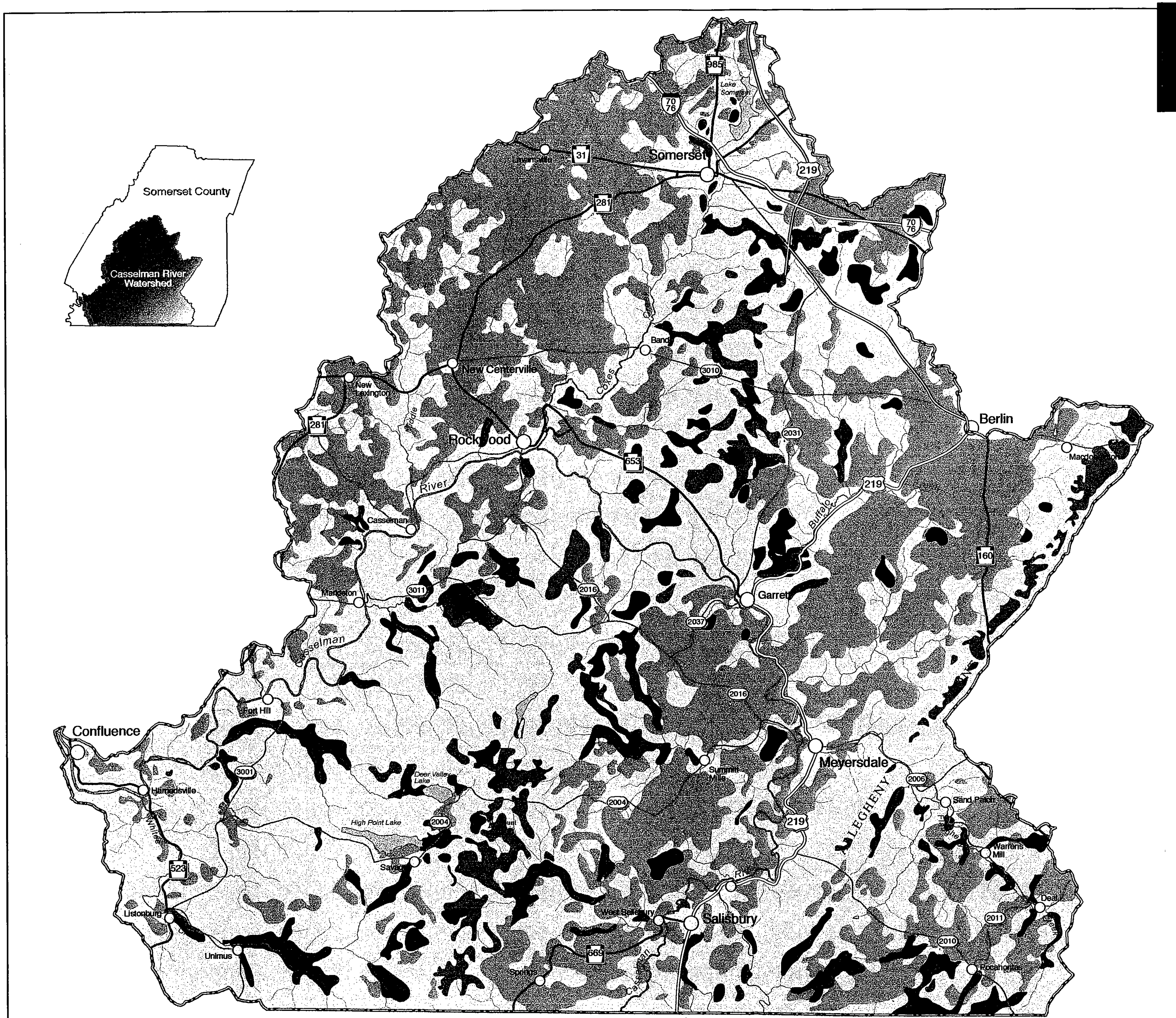
Leck Kill soils make up about 60 percent of this map unit. They are deep and well drained. Albrights soils make up about 10 percent. They are deep and moderately well drained and somewhat poorly drained. Minor soils make up 30 percent. They include Rayne, Gilpin, Ernest, Weikert, Berks, Dekalb, Hazleton, and Brinkerton soils on uplands and Atkins soils on flood plains.

Approximately half of the areas of this map unit have been cleared for cropland, hay, and pasture. The rest of the areas are mostly wooded. Small areas are used for home sites and recreation. The soils are mostly suited to farming. Slope and a seasonal high water table are major limitations.

<u>Crops and pasture</u>

Farming is a major land use in Somerset County. In 1974, farmland consisted of 224,780 acres. Of this total, 132,437 acres was cropland. The total number of acres harvested was 96,782; cropland used only for pasture was 28,320 acres; all other cropland was 7,335 acres. The harvested cropland consisted of 12,565 acres for corn; 13,266 acres for silage; 1,343 acres for wheat; 49,232 acres for hay; 1,158 acres for potatoes; 740 acres for vegetables; 141 acres for orchards; 16,518 acres for oats; 1,316 acres for barley;

Land Use / Cover Map
Casselman River Watershed



LEGEND

- Residential
- Commercial / Industrial
- Agricultural
- Deciduous Forest
- Mixed Forest
- Evergreen Forest
- Quarry / Strip Mine

North

1:12000

0 — 6.5 Kilometers

0 — 4 Miles

Mapping & GIS Compiled By:

LandVision
Planning and Mapping Services

12,551 acres for alfalfa hay; 644 acres for sweet corn; 86 acres for apples; and the rest for miscellaneous purposes.

Soil erosion is the main concern in management on most of the soils used for cropland and pasture in Somerset County. The Rayne, Gilpin, Leck Kill, Berks, and Hazleton soils are potentially productive soils for crops and pasture, but areas having slopes exceeding 3 per- cent have a moderate to severe hazard of erosion.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced, because the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a layer in or below the subsoil that limits the depth of the root zone. These include fragipans such as those in the Ernest, Cookport, Albrights, Monongahela, and Tyler soils or bedrock such as that in the Weikert and Dekalb soils. Erosion also reduces the productivity of soils that tend to be droughty, such as the Hazleton and Berks soils. Second, the erosion of soil on farmland results in sediment deposition in streams and reservoirs. Control of erosion minimizes the pollution of streams by sediment and improves the water quality for municipal use, for recreation, and for fish and wildlife.

In many sloping fields, preparation of a good seedbed and tillage are difficult on channery soils, because the original surface layer has been eroded away, leaving a high content of coarse fragments on the surface. Such areas are common on Berks-Weikert channery silt loams.

Methods of erosion control provide a protective surface cover, reduce surface water runoff, and increase infiltration. A cropping system that keeps plant cover on the soil for extended periods holds soil erosion losses to an amount that will not reduce the productive capacity of the soils. On livestock farms, which require pasture and hay, legumes and grass forage crops in the cropping system help reduce erosion on sloping land and also provide nutrients and improve tilth for the following crop.

Slopes are so short and irregular that contour tilling or terracing is not practical in most areas of the Dekalb, Chavies, and Allegheny soils. On these soils, cropping systems that provide substantial vegetative cover help control erosion. Minimum tillage provides additional soil protection.

Minimizing tillage and leaving crop residue on the surface help to increase infiltration and reduce the hazard of erosion. These methods can be adapted to most soils in the survey area. No-tillage for corn helps reduce erosion on sloping land and can be adapted to most soils in the survey area, except the poorly drained and very poorly drained soils.

Terraces and diversions reduce the length of slope, which helps reduce the surface water runoff and erosion. These methods are most practical on well-drained soils that have regular slopes. The Rayne, Gilpin, Leck Kill, and Hazleton soils are suitable for terraces and diversions. Some of the soils are less suitable for terraces or diversions because of irregular slopes, excessive wet- ness in the terrace channels, or bedrock at a depth of less than 40 inches.

Contour farming and stripcropping are common methods of erosion control in the survey area. They are best suited to soils having smooth, uniform slopes, including most areas of the sloping Rayne, Gilpin, Hazleton, Wharton, Ernest, and Leck Kill soils.

Soil drainage is the main management need on about 20 percent of the acreage used for crops and pasture in the survey area. Some soils are naturally so wet that the production of common crops is generally not successful without the use of artificial drainage. Such soils are the poorly drained and very poorly drained Armagh, Brinkerton, Purdy, and Atkins soils. Unless they are artificially drained, the somewhat poorly drained soils are so wet that crop damage results during most years. In this category are the Cavode, Tyler, and Nolo soils.

Some soils that are wet are along drainageways and in swales and are commonly included in areas of the moderately well drained Philo, Ernest, Wharton, Blairton, Monongahela, and Albrights soils. Artificial drainage is needed in most of these wetter soils.

The design of both surface and subsurface drainage systems varies, depending on the kinds of soil involved. A combination of surface drainage and tile drainage is needed in most areas of the poorly drained soils used for more intensive cropping systems. Drains need to be more closely spaced in soils that have slow permeability than in soils that are more permeable. Adequate outlets for tile drainage systems are commonly difficult to find in areas of the Wharton, Cavode, Ernest, Nolo, Albrights, and Cookport soils.

Fertility is naturally low in many soils in the survey area. Many upland soils are naturally very strongly acid. If they have never been limed, they require application of ground limestone to sufficiently raise the pH level for good growth of alfalfa and other crops.

Available phosphorus and magnesium levels are naturally low in most soils. Additions of lime and fertilizer on soils should be based on the results of soil tests, crop needs, and the expected level of yields. The Cooperative Extension Service helps determine the kinds and amounts of fertilizer and lime to apply.

Soil tilth is important in the germination of seeds and the infiltration of water into the soil. Soils that have good tilth are granular and porous.

Many soils in the survey area are used for crops and have a surface layer that is relatively low in organic matter content. Generally, the structure of such soils is weak, and intense rainfall causes crusting of the ex- posed surface. The crust is hard when dry, and it is nearly impervious to water. Once the crust forms, it reduces infiltration and increases runoff. Regular additions of crop residue, manure, and other organic material help improve soil structure and reduce crust formation.

Fall plowing is generally not practical on soils that have a silt loam surface layer and a low content of organic matter, because of the crust that forms in winter and spring. Many of the fall-plowed soils are nearly as dense and hard at planting time as they were before they were plowed. Also, most of the cropland consists of sloping soils that are subject to damaging erosion if they are plowed in fall.

Field crops suited to the soils and climate of the survey area include many that are not now commonly grown. Corn is the major row crop, although grain sorghum, potatoes, soybeans, and similar crops are grown if economic conditions are favorable. Wheat, oats, and barley are the common close-grown crops.

The most common special crops grown commercially in the survey area are apples, vegetables, and nursery plants. Deep soils that have good natural drainage and that warm up early in spring are best suited for these crops. Good air drainage is needed to reduce frost damage.

In the survey area, the Hazleton, Rayne, Gilpin, and Leck Kill soils are best suited to fruits and vegetables because these soils have good physical properties. The landscape positions generally provide good air drainage. The Pope, Chavies, and Allegheny soils also have good suitability for vegetables.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In the capability system, all kinds of soil are grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs. A survey area may not have soils of all classes. *Capability classes,* the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VII soils and landforms have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class; they are designated by adding a small letter, e, *w, s,* or *c,* to the class numeral, for example, lie. The letter e shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; w shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); s shows that the soil is limited mainly because it is shallow, droughty, or stony; and c, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s, or* c because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and sub- class is indicated in table 6. All soils in the survey area except those named at a level higher than the series are included. Some of the soils that are well suited to crops and pasture may be in low-intensity use, for example, soils in capability classes I and II. Data in this table can be used to determine the farming potential of such soils.

Woodland

Somerset county has approximately 443,400 acres of woodland(8). This is nearly 64 percent of the total land area in the county. Farmers own 41 percent, private concerns own 45 percent, forest industries own 2 percent, and the State owns 12 percent of the commercial woodland in the county. One percent of the woodland is classified as noncommercial.

Stands of second- and third-growth trees make up the woodland in the county. The principal forest cover types (6) making up the present woodland and the extent of each, as given by the Forest Service, are described in the following paragraphs.

Oak-hickory makes up 52 percent of the total woodland. This cover type mainly consists of white oak, red oak, and hickory, although black oak and chestnut oak are predominant in some stands. The principal associates are yellow poplar, shagbark hickory, white ash, red maple, and beech.

Elm-ash-red maple makes up 8 percent of the total woodland. White ash, American elm, and red maple are predominant. Associates are slippery elm, yellow birch, sycamore, and hemlock.

Maple-beech-birch makes up 24 percent of the total woodland. Sugar maple, beech, and yellow birch are the component species in this cover type. Associates are varying admixtures of basswood, red maple, hemlock, red oak, white ash, white pine, black birch, black cherry, yellow-poplar, and cucumber tree.

Aspen-birch makes up 6 percent of the total wood- land. Quaking aspen, bigtooth aspen, and gray birch predominate the mixture of the cover type. Principal associates are pin cherry, red maple, yellow birch, white pine, ash, and sugar maple.

Chestnut oak makes up 6 percent of the total woodland. Chestnut oak is in pure stands or is predominant. Common associates are red oak, white oak, black oak, scarlet oak, pitch pine, blackgum, and red maple.

Virginia pine-pitch pine makes up 2 percent of the total woodland. Virginia pine and pitch pine predominate. Principal associates are red oak, black oak, scarlet oak, chestnut oak, and hickory.

White pine makes up 2 percent of the total woodland. White pine is pure or is predominant. The principal associates are Virginia and pitch pine, ash, sugar and red maple, hemlock, red and white oak, quaking and bigtooth aspen, and paper, yellow, and black birch.

Seventy-five percent of the woodland in the county is on soils that have very high to moderately high potential productivity. Fifteen percent is on soils that have moderate productivity, and 10 percent is on soils that have low productivity.

Approximately 50 percent of the commercial forest acreage is sawtimber, 28 percent is poletimber, 19 percent is seedlings and saplings, and 3 percent is classified as nonstocked or forest land that is stocked with less than 10 percent desirable trees.

Generally, the soils in this county are capable of supporting good stands of red oak, sugar maple, yellow- poplar, ash, and white pine. Trees grow more slowly on the shallow and poorly drained soils than on the deeper, well-drained soils.

Good woodland management in areas where potential productivity is very high to moderately high helps encourage the growth of desirable trees. The local service forester or a consulting forester can provide assistance for a woodland improvement program. Those soils rated low for potential productivity generally will not economically justify any management to increase yields of wood crops. Soils that are rated moderate are the most difficult to appraise for management of wood crops. An onsite inventory of the growing stock and its quality is needed. An investigation of market potential is needed to determine if woodland management is economically feasible where soils rated moderate are mixed with more productive soils.

The county has an ideal climate for the production of maple syrup. Most 'sugar bushes' are on the Rayne, Gilpin, and Ernest soils in the maple-beech-birch forest cover type. The service forester or a consulting forester helps woodland owners develop their stands for the production of maple syrup by the proper silvicultural treatment. The sap of individual sugar maples are checked for sugar percentage to determine which trees are to remain in the stand for tapping in February and March.

The woodland in Somerset County has watershed protection and recreational and esthetic values as well as a source of income for woodland owners. The better sites return a good profit to the owner, if they are properly managed for wood crops and are protected from fire, disease, insects, and livestock grazing.

Woodland management and productivity

Table 7 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Map unit symbols for soils suitable for wood crops are listed, and the ordination (woodland suitability) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the *ordination symbol,* a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter x indicates stoniness or rockiness; w, excessive water in or on the soil; d, restricted root depth; f, high content of coarse fragments in the soil profile; and r, steep slopes. The letter o indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: x, w, d, f, and r.

In table 7 the soils are also rated for a number of factors to be considered in management. *Slight, moderate, and severe* are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate,* 25 to 50 percent; and *severe,* more than 50 percent.

Considered in the ratings of *windthrow hazard are* characteristics of the soil that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring *winds; moderate,* that some trees are blown down during periods of excessive soil wetness and strong winds; and *severe,* that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The potential productivity of merchantable or *common trees* on a soil is expressed as a *site index.* This index is the average height, in feet, that dominant and codominant trees of a given species attain in 50 years. The site index applies to fully stocked, even-aged, unmanaged stands. Site index is listed for trees that woodland managers generally favor for wood crop production. They are the most important tree species in regard to growth rate, quality, value, and marketability. Other trees that commonly occur on the soil are also listed, regardless of potential value and growth.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Engineering

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 8 shows, for each kind of soil, the degree and kind of limitations for building site development; table 9, for sanitary facilities; and table 11, for water management. Table 10 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 8. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewer- lines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and small commercial buildings referred to in table 8 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in- place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 8 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Lawns and landscaping require soils that are suitable for the establishment and maintenance of turf for lawns and ornamental trees and shrubs for landscaping. The best soils are firm after rains, are not dusty when dry, and absorb water readily and hold sufficient moisture for plant growth. The surface layer should be free of stones. If shaping is required, the soils should be thick enough over bedrock or hardpan to allow for necessary grading. In rating the soils, the availability of water for sprinkling is assumed.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 9 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight,* soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate,* soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe,* soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good, fair, or poor,* which, respectively, mean about the same as the terms *slight, moderate, and severe.*

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seep- age and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bed- rock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be in- stalled or the size of the absorption field can be in- creased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse in- creases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 9 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

<u>Construction materials</u>

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 10 by ratings of good, fair, or poor. The texture, thickness, and organic matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 14 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor.*

Sand and gravel are used in great quantities in many kinds of construction. The ratings in table 10 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good or fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 14.

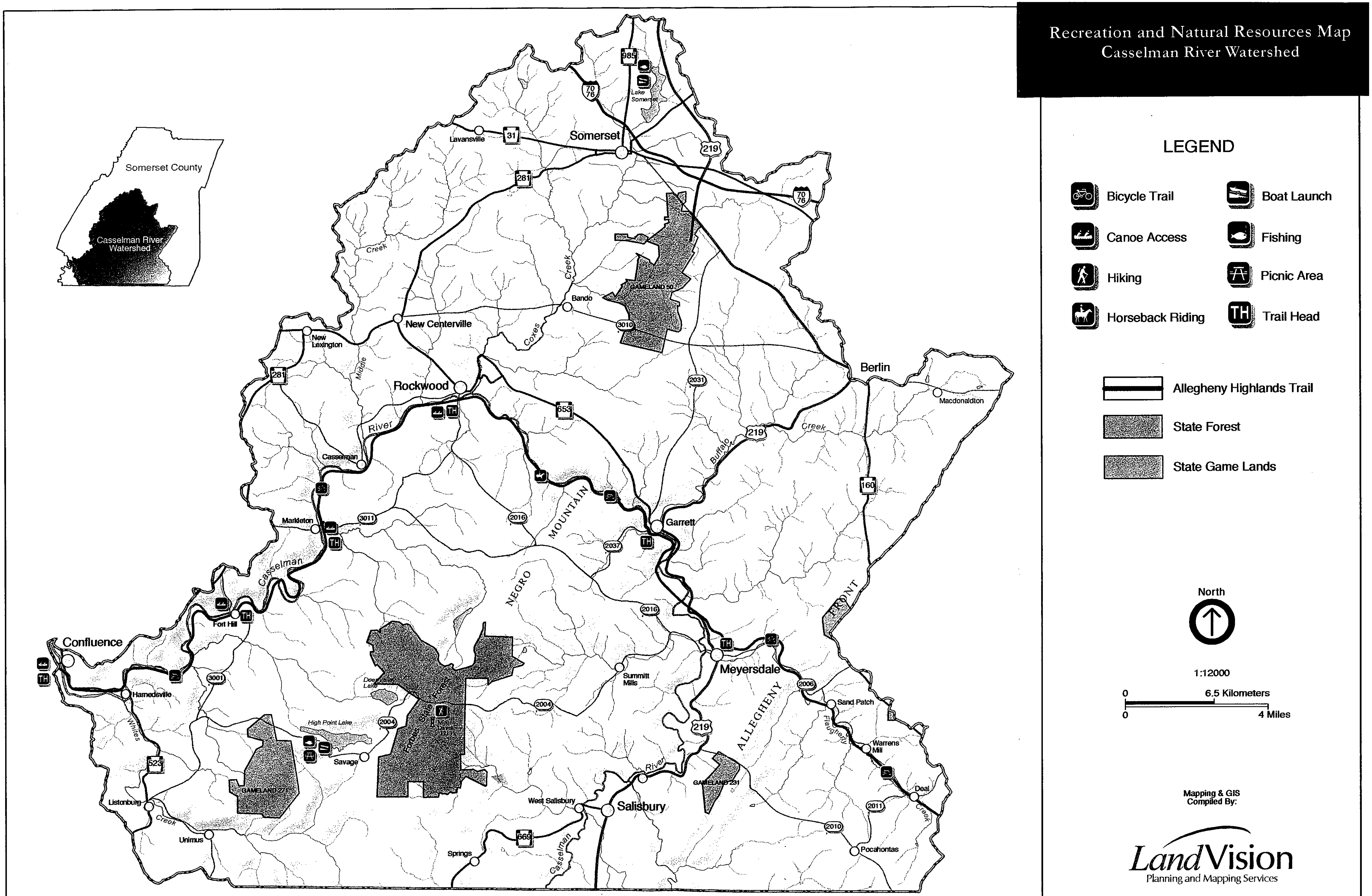
Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plant life. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plant life is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt. Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic matter content. This horizon is designated



Recreation and Natural Resources Map
Casselman River Watershed
LEGEND
Bicycle Trail
Boat Launch
Canoe Access
Fishing
Hiking
Picnic Area
Horseback Riding
Trail Head
Allegheny Highlands Trail
State Forest
State Game Lands
North
1:12000
0
6.5 Kilometers
0
4 Miles
Mapping & GIS Compiled By:
LandVision
Planning and Mapping Services
Somerset County
Casselman River Watershed
Somerset
Lavansville
Lake Somerset
New Centerville
Bando
New Lexington
Rockwood
Casselman
Markleton
Berlin
Macdonaldton
Garrett
Confluence
Fort Hill
Harnedsville
Meyersdale
Summit Mills
Sand Patch
Warrens Mill
Deal
Savage
High Point Lake
Listonburg
Unimus
West Salisbury
Salisbury
Springs
Pocahontas
GAMELAND 50
GAMELAND 231
NEGRO MOUNTAIN
ALLEGHENY FRONT
Casselman River
Coxes Creek
Buffalo Creek
Middle Creek
Whites Creek
Flaugherty Creek

as Al or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 11 the soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Aquifer-fed excavated ponds are bodies of water made by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 11 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steep- ness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Recreation

Recreation is an important activity in Somerset County. The many and diversified recreational facilities attract thousands of tourists and residents each year and provide important sources of income.

Among the major attractions are several large resorts, approximately ten golf courses over 100 acres in size, and six large lakes over 100 acres in size. More than 20 percent of the land area in Somerset County is used for recreation. The two largest parks are Laurel Hill State Park, 4,126 acres, and Kooser State Park, 350 acres. Laurel Hill State Park has an estimated 650,000 visitors, annually, and Kooser State Park has 363,000 visitors. Deer Lake at Mt. Davis also receives 12,000 visitors annually.

The Allegheny Highlands Trail (Rails to Trails) attracts many visitors to the area. The trail is complete from the Pinkerton Horn (just west of Markleton) to Meyersdale. The trail is open year round to hikers, bicyclists,wheel chairs, and skiers. It is relatively flat, and follows the old Western Maryland

Railroad along the Casselman River. When it is finished, it will connect trails leading to Pittsburgh, PA and Washington, DC.

Hunting in Somerset County is of major economic importance. The Pennsylvania Game Commission operates five tracts of land consisting of 15,615 acres, and the Pennsylvania Department of Environmental Resources, Bureau of Forestry, has five tracts consisting of 28,385 acres. Seven farm game cooperative projects consisting of 75,000 acres are also used for hunting. Some private lands are owned by sports organizations.

About 75 percent of the soils in the county have potential for recreational development. The deep, well drained Rayne, Hazleton, and Leck Kill soils having as much as 15 percent slopes have the best potential for most recreational uses. About 40 percent of the soils in the county have very stony or bouldery surfaces which seriously limit potential for more intensive uses. These stony soils have some potential for hiking trails, hunting, and other types of recreation that require slight or no land alteration. The soils that have poorest potential for most recreational uses are the poorly drained and very poorly drained Armagh, Brinkerton, Purdy, Nolo, and Atkins soils and the steep and very steep Rayne, Gilpin, Hazleton, Berks, Weikert, and Leck Kill soils.

The soils of the survey area are rated in table 12 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewer lines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 12 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 9, and interpretations for dwellings without basements and for local roads and streets, given in table 8.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but re- mains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bed- rock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They should have a surface that is free of stones and boulders and have moderate slopes. Suitability of the soil for traps, tees, or greens was not considered in rating the soils. Irrigation is an assumed management practice.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verity the field estimates of soil properties and to determine ~~all~~ major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features.

Engineering properties

Table 14 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 14 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 14 in the standard terms used by the U.S. Department of Agriculture(7). These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (2) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (1).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic matter content. Soils are grouped into 15 classes-eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *A,4SHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The estimated classification, without group index numbers, is given in table 14. Also in table 14 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of 'soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 15 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field-particularly soil structure, porosity, and gradation or texture-that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless spatial designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environ- mental quality. The rate is expressed in tons of soil loss per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, the estimated content of organic matter of the plow layer is expressed as a percent, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth of the soil. It is a source of nitrogen and other nutrients for crops.

Soil and water features

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by flood- water; irregular decrease in organic matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are under- lain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Potential frost action refers to the likelihood of damage to pavements and other structures by frost heaving and low soil strength after thawing. Frost action results from the movement of soil moisture into the freezing temperature zone in the soil, which causes ice lenses to form. Soil texture, temperature, moisture con- tent, porosity, permeability, and content of organic matter are the most important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not artificially drained. Silty and clayey soils that have a high water table in winter are most susceptible to frost action. Well-drained very gravelly or sandy soils are the least susceptible.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Table 1. Temperature and Precipitation

Month	Temperature[1]						Precipitation[1]				
	Average Daily Maximum	Average Daily Minimum	Average Daily	2 years in 10 will have... Maximum temperature higher than -	2 years in 10 will have... Minimum temperature lower than -	Average number of growing degree days[2]	Average	2 years in 10 will have ... Less than -	2 years in 10 will have ... More than -	Average number of days with 0.10 inch or more	Average Snowfall
	°F	°F	°F	°F	F	Units	In	In	In		In
January	36.5	17.7	27.1	66	-8	16	3.26	1.96	4.42	9	15.3
February	38.4	18.1	28.3	65	-8	17	2.87	1.65	3.86	8	17.1
March	47.0	25.5	36.3	78	6	79	4.02	2.57	5.33	10	13.5
April	60.0	35.2	47.6	84	18	238	3.86	2.57	5.04	10	1.8
May	70.7	44.1	57.4	88	27	539	4.03	2.18	5.53	10	.1
June	79.1	52.9	66.0	93	37	780	4.11	2.05	5.78	8	.0
July	82.8	57.0	69.8	94	43	924	4.35	2.57	5.93	9	.0
August	81.2	56.4	68.8	93	42	893	3.84	2.38	5.15	8	.0
September	75.5	49.5	62.5	92	32	675	3.28	1.80	4.48	7	.0
October	64.5	38.4	51.5	84	20	364	2.58	1.14	3.74	6	.2
November	50.7	30.2	38.9	74	9	249	2.70	1.78	3.52	8	3.9
December	39.1	21.9	30.6	70	-2	45	3.34	1.87	4.53	9	14.0
r	60.4	37.2	48.7	96	-12	4,819	42.24	36.55	47.73	102	65.9

[1] Recorded in the period 1951-1975 at Confluence, Pa.

[2] A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40°F)

Table 2. Freeze Dates in Spring and Fall

Probability	Temperature[1]		
	24°F or Lower	28°F or Lower	32°F or Lower
Last freezing temperature in spring:			
1 year in 10 later than:	April 28	May 9	May 23
2 years in 10 later than:	April 23	May 5	May 18
5 years in 10 later than:	April 14	April 26	May 10
First freezing temperature in fall:			
1 year in 10 later than:	October 13	October 3	September 24
2 years in 10 later than:	October 19	October 9	September 28
5 years in 10 later than:	October 30	October 19	October 8

[1] Recorded in the period 1951-1975 at Confluence, Pa.

Table 3. Growing Season Length

Probability	Daily minimum temperature during growing season[1]		
	Higher than 24°F	Higher than 28°F	Higher than 32°F
	Days	Days	Days
9 years in 10	180	154	130
8 years in 10	187	162	137
5 years in 10	199	175	151
2 years in 10	211	189	164
1 year in 10	217	196	171

[1]Recorded in the period 1951-1975 at Confluence, Pa.

Table 4. Acreage and Proportionate Extent of the Soils

Map Symbol	Soil Name	Acres	Percent
AbB	Albrights silt loam, 3 to 8 percent slopes	2,663	0.4
AbC	Albrights silt loam, 8 to 15 percent slopes	1,119	0.2
AgB	Albrights very stony silt loam, 3 to 8 percent slopes	1,274	0.2
AgD	Albrights very stony silt loam, 8 to 25 percent slopes	1,266	0.2
AhB	Allegheny silt loam, gravelly substratum, 3 to 8 percent slopes	303	*
AhC	Allegheny silt loam, gravelly substratum, 8 to 15 percent slopes	318	*
Ar	Armagh silt loam	2,810	0.4
AsB	Armagh very stony silt loam, 0 to 8 percent slopes	848	0.1
At	Atkins silt loam	9,999	1.4
BeB	Berks channery silt loam, 3 to 8 percent slopes	2,907	0.4
BeC	Berks channery silt loam, 8 to 15 percent slopes	5,923	0.9
BeD	Berks channery silt loam, 15 to 25 percent slopes	6,164	0.9
BkB	Berks-Weikert channery silt loams, 3 to 8 percent slopes	2,755	0.4
BkC	Berks-Weikert channery silt loams, 8 to 15 percent slopes	3,972	0.6
BkD	Berks-Weikert channery silt loams, 15 to 25 percent slopes	6,807	1.0
BkF	Berks and Weikert soils, 25 to 70 percent slopes	23,080	3.3
BnB	Blairton channery silt loam, 3 to 8 percent slopes	2,706	0.4
BnC	Blairton channery silt loam, 8 to 15 percent slopes	552	0.1
BrA	Brinkerton silt loam, 0 to 3 percent slopes	10,626	1.5
BrB	Brinkerton silt loam, 3 to 8 percent slopes	6,559	0.9
BtB	Brinkerton very stony silt loam, 0 to 8 percent slopes	6,134	0.9
CaA	Cavode silt loam, 0 to 3 percent slopes	2,891	0.4
CaB	Cavode silt loam, 3 to 8 percent slopes	22,443	3.2
CaC	Cavode silt loam, 8 to 15 percent slopes	7,238	1.0
CbB	Cavode very stony silt loam, 0 to 8 percent slopes	5,996	0.9
ChA	Chavies silt loam, 0 to 3 percent slopes	1,979	0.3
ChB	Chavies silt loam, 3 to 8 percent slopes	612	0.1
CoB	Cookport loam, 3 to 8 percent slopes	4,773	0.7
CoC	Cookport loam, 8 to 15 percent slopes	1,151	0.2
CpB	Cookport very stony loam, 3 to 8 percent slopes	23,814	3.4
CpD	Cookport very stony loam, 8 to 25 percent slopes	5,457	0.8
DhB	Dekalb-Hazleton channery sandy loams, 3 to 8 percent slopes	589	0.1
DkB	Dekalb-Hazleton very stony sandy loams, 3 to 8 percent slopes	2,450	0.4
ErB	Ernest silt loam, 3 to 8 percent slopes	18,219	2.6
ErC	Ernest silt loam, 8 to 15 percent slopes	9,198	1.3
EsB	Ernest very stony silt loam, 3 to 8 percent slopes	14,335	2.1
EsD	Ernest very stony silt loam, 8 to 25 percent slopes	12,200	1.8
FV	Fluvaquents	2,788	0.4
HaB	Hazleton channery sandy loam, 3 to 8 percent slopes	10,205	1.5
HaC	Hazleton channery sandy loam, 8 to 15 percent slopes	3,867	0.6
HaD	Hazleton channery sandy loam, 15 to 25 percent slopes	1,806	0.3
HbB	Hazleton very stony sandy loam, 3 to 8 percent slopes	25,890	3.7

HbD	Hazleton very stony sandy loam, 8 to 25 percent slopes	32,243	4.6
HbF	Hazleton very stony sandy loam, 25 to 65 percent slopes	20,183	2.9
HzB	Hazleton very bouldery sandy loam, 0 to 8 percent slopes	11,484	1.7
HzD	Hazleton very bouldery sandy loam, 8 to 25 percent slopes	7,740	1.1
HzF	Hazleton very bouldery sandy loam, 25 to 60 percent slopes	6,553	0.9
LeB	Leck Kill channery silt loam, 3 to 8 percent slopes	4,268	0.6
LeC	Leck Kill channery silt loam, 8 to 15 percent slopes	7,642	1.1
LeD	Leck Kill channery silt loam, 15 to 25 percent slopes	7,045	1.0
LkB	Leck Kill very stony silt loam, 3 to 8 percent slopes	793	0.1
LkD	Leck Kill very stony silt loam, 8 to 25 percent slopes	5,832	0.8
LmF	Leck Kill soils, 25 to 70 percent slopes	19,229	2.8
MoA	Monongahela silt loam, 0 to 3 percent slopes	659	0.1
MoB	Monongahela silt loam, 3 to 8 percent slopes	277	0.1
NoA	Nolo loam, 0 to 3 percent slopes	2,233	0.3
NoB	Nolo loam, 3 to 8 percent slopes	1,122	0.2
NsB	Nolo very stony loam, 0 to 8 percent slopes	10,702	1.5
Ph	Philo silt loam	2,953	0.4
Po	Pope fine sandy loam	1,723	0.2
Pu	Purdy silt loam	1,411	0.2
Qu	Quarries	147	*
RgB	Rayne-Gilpin channery silt loams, 3 to 8 percent slopes	33,570	4.8
RgC	Rayne-Gilpin channery silt loams, 8 to 15 percent slopes	41,591	6.0
RgD	Rayne-Gilpin channery silt loams, 15 to 25 percent slopes	24,301	3.5
RgF	Rayne-Gilpin channery silt loams, 25 to 65 percent slopes	42,983	6.2
RpB	Rayne-Gilpin very stony silt loams, 3 to 8 percent slopes	12,338	1.8
RpD	Rayne-Gilpin very stony silt loams, 8 to 25 percent slopes	33,721	4.9
Ty	Tyler sit loam	1,221	0.2
UDA	Udorthents, mine spoil, 0 to 8 percent slopes	7,532	1.1
UDD	Udorthents, mine spoil, 8 to 25 percent slopes	12,936	1.9
UDF	Udorthents, mine spoil, 25 to 70 percent slopes	10,046	1.4
UOA	Udorthents, smoothed,	1,256	0.2
WhB	Wharton silt loam, 3 to 8 percent slopes	23,268	3.4
WhC	Wharton silt loam, 8 to 15 percent slopes	11,453	1.6
WhD	Wharton silt loam, 15 to 25 percent slopes	3,014	0.4
WvB	Wharton very stony silt loam, 3 to 8 percent slopes	6,735	1.0
WvD	Wharton very stony silt loam, 8 to 25 percent slopes	5,705	0.8
	Water	1,605	0.2
	Total	694,400	100.0

* Less than 0.1 percent.

Table 5. Yields Per Acre of Crops and Pasture

Soil Name & Map Symbol	Corn	Corn Silage	Oats	Wheat	Alfalfa Hay	Grass-Legume Hay	Pasture
	Bu	Ton	Bu	Bu	Ton	Ton	AUM
AbB – Albrights	100	20	70	40	3.5	3.0	6.5
AbC – Albrights	90	18	65	40	3.5	3.0	6.5
AgB, AgD – Albrights	--	--	--	--	--	--	--
AhB – Allegheny	120	24	75	45	4.5	3.5	8.5
AhC – Allegheny	110	22	70	40	4.0	3.0	8.0
Ar – Armagh	80	16	60	--	--	2.5	5.0
AsB – Armagh	--	--	--	--	--	--	--
At – Atkins	100	20	60	--	--	3.0	5.5
BeB – Berks	80	16	60	35	3.5	3.0	6.5
BeC – Berks	75	15	55	35	3.0	2.5	5.5
BeD – Berks	70	14	50	30	3.0	2.5	5.5
BkB – Berks	70	14	55	30	2.9	2.6	5.4
BkC – Berks	65	13	50	30	2.8	2.4	5.1
BkD – Berks	--	--	--	--	--	--	--
BkF – Berks	--	--	--	--	--	--	--
BnB – Blairton	75	15	60	35	--	2.5	5.0
BnC – Blairton	70	14	55	30	--	2.0	4.0
BrA – Brinkerton	90	18	60	--	--	2.5	5.0
BrB – Brinkerton	90	18	60	--	--	2.5	5.0
BtB – Brinkerton	--	--	--	--	--	--	--
CaA – Cavode	85	17	65	35	--	3.0	5.5
CaB – Cavode	85	17	65	35	--	3.0	5.5
CaC- Cavode	80	16	60	30	--	3.0	5.5
CbB – Cavode	--	--	--	--	--	--	--
ChA – Chavies	120	24	75	45	5.0	3.5	7.0
ChB – Chavies	115	23	75	45	5.0	3.5	7.0
CoB – Cookport	100	20	65	40	3.5	3.0	6.5
CoC – Cookport	90	18	60	35	3.5	3.0	6.5
CpB – Cookport	--	--	--	--	--	--	--
CpD – Cookport	--	--	--	--	--	--	--
DhB, DkB, - Dekalb	--	--	--	--	--	--	--
ErB – Ernest	100	20	65	40	3.5	--	6.5
ErC – Ernest	95	18	60	35	3.5	--	6.5
EsB, EsD – Ernest	--	--	--	--	--	--	--
FV**. – Fluvaquents							
HaB – Hazleton	120	24	70	45	4.5	3.5	5.0

HaC – Hazleton	110	22	65	40	4.5	3.5	5.0
HaD – Hazleton	105	21	55	35	4.0	3.0	4.5
HbB – Hazleton	--	--	--	--	--	--	--
HbD – Hazleton	--	--	--	--	--	--	--
HbF – Hazleton	--	--	--	--	--	--	--
HzB – Hazleton	--	--	--	--	--	--	--
HzD – Hazleton	--	--	--	--	--	--	--
HzF – Hazleton	--	--	--	--	--	--	--
LeB – Leck Kill	125	25	80	50	4.5	3.0	8.0
LeC – Leck Kill	120	24	75	50	4.0	3.0	7.5
LeD – Leck Kill	105	21	70	45	4.0	2.5	7.0
LkB, LkD, LmF, - Leck Kill	--	--	--	--	--	--	--
MoA – Monongahela	110	22	65	40	3.5	3.0	6.5
MoB – Monongahela	110	22	65	40	3.5	3.0	6.5
NoA – Nolo	80	16	60	--	--	2.5	5.0
NoB – Nolo	80	16	60	--	--	2.5	5.0
NsB – Nolo	--	--	--	--	--	--	--
Ph – Philo	130	26	80	45	4.5	3.5	8.5
Po – Pope	130	26	80	45	5.0	3.5	8.5
Pu – Purdy	80	16	55	--	--	2.5	--
Qu**. – Quarries							
RgB – Rayne	100	20	70	45	4.0	3.5	7.0
RgC – Rayne	95	19	65	40	4.0	3.5	7.0
RgD – Rayne	90	18	60	35	3.5	3.0	6.5
RgF, RpB, RpD – Rayne	--	--	--	--	--	--	--
Ty Tyler	95	19	60	30	--	3.0	6.5
UDA**, UDD**, UDF**, UOA**. Udorthents							
WhB – Wharton	90	18	65	40	3.5	3.0	6.5
WhC – Wharton	80	16	60	35	3.5	3.0	6.5
WhD – Wharton	70	14	55	30	3.0	2.5	5.5
WvB, WvD – Wharton	--	--	--	--	--	--	--

* Animal-unit-month: The amount of forage or feed required to feed one animal unit(one cow, one horse, one mule, five sheep, or five goats0 for 30 days.

** See description of the map unit for the composition and behavior characteristics of the map unit.

Table 6. Capability Classes and Subclasses

Miscellaneous areas are excluded. Absence of an entry indicates no acreage.

Class	Total Acreage	Major Management Concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil Problem (s)
		Acres	Acres	Acres
I	3,702	--	--	--
II	105,466	101,854	3,612	--
III	131,515	92,255	39,260	--
IV	71,615	48,854	24,761	--
V	--	--	--	--
VI	266,045	49,790	--	216,255
VII	82,535	42,309	2,788	37,438
VIII	--	--	--	--

Table 7. Woodland Management and Productivity

Soil name & map symbol	Ordination symbol	Management Concerns				Potential productivity		Trees to Plant
		Erosion hazard	Equipment limitations	Seedling mortality	Wind throw hazard	Common trees	Site index	
AbB Albrights	3w	Slight	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar White Ash Red Maple	70 75 70 70	Red Pine, Eastern White Pine, European larch, Norway Spruce, White Spruce
AbC Albrights	3w	Moderate	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar White Ash Red Maple	70 75 70 70	Red Pine, Eastern White Pine, European larch, Norway Spruce, White Spruce
AgB Albrights	3w	Slight	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar White Ash Red Maple	70 75 70 70	Red Pine, Eastern White Pine, European larch, Norway Spruce, White Spruce
AgD Albrights	3r	Severe	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar White Ash Red Maple	70 75 70 70	Red Pine, Eastern White Pine, European larch, Norway Spruce, White Spruce
AhB, AhC Allegheny	2o	Slight	Slight	Slight	Slight	Northern Red Oak Yellow Poplar Virginia Pine Eastern White Pine Shortleaf Pine	80 90 75 90 75	Eastern White Pine Austrian Pine Yellow Poplar Black Walnut European Larch Red Pine Norway Spruce
Ar, AsB Armagh	3w	Slight	Severe	Severe	Severe	Northern Red Oak	70	Eastern White Pine Norway Spruce

At Atkins	1w	Slight	Severe	Severe	Moderate	Pin Oak	100	Eastern White Pine White Spruce
BeB, BeC Berks	3f	Slight	Moderate	Moderate	Slight	Northern Red Oak Black Oak Virginia Pine	70 70 70	Virginia Pine Eastern White Pine Norway Spruce Red pine
BeD Berks	3f	Slight	Slight	Moderate	Slight	Northern Red Oak Black Oak Virginia Pine	70 70 70	Virginia Pine Eastern White Pine Norway Spruce Red pine
BkB*, BkC* Berks	3f	Slight	Slight	Moderate	Slight	Northern Red Oak Black Oak Virginia Pine	70 70 70	Virginia Pine Eastern White Pine Norway Spruce Red pine
Weikert	4d	Slight	Slight	Severe	Moderate	Northern Red Oak Virginia Pine	59 56	Virginia Pine Shortleaf Pine Red Pine Eastern White Pine
Pu Purdy	1w	Slight	Severe	Severe	Severe	Pin Oak Shortleaf Pine Virginia Pine Yellow Poplar	85 75 75 90	Virginia Pine Eastern White Pine
RgB*, RgC* Rayne	2o	Slight	Slight	Slight	Slight	Northern Red Oak Yellow Poplar Virginia Pine Eastern White Pine Shortleaf Pine	80 90 75 90 75	Eastern White Pine Yellow Poplar Black Cherry Virginia Pine Norway Spruce
Gilpin	2o	Slight	Slight	Slight	Slight	Northern Red Oak Yellow Poplar	80 95	European Larch Virginia Pine Eastern White Pine Black Cherry Yellow Poplar
RgD* Rayne	2r	Moderate	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar Virginia Pine Eastern White Pine Shortleaf Pine	80 90 75 90 75	Eastern White Pine Yellow Poplar Black Cherry Virginia Pine Norway Spruce
Gilpin	2r	Moderate	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar	80 95	European Larch Virginia Pine Eastern White Pine Black Cherry Yellow Poplar
RgF* Rayne	2r	Moderate	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar Virginia Pine Eastern White Pine Shortleaf Pine	80 90 75 90 75	Eastern White Pine Yellow Poplar Black Cherry Virginia Pine Norway Spruce
Gilpin	2r	Severe	Severe	Slight	Slight	Northern Red Oak Yellow Poplar	80 95	European Larch Virginia Pine Eastern White Pine Black Cherry Yellow Poplar
RpB* Rayne	20	Slight	Slight	Slight	Slight	Northern Red Oak Yellow Poplar Virginia Pine Eastern White Pine Shortleaf Pine	80 90 75 90 75	Eastern White Pine Yellow Poplar Black Cherry Virginia Pine Norway Spruce
Gilpin	2o	Slight	Slight	Slight	Slight	Northern Red Oak Yellow Poplar	80 95	European Larch Virginia Pine Eastern White Pine Black Cherry Yellow Poplar

RpD* Rayne	2r	Moderate	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar Virginia Pine Eastern White Pine Shortleaf Pine	80 90 75 90 75	Eastern White Pine Yellow Poplar Black Cherry Virginia Pine Norway Spruce
HbF Hazleton	3r	Moderate	Severe	Slight	Slight	Northern Red Oak Yellow Poplar	70 80	European Larch Eastern White Pine Norway spruce Austrian Pine Black Cherry
HzB Hazleton	3o	Slight	Slight	Slight	Slight	Northern Red Oak Yellow Poplar	70 80	European Larch Eastern White Pine Norway spruce Austrian Pine Black Cherry
HzD Hazleton	3r	Slight	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar	70 80	European Larch Eastern White Pine Norway spruce Austrian Pine Black Cherry
HzF Hazleton	3r	Moderate	Severe	Slight	Slight	Northern Red Oak Yellow Poplar	70 80	European Larch Eastern White Pine Norway spruce Austrian Pine Black Cherry
LeB, LeC Leck Kill	3o	Slight	Slight	Slight	Slight	Northern Red Oak	65	Eastern White Pine Virginia Pine
LeD Leck Kill	3r	Slight	Moderate	Slight	Slight	Northern Red Oak	65	Eastern White Pine Virginia Pine
LkB Leck Kill	3o	Slight	Slight	Slight	Slight	Northern Red Oak	65	Eastern White Pine Virginia Pine
LkD Leck Kill	3r	Slight	Moderate	Slight	Slight	Northern Red Oak	65	Eastern White Pine Virginia Pine
LmF* Leck Kill	3r	Moderate	Severe	Slight	Slight	Northern Red Oak	65	Eastern White Pine Virginia Pine
MoA, MoB Monogahela	3w	Slight	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar Virginia Pine Eastern White Pine	70 85 72 77	Eastern White Pine Virginia Pine Yellow Poplar Black Cherry European Larch
NoA, NoB, NsB Nolo	3w	Slight	Severe	Severe	Moderate	Northern Red Oak Black Cherry	70 70	Eastern White Pine Norway Spruce Red Maple
Ph Philo	1w	Slight	Moderate	Slight	Slight	Virginia Pine Northern Red Oak Yellow Poplar Shortleaf Pine	74 85 102 80	Eastern White Pine Yellow Poplar
Po Pope	2o	Slight	Slight	Slight	Slight	Northern Red Oak Yellow Poplar Eastern White Pine Virginia Pine	80 102 89 74	Eastern White Pine Yellow Poplar Black Walnut Black Cherry Norway Spruce European Larch
CpD Cookport	2w	Moderate	Moderate	Slight	Slight	Northern Red Oak Black Cherry Yellow Poplar White Ash Sugar Maple	76 92 92 86 80	Yellow Poplar Eastern White Pine European Larch Norway Spruce
DhB Dekalb	3f	Slight	Slight	Moderate	Slight	Northern Red Oak Black Cherry White Ash	70 88 80	Norway Spruce Yellow Poplar Black Cherry
Hazleton	3o	Slight	Slight	Slight	Slight	Northern Red Oak Yellow Poplar	70 80	European Larch Eastern White Pine Norway Spruce Austrian Pine Black Cherry

DkB*, Dekalb	3f	Slight	Slight	Moderate	Slight	Northern Red Oak Black Cherry White Ash	70 88 80	Norway Spruce Yellow Poplar Black Cherry
Hazleton	3o	Slight	Slight	Slight	Slight	Northern Red Oak Yellow Poplar	70 80	European Larch Eastern White Pine Norway Spruce Austrian Pine Black Cherry
ErB Ernest	2w	Slight	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar	80 90	Eastern White Pine Norway Spruce
ErC Ernest	2w	Moderate	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar	80 90	Eastern White Pine Norway Spruce
EsB Ernest	2w	Moderate	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar White Ash Black Walnut	80 90 80 80	Eastern White Pine Norway Spruce
EsD Ernest	2w	Severe	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar White Ash Black Walnut	80 90 80 80	Eastern White Pine Norway Spruce
HaB, HaC Hazelton	3o	Slight	Slight	Slight	Slight	Northern Red Oak Yellow Poplar	70 80	European Larch Eastern White Pine Norway Spruce Austrian Pine Black Cherry
HaD Hazleton	3r	Slight	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar	70 80	European Larch Eastern White Pine Norway Spruce Austrian Pine Black Cherry
HbB Hazleton	3o	Slight	Slight	Slight	Slight	Northern Red Oak Yellow Poplar	70 80	European Larch Eastern White Pine Norway Spruce Austrian Pine Black Cherry
HbD Hazleton	3r	Slight	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar	70 80	European Larch Eastern White Pine Norway Spruce Austrian Pine Black Cherry
BkD*, Berks	3f	Slight	Moderate	Moderate	Slight	Northern Red Oak Black Oak Virginia Pine	70 70 70	Virginia Pine Eastern White Pine Norway Spruce Red Pine
Weikert	4d	Slight	Moderate		Moderate	Northern Red Oak Virginia Pine	64 60	Eastern White Pine Shortleaf Pine Virginia Pine
BkF*, Berks	3f	Moderate	Severe	Moderate	Slight	Northern Red Oak Black Oak Virginia Pine	70 70 70	Virginia Pine Eastern White Pine Norway Spruce Red Pine
Weikert	4d	Slight	Severe	Severe	Moderate	Northern Red Oak Virginia Pine	64 60	Eastern White Pine Shortleaf Pine Virginia Pine
BnB Blairton	3w	Slight	Moderate	Slight	Slight	Northern Red Oak White Ash Sugar Maple Yellow Poplar	70 70 70 80	Yellow Poplar European Larch Eastern White Pine Norway Spruce
BnC Blairton	3w	Moderate	Moderate	Slight	Slight	Northern Red Oak White Ash Sugar Maple Yellow Poplar	70 70 70 80	Yellow Poplar European Larch Eastern White Pine Norway Spruce

BrA, BrB, BtB Brinkerton	2w	Slight	Severe	Severe	Moderate	Northern Red Oak	77	Eastern White Pine White Spruce Red Maple Yellow Poplar
CaA, CaB Cavode	2w	Slight	Moderate	Moderate	Moderate	Northern Red Oak Yellow Poplar	83 95	Eastern White Pine Yellow Poplar Black Cherry Norway Spruce White Pine
CaC Cavode	2w	Moderate	Moderate	Moderate	Moderate	Northern Red Oak Yellow Poplar	83 95	Eastern White Pine Yellow Poplar Black Cherry Norway Spruce White Pine
CbB Cavode	2w	Slight	Moderate	Moderate	Moderate	Northern Red Oak Yellow Poplar	83 95	Eastern White Pine Yellow Poplar Black Cherry Norway Spruce White Pine
ChA, ChB Chavies	2o	Slight	Slight	Slight	Slight	Northern Red Oak Yellow Poplar Pin Oak Black Walnut Black Cherry Sugar Maple	80 90 90 80 92 80	Eastern White Pine Yellow Poplar Black Walnut
CoB, CoC Cookport	2w	Slight	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar Black Cherry White Ash Sugar Maple	76 92 92 86 80	Yellow Poplar Eastern White Pine Black Cherry European Larch Norway Spruce
CpB Cookport	2w	Slight	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar Black Cherry White Ash Sugar Maple	76 92 92 86 80	Yellow Poplar Eastern White Pine European Larch Norway Spruce
RpD*, Gilpin	2r	Moderate	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar	80 95	Yellow Poplar Eastern White Pine Black Cherry Virginia Pine Norway Spruce
Ty Tyler	2d	Slight	Moderate	Moderate	Moderate	Northern Red Oak Yellow Poplar Pin Oak Red Maple White Ash	80 90 90 80 80	Eastern White Pine Yellow Poplar
WhB Wharton	2o	Slight	Slight	Slight	Slight	Northern Red Oak Yellow Poplar	76 90	Eastern White Pine Yellow Poplar
WhC Wharton	2r	Moderate	Slight	Slight	Slight	Northern Red Oak Yellow Poplar	76 90	Eastern White Pine Yellow Poplar
WhD Wharton	2r	Severe	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar	76 90	Eastern White Pine
WvB Wharton	20	Slight	Slight	Slight	Slight	Northern Red Oak Yellow Poplar	76 90	Yellow Poplar
WvD Wharton	2r	Moderate	Moderate	Slight	Slight	Northern Red Oak Yellow Poplar	76 90	Eastern White Pine Yellow Poplar

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 8. Building Site Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil Name and Map Symbol	Shallow Excavation	Dwellings without Basements	Dwellings with Basements	Small Commercial Buildings	Local Roads and Streets	Lawns and Landscaping
AbB Albrights	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: wetness, frost action	Moderate: wetness
AbC Albrights	Severe: wetness	Severe: wetness	Severe: wetness	Severe: slope, wetness	Moderate: slope, wetness, frost action	Moderate: slope, wetness
AgB Albrights	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: wetness, frost action	Moderate: large stones, wetness
AgD Albrights	Severe: slope, wetness	Severe: slope, wetness	Severe: slope, wetness	Severe: slope, wetness	Severe: slope	Severe: slope
AhB Allegheny	Slight	Moderate	Slight	Moderate: slope, frost action	Moderate: low strength, frost action	Slight
AhC Allegheny	Moderate: slope	Moderate: slope, frost action	Moderate: slope	Severe: slope	Moderate: slope, low strength, frost action	Moderate: slope
Ar, AsB Armagh	Severe: wetness	Severe: wetness, frost action	Severe: wetness	Severe: wetness, frost action	Severe: wetness, frost action	Severe wetness
At Atkins	Severe: floods, wetness	Severe: floods, wetness	Severe: floods, wetness	Severe: floods, wetness	Severe: floods, wetness	Severe: floods, wetness
BeB Berks	Moderate: depth to rock	Slight	Moderate: depth to rock	Moderate: slope	Slight	
BeC Berks	Moderate: slope, depth to rock	Moderate: slope	Moderate: slope, depth to rock	Severe: slope	Moderate: slope	Severe: small stones
BeD Berks	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
BkB* Berks	Moderate: depth to rock	Slight	Moderate: depth to rock	Moderate: slope	Slight	Severe: small stones
Weikert	Severe: depth to rock	Moderate: depth to rock, frost action	Moderate: depth to rock	Moderate: slope, depth to rock	Moderate: depth to rock, frost action	Moderate: small stones, depth to rock
BkC* Berks	Moderate: slope, depth to rock	Moderate: slope	Moderate: slope depth to rock	Severe: slope	Moderate: slope	Severe: small stones
Weikert	Severe: depth to rock	Moderate: slope, depth to rock, frost action	Moderate: slope depth to rock	Severe: slope	Moderate: slope, depth to rock, frost action	Moderate: slope, small stones, depth to rock
BkD*, BkF* Berks	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Weikert	Severe: slope, depth to rock	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
BnB Blairton	Severe:	Severe:	Severe:	Severe:	Severe: frost	Moderate:

	wetness	wetness, frost action	wetness	wetness, frost action	action	depth to rock, wetness
BnC Blairton	Severe: wetness	Severe: wetness, frost action	Severe: wetness	Severe: slope, wetness	Severe: frost action	Moderate: slope, depth to rock, wetness
BrA, BrB, BtB Brinkerton	Severe: wetness	Severe: wetness, frost action	Severe: wetness	Severe: wetness, frost action	Severe: wetness, frost action	Severe: wetness
CaA, CaB Cavode	Severe: wetness	Severe: wetness, frost action	Severe: wetness	Severe: wetness, frost action	Severe: frost action	Moderate: wetness
CaC Cavode	Severe: wetness	Severe: wetness, frost action	Severe: wetness	Severe: slope, wetness	Severe: frost action	Moderate: wetness, slope
CbB Cavode	Severe: wetness	Severe: wetness, frost action	Severe: wetness	Severe: wetness, frost action	Severe: frost action	Moderate: large stones, wetness
ChA, ChB Chavies	Moderate: floods	Severe: floods	Severe: floods	Severe: floods	Moderate: floods	Slight
CoB Cookport	Severe: wetness	Severe: wetness, frost action	Severe: wetness	Severe: wetness, frost action	Moderate: frost action	Slight
CoC Cookport	Severe: wetness	Severe: wetness, frost action	Severe: wetness	Severe: slope	Moderate: frost action	Moderate: slope
CpB Cookport	Severe: wetness	Moderate: large stones	Severe: wetness	Moderate: large stones, wetness	Moderate: frost action	Moderate: large stones
CpD Cookport	Severe: slope, wetness	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
DhB* Dekalb	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: slope, depth to rock	Moderate: depth to rock	Severe: small stones
Hazleton	Moderate: small stones	Moderate: frost action	Slight	Moderate: slope, frost action	Moderate: frost action	Moderate: small stones
DkB* Dekalb	Severe: depth to rock	Moderate: depth to rock, large stones	Severe: depth to rock	Moderate: slope, depth to rock, large stones	Moderate: depth to rock	Severe: small stones
Hazleton	Moderate: large stones	Moderate: large stones, frost action	Moderate: large stones	Moderate: slope, large stones	Moderate: frost action	Moderate: large stones
ErB Ernest	Severe: wetness	Moderate: wetness, frost action, shrink-swell	Severe: wetness	Moderate: slope, wetness, frost action	Moderate: frost action	Slight
ErC Ernest	Severe: wetness	Moderate: wetness, frost action, slope	Severe: wetness	Severe: slope	Moderate: slope, frost action	Moderate: slope
EsB Ernest	Severe: wetness	Moderate: large stones, wetness	Severe: wetness	Moderate: slope, large stones	Moderate: frost action	Moderate: large stones
EsD Ernest	Severe: slope, wetness	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
FV* Fluvaquents						
HaB Hazleton	Moderate: small stones	Moderate: frost action	Slight	Moderate: slope, frost action	Moderate: frost action	Moderate: small stones

HaC Hazleton	Moderate: slope, small stones	Moderate: slope, frost action	Moderate: slope	Severe: slope	Moderate: slope, frost action	Moderate: slope, small stones
HaD Hazleton	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
HbB Hazleton	Moderate: large stones	Moderate: large stones, Frost action	Moderate: large stones	Moderate: slope, large stones	Moderate: frost action	Moderate: large stones
HbD, HbF Hazleton	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
HzB Hazleton	Moderate: large stones	Moderate: large stones, frost action	Moderate: large stones	Moderate: slope, large stones	Moderate: frost action	Moderate: small stones
HzD Hazleton	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
HzF Hazleton	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
LeB Leck Kill	Moderate: depth to rock	Moderate: frost action	Slight	Moderate: slope, frost action	Moderate: frost action	Moderate: small stones
LeC Leck Kill	Moderate: slope, depth to rock	Moderate slope, frost action	Moderate: slope	Severe: slope	Moderate slope, frost action	Moderate: slope, small stones
LeD Leck Kill	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
LkB Leck Kill	Moderate: depth to rock	Moderate: frost action, large stones	Moderate: large stones	Moderate slope, frost action	Moderate: frost action	Moderate: large stones
LkD Leck Kill	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
LmF* Leck Kill	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
MoA, MoB Monongahela	Severe: wetness	Severe: frost action	Moderate: wetness	Severe: frost action	Severe: frost action	Slight
NoA, NoB Nolo	Severe: wetness	Severe: wetness, frost action	Severe: wetness	Severe: wetness, frost action	Severe: wetness, frost action	Severe: wetness
NsB Nolo	Severe: wetness	Severe: wetness, frost action	Severe: wetness	Severe: wetness	Severe: wetness, frost action	Severe: wetness
Ph Philo	Severe: floods, wetness	Severe: floods	Severe: floods, wetness	Severe: floods, wetness	Severe: floods	Moderate: floods
Po Pope	Severe: floods	Severe: floods	Severe: floods	Severe: floods	Severe: floods	Moderate: floods
Pu Purdy	Severe: wetness, too clayey	Severe: wetness, frost action	Severe: wetness	Severe: wetness, frost action	Severe: wetness, low strength	Severe: wetness
Qu* Quarries						
RgB*, Rayne	Slight	Moderate: frost action	Slight	Moderate: slope, frost action	Moderate: frost action	Moderate: small stones
Gilpin	Moderate: depth to rock	Moderate: frost action	Moderate: depth to rock	Moderate: slope, frost action	Moderate: depth to rock, frost action	Moderate: depth to rock, small stones
RgC* Rayne	Moderate: slope	Moderate: slope, frost action	Moderate: slope	Severe: slope	Moderate: slope, frost action low strength	Moderate: slope, depth to rock, small stones
Gilpin	Moderate: slope, depth to rock	Moderate: slope, frost action	Moderate: slope, depth to rock	Severe: slope	Moderate: slope, frost action	Moderate: slope, depth to rock, small stones
RgD*, RgF* Rayne	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Gilpin	Severe: slope	Severe: slope	Severe: depth	Severe: slope	Severe: slope	Severe: slope

			to rock, slope			
RpB* Rayne	Moderate: large stones	Moderate: large stones, frost action	Moderate: large stones	Moderate: slope, frost action	Moderate: frost action, low strength	Moderate: large stones, small stones
Gilpin	Moderate: large stones, depth to rock	Moderate: large stones, depth to rock, frost action	Moderate: depth to rock, slope	Moderate: slope, frost action	Moderate: frost action	Moderate: large stones, depth to rock
RpD* Rayne	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Gilpin	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Ty Tyler	Severe: wetness	Severe: wetness, frost action	Severe: wetness	Severe: wetness	Severe: wetness, frost action, low strength	Severe: wetness
UDA*, UDD*, UDF*, UOA* Udorthents						
WhB Wharton	Severe: wetness	Severe: frost action	Severe: wetness	Severe: frost action	Severe: frost action	Moderate: too clayey
WhC Wharton	Severe: wetness	Severe: frost action	Severe: wetness	Severe: slope	Severe: frost action	Moderate: too clayey
WhD Wharton	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
WvB Wharton	Severe: wetness	Severe: frost action	Severe: wetness	Severe: frost action	Severe: frost action	Moderate: large stones
WvD Wharton	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

* See description of the map unit for the composition and behavior characteristics of the map unit.

Table 9. Sanitary Facilities

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," and "fair." Absence of an entry indicates that a soil was not rated.

Soil Name and Map Symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AbB Albrights	Severe: wetness, percs slowly	Moderate: slope	Severe: wetness	Severe: wetness	Fair: thin layer
AbC Albrights	Severe: wetness, percs slowly	Severe: slope	Severe: wetness	Severe: wetness	Fair: thin layer, slope
AgB Albrights	Severe: wetness, percs slowly	Moderate: slope, large stones	Severe: wetness	Severe: wetness	Fair: thin layer, large stones
AgD Albrights	Severe: slope, wetness	Severe: slope	Severe: wetness	Severe: slope, wetness	Poor: slope
AhB Allegheny	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Good
AhC Allegheny	Moderate: slope	Severe: slope, seepage	Severe: seepage	Severe: seepage	Fair: slope
Ar Armagh	Severe: wetness, percs slowly	Slight	Severe: wetness	Severe: wetness	Poor: wetness
AsB Armagh	Severe: wetness, percs slowly	Moderate: slope	Severe: wetness	Severe: wetness	Poor: wetness
At Atkins	Severe: floods, wetness	Severe: floods, wetness, seepage	Severe: floods, wetness, seepage	Severe: floods, wetness, seepage	Poor: wetness
BeB Berks	Severe: depth to rock	Severe: seepage, depth to rock, small stones	Severe: depth to rock, seepage	Severe: seepage	Poor: small stones
BeC Berks	Severe: depth to	Severe: seepage,	Severe: depth to	Severe: seepage	Poor: small

	rock	depth to rock, slope	rock, seepage		stones
BeD Berks	Severe: depth to rock, slope	Severe: seepage, depth to rock, slope	Severe: depth to rock, seepage	Severe: seepage, slope	Poor: small stones, slope
BkB* Berks	Severe: depth to rock	Severe: seepage, depth to rock, small stones	Severe: depth to rock, seepage	Severe: seepage	Poor: small stones
Weikert	Severe: depth to rock	Severe: seepage, depth to rock	Severe: depth to rock, seepage	Severe: seepage	Poor: thin layer
BkC* Berks	Severe: depth to rock	Severe: seepage, depth to rock, slope	Severe: depth to rock, seepage	Severe: seepage	Poor: small stones
Weikert	Severe: depth to rock	Severe: seepage, depth to rock, slope	Severe: depth to rock, seepage	Severe: seepage	Poor: thin layer
BkD* Berks	Severe: depth to rock, slope	Severe: seepage, depth to rock, slope	Severe: depth to rock, seepage	Severe: seepage, slope	Poor: small stones, slope
Weikert	Severe: depth to rock, slope	Severe: seepage, depth to rock, slope	Severe: depth to rock, seepage	Severe: seepage, slope	Poor: slope, thin layer
BkF* Berks	Severe: depth to rock, slope	Severe: seepage, depth to rock, slope	Severe: seepage, depth to rock, slope	Severe: seepage, slope	Poor: small stones, slope
Weikert	Severe: depth to rock, slope	Severe: seepage, depth to rock, slope	Severe: seepage, depth to rock, slope	Severe: seepage, slope	Poor: slope, thin layer
BnB Blairton	Severe: wetness, percs slowly, depth to rock	Severe: wetness, depth to rock	Severe: wetness, depth to rock	Severe: wetness	Fair: thin layer, small stones
BnC Blairton	Severe: wetness, percs slowly, depth to rock	Severe: wetness, depth to rock, slope	Severe: wetness, depth to rock	Severe: wetness	Fair: thin layer, small stones, slope
BrA Brinkerton	Severe: wetness, percs slowly	Slight	Severe: wetness	Severe: wetness	Poor: wetness
BrB Brinkerton	Severe: wetness, percs slowly	Moderate: slope	Severe: wetness	Severe: wetness	Poor: wetness
BtB Brinkerton	Severe: wetness, percs slowly	Moderate: slope, large stones	Severe: wetness	Severe: wetness	Poor: wetness
CaA, CaB Cavode	Severe: wetness, percs slowly	Moderate: depth to rock	Severe: wetness	Severe: wetness	Poor: too clayey
CaC Cavode	Severe: wetness, percs slowly	Severe: slope	Severe: wetness	Severe: wetness	Poor: too clayey
CbB Cavode	Severe: wetness, percs slowly	Moderate: depth to rock	Severe: wetness	Severe: wetness	Poor: too clayey
ChA, ChB Chavies	Moderate: floods	Severe: seepage	Severe: seepage	Severe: seepage	Good
CoB Cookport	Severe: wetness, percs slowly	Moderate: slope	Severe: wetness	Severe: wetness	Fair: thin layer
CoC Cookport	Severe: wetness, percs slowly	Severe: slope	Severe: wetness	Severe: wetness	Fair: thin layer
CpB Cookport	Severe: wetness, percs slowly	Moderate: slope	Severe: wetness	Severe: wetness	Fair: thin layer, large stones
CpD Cookport	Severe: slope, wetness	Severe: slope	Severe: wetness	Severe: wetness, slope	Poor: slope
DhB* Dekalb	Severe: depth to rock	Severe: seepage, depth to rock, small stones	Severe: seepage, depth to rock	Severe: seepage	Poor: small stones
Hazleton	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Poor: small stones

DkB* Dekalb	Severe: depth to rock	Severe: seepage, depth to rock, small stones	Severe: seepage, depth to rock	Severe: seepage	Poor: small stones
Hazleton	Moderate: large stones	Severe: seepage	Severe: seepage	Severe: seepage	Poor: small stones
ErB Ernest	Severe: wetness, percs slowly	Moderate: slope	Severe: wetness	Severe: wetness	Fair: thin layer
ErC Ernest	Severe: wetness, percs slowly	Severe: slope	Severe: wetness	Severe: wetness	Fair: thin layer
EsB Ernest	Severe: wetness, percs slowly	Moderate: slope, large stones	Severe: wetness	Severe: wetness	Fair: thin layer, large stones
EsD Ernest	Severe: wetness, percs slowly, slope	Severe: slope	Severe: wetness	Severe: wetness, slope	Poor: slope
FV* Fluvaquents					
HaB Hazleton	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Poor: small stones
HaC Hazleton	Moderate: slope	Severe: seepage, slope	Severe: seepage	Severe: seepage	Poor: small stones
HaD Hazleton	Severe: slope	Severe: seepage, slope	Severe: seepage	Severe: seepage, slope	Poor: slope, small stones
HbB Hazleton	Moderate: depth to rock, large stones	Severe: seepage	Severe: seepage	Severe: seepage	Poor: small stones
HbD Hazleton	Severe: slope	Severe: seepage, slope	Severe: seepage	Severe: seepage, slope	Poor: slope, small stones
HbF Hazleton	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: slope, small stones
HzB Hazleton	Moderate: large stones	Severe: seepage	Severe: seepage	Severe: seepage	Poor: small stones
HzD Hazleton	Severe: slope	Severe: seepage, slope	Severe: seepage	Severe: seepage, slope	Poor: slope, small stones
HzF Hazleton	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: slope, small stones
LeB Leck Kill	Moderate: wetness	Severe: seepage	Severe: seepage, wetness	Severe: seepage	Fair: small stones
LeC Leck Kill	Moderate: wetness, slope	Severe: seepage, slope	Severe: seepage, wetness	Severe: seepage	Fair: slope, small stones
LeD Leck Kill	Severe: slope	Severe: seepage, slope	Severe: seepage, wetness	Severe: seepage, slope	Poor: slope
LkB Leck Kill	Moderate: large stones, wetness	Severe: seepage	Severe: seepage, wetness	Severe: seepage	Fair: large stones
LkD Leck Kill	Severe: slope	Severe: seepage, slope	Severe: seepage, wetness	Severe: seepage, slope	Severe: slope
LmF* Leck Kill	Severe: slope	Severe: slope	Severe: slope	Severe: seepage, slope	Poor: slope
MoA Monongahela	Severe: wetness, percs slowly	Moderate: seepage	Severe: wetness	Severe: wetness	Fair: thin layer
MoB Monongahela	Severe: wetness, percs slowly	Moderate: seepage, slope	Severe: wetness	Severe: wetness	Fair: thin layer
NoA, NoB, NsB Nolo	Severe: wetness, percs slowly	Severe: wetness	Severe: wetness	Severe: wetness	Poor: wetness
Ph Philo	Severe: floods, wetness	Severe: floods, wetness	Severe: floods, wetness	Severe: floods, wetness	Good
Po Pope	Severe: floods	Severe: floods, seepage	Severe: floods, seepage	Severe: floods	Good
Pu Purdy	Severe: wetness, percs slowly	Slight	Severe: wetness, too clayey	Severe: wetness	Poor: wetness, too clayey
Qu* Quarries					

RgB*, Rayne	Moderate: depth to rock, wetness	Moderate: slope, depth to rock, seepage	Severe: wetness	Moderate: wetness	Fair: thin layer
Gilpin	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Slight	Fair: thin layer, small stones
RgC* Rayne	Moderate: slope, depth to rock, wetness	Severe: slope	Severe: wetness	Moderate: slope, wetness	Fair: slope, thin layer
Gilpin	Severe: depth to rock	Severe: depth to rock, slope	Severe: depth to rock	Moderate: slope	Fair: small stones slope
RgD* Rayne	Severe: Slope	Severe: Slope	Severe: wetness	Severe: Slope	Poor: slope
Gilpin	Severe: depth to rock, slope	Severe: depth to rock, slope	Severe: depth to rock	Severe: Slope	Poor: slope
RgF* Rayne	Severe: Slope	Severe: Slope	Severe: Slope	Severe: Slope	Poor: slope
Gilpin	Severe: depth to rock, slope	Severe: depth to rock	Severe: depth to rock	Severe: Slope	Poor: slope
RpB* Rayne	Moderate: depth to rock, large stones, wetness	Moderate: slope, seepage	Severe: wetness	Moderate: wetness	Fair: large stones, small stones, thin layer
Gilpin	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Slight	Fair: thin layer, large stones
RpD* Rayne	Severe: slope	Severe: slope	Severe: wetness	Severe: slope	Poor: slope
Gilpin	Severe: depth to rock, slope	Severe: depth to rock, slope	Severe: depth to rock	Severe: slope	Poor: slope
Ty Tyler	Severe: percs slowly, wetness	Slight	Severe: wetness	Severe: wetness	Fair: too clayey
UDA*, UDD*, UDF*, UOA* Udorthents					
WhB Wharton	Severe: percs slowly, wetness	Moderate: depth to rock	Severe: depth to rock, wetness	Severe: wetness	Poor: too clayey
WhC Wharton	Severe: percs slowly, wetness	Severe: slope	Severe: depth to rock, wetness	Severe: wetness	Poor: too clayey
WhD Wharton	Severe: slope, wetness	Severe: slope	Severe: depth to rock, wetness	Severe: wetness, slope	Poor: too clayey, slope
WvB Wharton	Severe: percs slowly, wetness	Moderate: depth to rock, large stones	Severe: depth to rock, wetness	Severe: wetness	Poor: too clayey
WvD Wharton	Severe: percs slowly, wetness, slope	Severe: slope	Severe: depth to rock, wetness	Severe: wetness, slope	Poor: too clayey, slope

* See description of the map unit for the composition and behavior characteristics of the map unit.

Table 10. Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," and "fair." Absence of an entry indicates that a soil was not rated.

Soil Name and	Roadfill	Sand	Gravel	Topsoil

Map Symbol				
AbB Albrights	Fair: frost action, low strength	Unsuited: excess fines	Unsuited: excess fines	Good
AbC Albrights	Fair: frost action, low strength	Unsuited: excess fines	Unsuited: excess fines	Fair: slope
AgB Albrights	Fair: frost action, low strength	Unsuited: excess fines	Unsuited: excess fines	Poor: large stones
AgD Albrights	Fair: frost action, low strength	Unsuited: excess fines	Unsuited: excess fines	Poor: large stones, slope
AhB Allegheny	Fair: frost action, low strength	Unsuited: excess fines	Unsuited: excess fines	Fair: thin layer
AhC Allegheny	Fair: frost action, low strength	Unsuited: excess fines	Unsuited: excess fines	Fair: thin layer, slope
Ar Armagh	Poor: wetness, frost action	Unsuited: excess fines	Unsuited: excess fines	Poor: wetness
AsB Armagh	Poor: wetness, frost action	Unsuited: excess fines	Unsuited: excess fines	Poor: wetness, large stones
At Atkins	Poor: wetness, frost action	Unsuited: excess fines	Unsuited: excess fines	Poor: wetness
BeB, BeC Berks	Poor: thin layer	Unsuited: excess fines	Unsuited: excess fines	Poor: small stones
BeD Berks	Poor: thin layer	Unsuited: excess fines	Unsuited: excess fines	Poor: small stones, slope
BkB*, BkC Berks	Poor: thin layer	Unsuited: excess fines	Unsuited: excess fines	Poor: small stones
Weikert	Poor: thin layer	Unsuited: excess fines	Poor: excess fines	Poor: small stones, thin layer
BkD* Berks	Poor: thin layer	Unsuited: excess fines	Unsuited: excess fines	Poor: small stones, slope
Weikert	Poor: thin layer	Unsuited: excess fines	Poor: excess fines	Poor: small stones, slope,thin layer
BkF* Berks	Poor: thin layer, slope	Unsuited: excess fines	Unsuited: excess fines	Poor: slope, small stones
Weikert	Poor: thin layer, slope	Unsuited: excess fines	Poor: excess fines	Poor: slope, small stones, thin layer
BnB, BnC Blairton	Poor: frost action	Unsuited: excess fines	Unsuited: excess fines	Poor: small stones
BrA, BrB, BtB Brinkerton	Poor: wetness, frost action, low strength	Unsuited: excess fines	Unsuited: excess fines	Poor: wetness
CaA, CaB, CaC Cavode	Poor: frost action	Unsuited: excess fines	Unsuited: excess fines	Fair: thin layer
CbB Cavode	Poor: frost action	Unsuited: excess fines	Unsuited: excess fines	Poor: large stones
ChA, ChB Chavies	Fair: low strength, frost action	Poor: excess fines	Unsuited: excess fines	Good
CoB Cookport	Fair: low strength, frost action	Unsuited: excess fines	Unsuited: excess fines	Good
CoC Cookport	Fair: low strength, frost action	Unsuited: excess fines	Unsuited: excess fines	Fair: slope
CpB Cookport	Fair: low strength, frost action	Unsuited: excess fines	Unsuited: excess fines	Poor: large stones
CpD Cookport	Fair: low strength, frost action, slope	Unsuited: excess fines	Unsuited: excess fines	Poor: large stones, slope
DhB* Dekalb	Poor: thin layer	Poor: excess fines	Poor: excess fines	Poor: small stones
Hazleton	Fair: frost action	Poor: excess fines	Poor: excess fines	Poor: small stones
DkB* Dekalb	Poor: thin layer	Poor: excess fines	Poor: excess fines	Poor: small stones, large stones
Hazleton	Fair: frost action	Poor: excess fines	Poor: excess fines	Poor: small stones, large stones
ErB Ernest	Fair: frost action, shrink-swell	Unsuited: excess fines	Unsuited: excess fines	Good
ErC Ernest	Fair: frost action, shrink-swell	Unsuited: excess fines	Unsuited: excess fines	Fair: slope
EsB Ernest	Fair: frost action,	Unsuited: excess fines	Unsuited: excess fines	Poor: large stones

	shrink-swell			
EsD Ernest	Fair: frost action, shrink-swell, slope	Unsuited: excess fines	Unsuited: excess fines	Poor: slope
FV* Fluvaquents				
HaB, HaC Hazleton	Fair: frost action	Poor: excess fines	Poor: excess fines	Poor: small stones
HaD Hazleton	Fair: frost action, slope	Poor: excess fines	Poor: excess fines	Poor: small stones, slope
HbB Hazleton	Fair: frost action	Poor: excess fines	Poor: excess fines	Poor: small stones, large stones
HbD Hazleton	Fair: frost action, slope	Poor: excess fines	Poor: excess fines	Poor: small stones, large stones, slope
HbF Hazleton	Severe: slope	Poor: excess fines	Poor: excess fines	Poor: small stones, large stones, slope
HzB Hazleton	Fair: frost action	Poor: excess fines, large stones	Poor: excess fines, large stones	Poor: small stones, large stones
HzD Hazleton	Fair: frost action, slope	Poor: excess fines	Poor: excess fines	Poor: small stones, large stones, slope
HzF Hazleton	Poor: slope	Poor: excess fines	Poor: excess fines	Poor: small stones, large stones, slope
LeB, LeC Leck Kill	Fair: frost action	Unsuited: excess fines	Unsuited: excess fines	Poor: small stones
LeD Leck Kill	Fair: frost action, slope	Unsuited: excess fines	Unsuited: excess fines	Poor: small stones, slope
LkB Leck Kill	Fair: frost action	Unsuited: excess fines	Unsuited: excess fines	Poor: large stones
LkD Leck Kill	Fair: frost action, slope	Unsuited: excess fines	Unsuited: excess fines	Poor: slope, large stones
LmF* Leck Kill	Poor: slope	Unsuited: excess fines	Unsuited: excess fines	Poor: slope
MoA, MoB Monongahela	Poor: frost action	Unsuited: excess fines	Unsuited: excess fines	Fair: thin layer
NoA, NoB, Nolo	Poor: wetness, frost action, low strength	Unsuited: excess fines	Unsuited: excess fines	Poor: wetness
NsB Nolo	Poor: wetness, frost action, low strength	Unsuited: excess fines	Unsuited: excess fines	Poor: wetness, large stones
Ph Philo	Fair: frost action, low strength	Poor: excess fines	Unsuited: excess fines	Good
Po Pope	Fair: frost action, low strength	Poor: excess fines	Unsuited: excess fines	Good
Pu Purdy	Poor: wetness, low strength	Unsuited: excess fines	Unsuited: excess fines	Poor: wetness
Qu* Quarries				
RgB*, RgC Rayne	Fair: frost action, low strength	Unsuited: excess fines	Unsuited: excess fines	Poor: small stones
Gilpin	Poor: thin layer	Unsuited: excess fines	Unsuited: excess fines	Poor: small stones
RgD* Rayne	Fair: frost action, low strength, slope	Unsuited: excess fines	Unsuited: excess fines	Poor: small stones, slope
Gilpin	Poor: thin layer	Unsuited: excess fines	Unsuited: excess fines	Poor: small stones, slope
RgF* Rayne	Poor: slope	Unsuited: excess fines	Unsuited: excess fines	Poor: small stones, slope
Gilpin	Poor: thin layer, slope	Unsuited: excess fines	Unsuited: excess fines	Poor: small stones, slope
RpB* Rayne	Fair: frost action, low strength	Unsuited: excess fines	Unsuited: excess fines	Poor: large stones
Gilpin	Poor: thin layer	Unsuited: excess fines	Unsuited: excess fines	Poor: large stones
RpD* Rayne	Fair: frost action, low strength, slope	Unsuited: excess fines	Unsuited: excess fines	Poor: large stones, slope
Gilpin	Poor: thin layer	Unsuited: excess fines	Unsuited: excess fines	Poor: large stones,

				slope
Ty Tyler	Poor: wetness, low strength	Unsuited: excess fines	Unsuited: excess fines	Poor: wetness
UDA*, UDD*, UDF*, UOA* Udorthents				
WhB, WhC Wharton	Fair: frost action, low strength	Unsuited: excess fines	Unsuited: excess fines	Fair: thin layer
WhD Wharton	Fair: frost action, low strength	Unsuited: excess fines	Unsuited: excess fines	Poor: slope
WvB Wharton	Fair: frost action, low strength	Unsuited: excess fines	Unsuited: excess fines	Poor: large stones
WvD Wharton	Fair: frost action, low strength	Unsuited: excess fines	Unsuited: excess fines	Poors: slopes, large stones

* See description of the map unit for the composition and behavior characteristics of the map unit.

Table 11. Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. Absence of an entry indicates that a soil was not evaluated.)

Soil Name and Map Symbol	Pond reservoir areas	Embankments, disks, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
AbB, AbC Albrights	Slope	Piping, low strength	Deep to water	Percs slowly, wetness	Slope, percs slowly	Percs slowly, wetness
AgB, AgD Albrights	Slope	Large stones, piping, low strength	Deep to water, large stones	Percs slowly, wetness	Slope, large stones, percs slowly	Percs slowly, wetness, large stones
AhB Allegheny	Seepage	Seepage, piping	No water	Not needed	Favorable	Favorable
AhC Allegheny	Seepage	Seepage, piping	No water	Not needed	Favorable	Slope
Ar Armagh	Favorable	Low strength	Favorable	Wetness, percs slowly	Not needed	Wetness, percs slowly
AsB Armagh	Favorable	Low strength, large stones	Large stones	Wetness, percs slowly	Not needed	Wetness, large stones, perc slowly
At Atkins	Seepage, wetness	Piping, flooding	Favorable	Floods, wetness	Not needed	Wetness, floods
BeB, BeC, BeD Berks	Depth to rock, seepage	Seepage, thin layer, piping	No water	Not needed	Depth to rock, slope, small stones	Depth to rock, droughty, slope
BkB*, BkC*, BkD*, BkF* Berks	Depth to rock, seepage	Seepage, thin layer, piping	No water	Not needed	Depth to rock, slope, small stones	Depth to rock, droughty, slope
Weikert	Seepage, slope, depth to rock	Thin layer, low strength, seepage	No water	Not needed	Depth to rock, rooting depth	Depth to rock, rooting depth, droughty
BnB, BnC Blairton	Depth to rock	Piping	Slow refill	Depth to rock, percs slowly, wetness	Depth to rock, percs slowly, wetness	Rooting depth, percs slowly, wetness
BrA, BrB, BtB Brinkerton	Slope	Piping, low strength	Favorable	Wetness, percs slowly	Percs slowly, erodes easily, wetness	Percs slowly, wetness, erodes easily
CaA, CaB,	Slope	Low strength	Deep to water	Wetness,	Wetness,	Wetness,

CaC Cavode				percs slowly	percs slowly	percs slowly
CbB Cavode	Slope	Low strength, large stones	Deep to water, large stones	Wetness, percs slowly	Wetness, percs slowly, large stones	Wetness, percs slowly, large stones
ChA, ChB Chavies	Seepage, slope	Piping	No water	Not needed	Slope	Slope
CoB, CoC Cookport	Slope	Piping, low strength	Slope, deep to water	Percs slowly, wetness	Percs slowly, wetness	Percs slowly, erodes easily
CpB, CpD Cookport	Slope	Large stones, piping low strength	Large stones, slope, deep to water	Percs slowly, wetness	Percs slowly, wetness, large stones	Percs slowly, erodes easily, large stones
DhB* Dekalb	Depth to rock, seepage	Piping, seepage	No water	Not needed	Slope, depth to rock	Slope, droughty, rooting depth
Hazleton	Slope, seepage	Low strength, piping	No water	Not needed	Slope	Slope
DkB* Dekalb	Depth to rock, seepage	Piping, seepage, large stones	No water, large stones	Not needed	Depth to rock, large stones	Droughty, rooting depth, large stones
Hazleton	Slope, large stones, seepage	Low strength, piping, large stones	No water	Not needed	Slope, large stones	Slope, large stones
ErB, ErC Ernest	Slope	Piping, low strength	Slope, deep to water	Percs slowly, wetness	Percs slowly, wetness	Percs slowly, erodes easily
EsB, EsD Ernest	Slope	Large stones, piping, low strength	Large stones, slope, deep to water	Percs slowly, wetness	Percs slowly, wetness, large stones	Percs slowly, large stones
FV* Fluvaquents						
HaB, HaC, HaD Hazleton	Slope, seepage	Low strength, piping	No water	Not needed	Slope, depth to rock	Slope
HbB, HbD, HbF, HzB, HzD, HzF Hazleton	Slope, large stones, seepage	Low strength, piping, large stones	No water	Not needed	Slope, large stones	Slope, large stones
LeB, LeC, LeD Leck Kill	Seepage	Low strength, compressible, piping	No water	Not needed	Slope	Slope
LkB, LkD Leck Kill	Large stones, seepage	Low strength, compressible, piping	No water	Not needed	Large stones, slope	Large stones, slope
LmF* Leck Kill	Seepage	Low strength, compressible, piping	No water	Not needed	Slope	Slope
MoA, MoB Monongahela	Slope, seepage	Low strength, piping	No water	Slope, percs slowly	Percs slowly, piping, rooting depth	Slope, percs slowly, erodes easily
NoA, NoB, Nolo	Slope	Piping, low strength	Favorable	Wetness, percs slowly	Percs slowly, erodes easily, wetness	Percs slowly, wetness erodes easily
NsB Nolo	Slope	Piping, low strength, large stones	Large stones	Wetness, percs slowly	Percs slowly, erodes easily, wetness	Large stones wetness, erodes easily
Ph Philo	Seepage	Piping	Deep to water	Floods, poor outlets	Not needed	Not needed
Po Pope	Seepage	Piping	No water	Not needed	Not needed	Not needed
Pu Purdy	Slope	Low strength, compressible	Slow refill	Percs slowly	Wetness, percs slowly	Wetness
Qu* Quarries						

RgB*, RgC*, RgD*, RgF* Rayne	Slope, seepage, depth to rock	Low strength, compressible, piping	No water	Not needed	Slope, depth to rock	Slope
Gilpin	Slope, depth to rock, seepage	Thin layer	No water	Not needed	Slope, depth to rock	Slope, depth to rock
RpB*,RpD* Rayne	Slope, large stones, seepage	Large stones, low strength, piping	No water	Not needed	Slope, large stones	Slope, large stones
Gilpin	Depth to rock, slope, seepage	Large stones, thin layer	No water	No needed	Slope, depth to rock, large stones	Slope, depth to rock, large stones
Ty Tyler	Favorable	Wetness	Slow refill	Percs slowly, frost action	Not needed	Wetness, erodes easily, rooting depth
UDA*, UDD*, UDF*, UOA* Udorthents						
WhB, WhC, WhD Wharton	Slope	Low strength	Deep to water	Percs slowly	Slope, percs slowly	Slope, percs slowly
WvB, WvD Wharton	Slope, large stones	Low strength, large stones	Deep to water, large stones	Percs slowly	Slope, percs slowly, large stones	Slope, percs slowly, large stones

* See description of the map unit for the composition and behavior characteristics of the map unit.

TABLE 12. RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definition of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AbB Albrights	Moderate: wetness, percs slowly	Moderate: wetness	Moderate: slope, wetness	Moderate: wetness	Moderate: wetness
AbC Albrights	Moderate: slope, wetness, percs slowly	Moderate: slope, wetness	Severe: slope	Moderate: wetness	Moderate: slope, wetness
AgB Albrights	Moderate: wetness, percs slowly	Moderate: wetness	Moderate: slope, wetness, large stones	Moderate: wetness, large stones	Moderate: wetness, large stones
AgD Albrights	Severe: slope	Severe: slope, wetness	Severe: slope	Moderate; slope, large stones, wetness	Severe: slope
AhB allegheny	Slight	Slight	Moderate: slope	Slight	Slight
AhC Allegheny	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
Ar, AsB	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness

Armagh					
At Atkins	Severe: wetness, floods	Severe: wetness, floods	Severe: wetness, floods	Severe: wetness, floods	Severe: wetness, floods
BeB Berks	Moderate: small stones	Moderate: small stones	Moderate: small stones	Moderate: small stones	Moderate: small stones
BeC Berks	Moderate: slope, small stones	Moderate: slope, small stones	Severe: slope, small stones	Moderate: small stones	Severe: small stones
BeD Berks	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope, small stones	Severe: slope, small stones
BkB*: Berks	Moderate: small stones	Moderate: small stones	Severe: small stones	Moderate: small stones	Severe: small stones
Weikert	Moderate: small stones	Moderate: small stones	Severe: depth to rock	Moderate: small stones	Moderate: small stones
BkC*: Berks	Moderate: slope, small stones	Moderate: slope, small stones	Severe: slope, small stones	Moderate: small stones	Severe: small stones
Weikert	Moderate: slope, small stones	Moderate: slope, small stones	Severe: slope, depth to rock	Moderate: small stones	Moderate: slope, small stones, depth to rock
BkD*: Berks	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope, small stones	Severe: slope
BkD* Weikert	Severe: slope	Severe: slope	Severe: slope, depth to rock	Moderate: slope, small stones	Severe: slope
BkF*: Berks	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope, small stones
BnB Blairton	Moderate: percs slowly, wetness	Moderate: wetness	Moderate: wetness, slope	Moderate: wetness	Moderate: depth to rock, wetness
BnC Blairton	Moderate: slope, percs slowly, wetness	Moderate: slope, wetness	Severe: slope	Moderate: wetness	Moderate: slope, depth to rock, wetness
BrA, BrB, BtB Brinkerton	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
CaA, CaB Cavode	Moderate: wetness, percs slowly	Moderate: wetness	Moderate: wetness	Moderate: wetness	Moderate: wetness
CaC Cavode	Moderate: wetness, percs slowly	Moderate: wetness	Severe: slope	Moderate: wetness	Moderate: wetness, slope
CbB Cavode	Moderate: wetness, percs slowly	Moderate: wetness	Moderate: wetness, slope	Moderate: wetness	Moderate: large stones, wetness
ChA Chavies	Slight	Slight	Slight	Slight	Slight
ChB Chavies	Slight	Slight	Moderate: slope	Slight	Slight
CoB Cookport	Moderate: percs slowly	Slight	Moderate: percs slowly	Slight	Slight
CoC Cookport	Moderate: slope, percs slowly	Moderate: slope	Severe: slope	Slight	Moderate: slope
CpB Cookport	Moderate: percs slowly, large stones	Slight	Moderate: percs slowly, slope, large stones	Moderate: large stones	Moderate: large stones
CpD Cookport	Severe: slope	Severe: slope	Severe: slope	Moderate: large stones	Severe: slope
DhB*: Dekalb	Moderate: small stones	Moderate: small stones	Severe: small stones	Moderate: small stones	Severe: small stones
Hazleton	Moderate: small stones	Moderate: small stones	Severe: small stones	Moderate: small stones	Moderate: small stones
DkB* Dekalb	Moderate: small stones, large stones	Moderate: small stones	Severe: small stones	Moderate: small stones, large stones	Severe: small stones
Hazleton	Moderate: large stones, small stones	Moderate: small stones	Severe: small stones	Moderate: large stones, small stones	Moderate: large stones

ErB Ernest	Moderate: percs slowly	Slight	Moderate: slope, percs slowly	Slight	Slight
ErC Ernest	Moderate: slope, percs slowly	Moderate: slope	Severe: slope	Slight	Moderate: slope
EsB Ernest	Moderate: large stones, percs slowly	Slight	Moderate: slope, large stones, percs slowly	Moderate: large stones	Moderate: large stones
EsD Ernest	Severe: slope	Severe: slope	Severe: slope	Moderate: slope, large stones	Severe: slope
FV* Fluvaquents					
HaB Hazleton	Moderate: small stones	Moderate: small stones	Severe: small stones	Moderate: small stones	Moderate: small stones
HaC Hazleton	Moderate: slope, small stones	Moderate: slope, small stones	Severe: slope	Moderate: small stones	Moderate: slope, small stones
HaD Hazleton	Severe: slope	Severe: slope	Severe: slope	Moderate: slope, small stones	Severe: slope
HbB Hazleton	Moderate: large stones, small stones	Moderate: small stones	Severe: small stones	Moderate: large stones, small stones	Moderate: large stones
HbD Hazleton	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope, large stones, small stones	Severe: slope
HbF Hazleton	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
HzB Hazleton	Moderate: large stones, small stones	Moderate: small stones	Severe: small stones	Moderate: large stones	Moderate: large stones
HzD Hazleton	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope, large stones, small stones	Severe: slope
HzF Hazleton	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
LeB Leck Kill	Moderate: small stones	Moderate: small stones	Severe: small stones	Moderate: small stones	Moderate: small stones
LeC Leck Kill	Moderate: slope, small stones	Moderate: slope, small stones	Severe: slope, small stones	Moderate: small stones	Moderate: slope, small stones
LeD Leck Kill	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope, small stones	Severe: slope
LkB Leck Kill	Moderate: large stones, small stones	Moderate: small stones	Severe: small stones	Moderated: large stones, small stones	Moderate: large stones
LkD Leck Kill	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: slope, large stones, small stones	Severe: slope
LmF* Leck Kill	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
MoA Monongahela	Moderate: wetness, percs slowly	Slight	Moderate: wetness, percs slowly	Slight	Slight
MoB Monongahela	Moderate: wetness, percs slowly	Slight	Moderate: slope, wetness, percs slowly	Slight	Slight
NoA, NoB, NsB Nolo	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
Ph Philo	Severe: floods	Moderate: floods	Moderate: floods	Slight	Moderate: floods
Po Pope	Severe: floods	Moderate: floods	Moderate: floods	Slight	Moderate: floods
Pu Purdy	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
Qu* Quarries					
RgB* Rayne	Moderate: small	Moderate: small	Severe: small	Moderate: small	Moderate: small

RgB* Rayne	Moderate: small stones	Moderate: small stones	Severe: small stones	Moderate: small stones	Moderate: small stones
Gilpin	Moderate: small stones	Moderate: small stones	Severe: small stones	Moderate: small stones	Moderate: depth to rock, small stones
RgC* Rayne	Moderate: slope, small stones	Moderate: slope, small stones	Severe: small stones	Moderate: small stones	Moderate: slope, small stones
Gilpin	Moderate: slope, small stones	Moderate: slope, small stones	Severe: small stones, slope	Moderate: small stones, small stones	Moderate: slope, depth to rock, small stones
RgD* Rayne	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope, small stones	Severe: slope
Gilpin	Severe: slope	Severe: slope	Severe: small stones, slope	Moderate: slope, small stones	Severe: slope
RgF* Rayne	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
Gilpin	Severe: slope	Severe: slope	Severe: small stones, slope	Severe: slope	Severe: slope
RpB* Rayne	Moderate: large stones, small stones	Moderate: small stones	Severe: small stones	Moderate: large stones, small stones	Moderate: large stones, small stones
Gilpin	Moderate: large stones, small stones	Moderate: small stones	Severe: small stones	Moderate: large stones, small stones	Moderate: depth to rock, small stones
RpD* Rayne	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: large stones, small stones, slope	Severe: slope
Gilpin	Severe: slope	Severe: slope	Severe: slope, small stones	Moderate: large stones, small stones, slope	Severe: slope
Ty Tyler	Severe: percs slowly	Moderate: wetness	Severe: percs slowly	Moderate: wetness	Severe: wetness
UDA*, UDD*, UDF*, UOA* Udorthents					
WhB Wharton	Moderate: percs slowly	Slight	Moderate: percs slowly	Slight	Moderate: too clayey
WhC Wharton	Moderate: slope, percs slowly	Moderate: slope	Severe: slope	Slight	Moderate: too clayey
WhD Wharton	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
WvB Wharton	Moderate: percs slowly, large stones	Slight	Moderate: percs slowly, large stones	Moderate: large stones	Moderate: large stones
WvD Wharton	Severe: slope	Severe: slope	Severe: slope	Moderate: slope, large stones	Severe: slope

*** See description of the map unit for the composition and behavior characteristics of the map unit.**

Table 13. Wildlife Habitat Potentials

[See text for definitions of "good," "fair," "poor," "very poor." Absence of an entry indicates that the soil was not rated.]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland Wildlife	Wetland Wildlife
AbB Albrights	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
AbC Albrights	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
AgB Albrights	Very poor	Poor	Good	Good	Good	Poor	Very poor	Poor	Good	Very poor
AgD Albrights	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
AhB allegheny	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
AhC Allegheny	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Ar Armagh	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
AsB Armagh	Very poor	Fair	Fair	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor
\t Atkins	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
BeB Berks	Poor	Fair	Fair	Poor	Poor	Poor	Very poor	Fair	Poor	Very poor
BeC Berks	Poor	Fair	Fair	Poor	Poor	Poor	Very poor	Fair	Poor	Very poor
BeD Berks	Poor	Fair	Fair	Poor	Poor	Very poor	Very poor	Fair	Poor	Very poor
BkB*: Berks	Poor	Fair	Fair	Poor	Poor	Very poor	Very poor	Fair	Poor	Very poor
Weikert	Very poor	Poor	Poor	Very poor	Very poor	Poor	Very poor	Poor	Very poor	Very poor
BkC*: Berks	Poor	Fair	Fair	Poor	Poor	Very poor	Very poor	Fair	Poor	Very poor
Weikert	Very poor	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Poor	Very poor	Very poor
BkD*: Berks	Poor	Fair	Fair	Poor	Poor	Very poor	Very poor	Fair	Poor	Very poor
Weikert	Very poor	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Poor	Very poor	Very poor
BkF*: Berks	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
BkF* Weikert	Very poor	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Poor	Very poor	Very poor
BnB Blairton	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
BnC Blairton	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
BrA Brinkerton	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
3rB Brinkerton	Poor	Fair	Fair	Fair	Fair	Poor	Very poor	Fair	Fair	Very poor

BtB Brinkerton	Bery poop	Poor	Fair	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor
CaA Cavode	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
CaB Cavode	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
CaC Cavode	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
CbB Cavode	Very poor	Poor	Good	Good	Good	Poor	Very poor	Poor	Good	Very poor
ChA, ChB Chavies	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
CoB Cookport	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
CoC Cookport	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
CpB Cookport	Very poor	Poor	Good	Good	Good	Poor	Very poor	Poor	Good	Very poor
CpD Cookport	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
DhB*: Dekalb	Poor	Fair	Fair	Poor	Poor	Poor	Very poor	Fair	Poor	Very poor
Hazleton	Fair	Good	Good	Good	Good	Poor	Very poor	Very poor	Good	Very poor
DkB* Dekalb	Very poor	Poor	Fair	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor
Hazleton	Very poor	Poor	Good	Good	Good	Poor	Very poor	Poor	Good	Very poor
ErB Ernest	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
ErC Ernest	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
EsB Ernest	Very poor	Poor	Good	Good	Good	Poor	Very poor	Poor	Good	Very poor
EsD Ernest	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
FV* Fluvaquents										
HaB Hazleton	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
HaC Hazleton	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
HaD Hazleton	Poor	Good	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
HbB Hazleton	Very poor	Poor	Good	Good	Good	Poor	Very poor	Poor	Good	Very poor
HbD, HbF Hazleton	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
HzB Hazleton	Very poor	Poor	Good	Good	Good	Poor	Very poor	Poor	Good	Very poor
HzD Hazleton	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
HzF Hazleton	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
LeB Leck Kill	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
LeC Leck Kill	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
LeD Leck Kill	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
LkB Leck	Very	Poor	Good	Good	Good	Poor	Very	Poor	Good	Very

Kill	poor						poor			poor
LkD Leck Kill	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
LmF* Leck Kill	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
MoA Monongahela	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
MoB Monongahela	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
NoA Nolo	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
NoB Nolo	Poor	Fair	Fair	Fair	Fair	Poor	Very poor	Fair	Fair	Very poor
NsB Nolo	Very poor	Poor	Fair	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor
Ph Philo	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Po Pope	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Pu Purdy	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Qu* Quarries										
RgB* Rayne	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Gilpin	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor
RgC* Rayne	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Gilpin	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
RgD* Rayne	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Gilpin	Poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
RgF* Rayne	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Gilpin	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
RpB* Rayne	Very poor	Poor	Good	Good	Good	Poor	Very poor	Poor	Good	Very poor
Gilpin	Very poor	Poor	Good	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor
RpD* Rayne	Very Poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Gilpin	Very Poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Ty Tyler	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
UDA*, UDD*, UDF*, UOA* Udorthents										
WhB Wharton	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
WhC Wharton	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
WhD Wharton	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
WvB Wharton	Very poor	Poor	Good	Good	Good	Poor	Very poor	Poor	Good	Very poor
WvD Wharton	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor

* See description of the map unit for the composition and behavior characteristics of the map unit.

Table 14. Engineering Properties and Classifications

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil Name and Map Symbol	Depth In	USDA texture	Classification		Fragments > 3 inches Pct	Percentage passing sieve number				Liquid Limit Pct	Plasticity index
			Unified	AASHTO		4	10	40	200		
AbB, AbC Albrights	0-7	Silt loam	ML, CL	A-4	0-10	80-100	80-95	70-90	55-80		
	7-18	Channery clay loam, gravelly silt loam, silty clay loam	ML, CL, SM, SC	A-4, A-6	0-15	80-100	80-95	60-90	40-85	25-40	3-15
	18-65	Silt loam, gravelly silty clay loam, channery clay loam	CL, ML, SC, GM-GC	A-4, A-2, A-6	0-15	65-100	55-95	40-90	25-85	20-40	3-15
AgB Albrights	0-7	Very stony silt loam	ML, CL, GM	A-4	3-15	65-100	60-90	55-85	50-80		
	7-21	Channery clay loam, gravelly silt loam, silty clay loam	ML, CL, SM, SC	A-4, A-6	0-15	80-100	65-95	60-90	40-85	25-40	3-15
	21-60	Silt loam, gravelly silty clay loam, channery clay loam	CL, ML, SC, GM-GC	A-4, A-2, A-6, A-1	0-15	65-100	55-95	40-90	25-80	20-40	3-15
AgD Albrights	0-7	Very stony silt loam	ML, CL, GM	A-4	3-15	65-100	60-90	55-85	50-80		
	7-21	Channery clay loam, gravelly silt loam, silty clay loam	ML, CL, SM, SC	A-4, A-6	0-15	80-100	65-95	60-90	40-85	25-40	3-15
	21-65	Silt loam, gravelly silty clay loam, channery clay loam	CL, ML, SC, GM-GC	A-4, A-2, A-6, A-1	0-15	65-100	55-95	40-90	25-80	20-40	3-15
AhB, AhC Allegheny	0-10	Silt loam	ML,CL, CL-ML	A-4	0	90-100	85-100	65-100	55-95	<35	NP-10
	10-40	Clay loam, loam, sandy clay loam	ML, CL, SM, SC	A-4, A-6	0	90-100	65-100	55-95	35-80	<35	NP-15
	40-60	Gravelly sandy loam, sand, gravelly sandy clay loam	GC, SM, GW-GC, SW-SC	A-1, A-2, A-4	0-15	30-65	20-55	15-50	10-40	<35	NP-15
\r Armagh	0-6	Silt loam	ML, CL	A-4, A-6	0-5	95-100	90-100	80-95	75-85		
	6-50	Clay loam, loam, sandy	ML, CL, CH, MH	A-4, A-6, A-7	0-5	85-95	80-90	70-85	65-85	35-55	9-25

		clay loam									
	50-60	Gravelly sandy loam, sand, gravelly sandy clay loam	GM, SC, GC, SM	A-4, A-6, A-2, A-7	0-15	65-85	55-75	45-60	35-45	30-45	9-15
AsB Armagh	0-6	Very stony silt loam	ML, CL	A-4, A-6	3-15	95-100	90-100	80-95	75-85		
	6-50	Silt loam silty clay, shaly clay	ML, CL, CH	A-4, A-6, A-7	0-5	85-95	80-90	70-85	65-85	35-55	9-25
	50-60	Silty clay, shaly clay loam, very shaly loam	GM, SC, GC, SM	A-4, A-6, A-2, A-7	0-10	65-85	55-75	45-60	35-45	30-45	3-15
At Atkins	0-9	Silt loam	ML, CL	A-4, A-6	0	90-100	90-100	75-100	60-95	25-50	2-25
	9-46	Silty clay loam, silt loam	SM, SC, ML, CL-ML	A-5, A-4, A-6 A-7	0-5	85-100	80-100	60-100	35-85	20-50	1-25
	46-60	Stratified silty clay loam to sandy loam	SM, SC, GM, ML	A-2, A-4, A-6	0-15	60-100	60-100	50-95	15-85	20-45	1-15
Beb*, BkC*, BkD*, BkF* Berks	0-9	Channery silt loam	GM, ML, GC, SC	A-2, A-4	0-30	50-80	45-70	40-60	30-55	25-36	5-10
	9-29	Channery loam, very channery loam, channery silt loam	GM, SM, GM-GC, SM-SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	29-38	Channery loam, very channery loam, channery silt loam	GM, SM	A-1, A-2	0-40	35-65	25—55	20-40	15-35	24-38	2-10
	38	Weathered bedrock									
Weikert	0-7	Channery silt loam	GM, ML,	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10
	7-14	Shaly loam, very shaly silt loam, cherty loam	GM, GP, SM-SP	A-1, A-2	0-20	15-60	10-45	5-35	5-35	28-36	3-9
	14	Unweathered bedrock									
BnB, BnC Blairton	0-9	Channery silt loam	ML	A-4	0	70-90	65-75	55-70	50-65		
	9-39	Silt loam, channery silty clay loam, very shaly loam	ML, CL, GM, SM-SC	A-4, A-2 A-6, A-7	0-5	40-90	20-70	20-60	15-50	25-45	5-15
	39	Unweathered bedrock									
BrA, BrB Brinkerton	0-10	Silt loam	ML, CL	A-4, A-6	0-10	30-100	85-100	85-100	75-100		
	10-24	Silty clay loam, silt loam	ML	A-4, A-6, A-7	0-10	30-100	85-100	85-100	65-100	30-45	5-15
	24-46	Silt loam shaly loam, channery silty clay loam	ML	A-4, A-6, A-7	0-10	75-100	75-100	65-100	55-100	30-45	5-15
	46-66	Silt loam, shaly loam, channery silt loam	ML, GM, SM, GC	A-4, A-6, A-2	0-15	770-90	35-85	30-85	25-75	30-40	5-15
'tB rinkerton	0-10	Very stony silt loam	ML, CL	A-4, A-6	3-10	90-100	85-100	85-100	75-100		
	10-24	Silty clay	ML	A-4, A-6,	0-10	90-100	85-100	85-100	65-100	30-45	5-15

		loam, silt loam		A-7							
	24-46	Silt loam, shaly loam, channery silty clay loam	ML, CL	A-4, A-6, A-7, A-5	0-10	75-100	75-100	65-100	55-100	30-45	5-15
	46-66	Silt loam, shaly loam, channery silt loam	ML, GM, SM	A-4, A-6, A-2	0-15	70-90	35-85	30-85	25-75	30-40	5-15
CaA, CaB, CaC Cavode	0-8	Silt loam	ML, CL	A-4,	0-5	90-100	80-100	80-95	70-95		
	8-42	Silty clay loam, silty clay, clay	ML, CL	A-4, A-5, A-7, A-6	0-5	85-100	80-100	80-95	70-95	25-49	4-20
	42-66	Shaly silty clay loam, silty clay, clay	ML, CL, GC, SM	A-4, A-6	0-15	60-90	55-85	50-80	40-75	28-40	2-15
CbB Cavode	0-8	Very stony silt loam	ML, CL	A-4	3-10	90-100	80-100	80-95	75-95		
	8-42	Silty clay loam, silty clay, clay	ML, CL	A-4, A-7, A-6	0-5	85-100	80-100	80-95	70-95	25-49	4-20
	42-66	Shaly silty clay loam, silty clay, clay	ML, CL, GC, SM	A-4, A-6	0-15	60-90	55-85	50-80	40-75	28-40	2-15
ChA, ChB Chavies	0-10	Silt loam	SM, ML	A-4, A-2	0-30	75-100	55-100	40-95	25-75	<25	NP-5
	10-42	Fine sandy loam, gravelly fine sandy loam, silt loam	SM, ML, ML-CL	A-4, A-2	0-5	70-100	60-100	45-100	25-85	<35	NP-8
	42-65	Fine sandy loam, gravelly fine sandy loam, loam	SM, ML, ML-CL	A-4, A-2	0-5	70-100	60-95	40-85	20-75	<25	NP-5
CoB, CoC Cookport	0-12	Loam	ML, CL, SM, ML-CL	A-2, A-4, A-6	0-15	75-100	60-95	60-85	60-85	20-40	1-15
	12-22	Loam, sandy clay loam, clay loam	ML, CL, SM ML-CL	A-4, A-6	0-15	95-100	75-95	60-95	40-75	20-40	1-20
	22-40	Loam, sandy clay loam, clay loam	ML, CL, SM ML-CL	A-4, A-6	0-15	95-100	75-95	60-95	40-75	20-40	1-20
	40-62	Very channery sandy loam, gravelly loam	ML, CL, SM, GM	A-2, A-4, A-6	0-15	60-100	50-95	40-95	30-75	20-40	1-15
CpB, CpD Cookport	0-12	Very stony loam	ML, CL, SM, ML-CL	A-2, A-4, A-6	2-40	75-95	70-95	60-85	30-70	20-40	1-15
	12-22	Loam, sandy clay loam, clay loam	ML, CL, SM ML-CL	A-4, A-6	0-15	95-100	75-95	60-95	40-75	20-40	1-20
	22-40	Loam, gravelly sandy clay loam, loam	ML, CL, SM, ML-CL	A-4, A-6	0-15	95-100	75-95	60-95	40-75	20-40	1-20
	40-62	Very channery sandy loam, channery loam	ML, CL, SM, GM	A-2, A-4, A-6	0-15	60-100	50-95	40-95	30-75	20-40	1-15
DhB* Dekalb	0-12	Channery sandy loam	SM, GM, ML, CL-ML	A-2, A-4, A-1	0-30	50-90	45-80	40-75	20-55	15-32	NP-7
	12-35	Channery sandy loam,	SM, GM,	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-7

		channery loam, very channery sandy loam	ML, GM-GC								
	35	Unweathered bedrock									
Hazleton	0-7	Channery sandy loam	ML, GM, SM	A-2, A-4	0-15	60-85	60-80	60-75	35-55		
	7-36	Channery sandy loam, loam, very channery loam	GM, SM-SC ML, SC	A-2, A-4, A-1	0-50	60-90	45-90	35-70	20-55	<30	NP-8
	36-70	Channery loam, very channery sandy loam, very channery loamy sand	GM, SM, SC, GC-GM	A-2, A-1, A-4	0-60	60-80	55-75	25-65	15-50	<30	NP-8
DkB* Dekalb	0-12	Very stony sandy loam	SM, GM, ML	A-2, A-4, A-1	10-30	50-90	45-80	40-75	20-55	10-32	NP-7
	12-35	Channery sandy loam, channery loam, very channery sandy loam	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-75	40-75	20-55	15-32	NP-7
	35	Unweathered									
Hazleton	0-7	Very stony sandy loam	ML, GM, SM	A-4, A-2	5-15	60-85	50-80	50-70	35-55		
	7-36	Channery sandy loam, channery loam, loam	GM, SM, ML, SC	A-2, A-4, A-1	0-50	60-95	45-90	35-70	20-55	<30	NP-8
	36-70	Channery loam, very channery sandy loam, very channery loamy sand	GM, SM, SC, GC	A-2, A-1	5-60	60-80	55-75	25-65	15-50	<30	NP-8
ErB, ErC Ernest	0-10	Silt loam	ML, CL	A-4, A-6	0-15	75-100	70-100	70-95	60-95	25-40	2-15
	10-19	Silt loam, silty clay loam	ML, CL, ML-CL	A-4, A-5 A-6, A-7	0-15	75-100	75-100	70-95	65-95	25-50	2-25
	19-48	Silty clay loam, clay loam, channery silt loam	GM, SM, ML, CL	A-4, A-5 A-6, A-7	5-20	70-95	55-95	50-95	40-95	25-50	2-25
	48-60	Silt loam silty clay loam, silty clay	GM, SM, ML, CL	A-4, A-5 A-6, A-7	5-20	70-95	55-95	50-95	40-95	25-50	2-25
EsB, EsD Ernest	0-10	Very stony silt loam	ML, CL, ML-CL	A-4, A-6	3-20	75-100	70-100	70-95	60-95	15-40	2-15
	10-19	Silt loam, silty clay loam	ML, CL, ML-CL	A-4, A-5 A-6, A-7	0-15	75-100	75-100	70-95	65-95	25-50	2-25
	19-48	Silty clay loam, clay loam, channery silt loam	GM, SM, ML, CL	A-4, A-5 A-6, A-7	5-20	70-95	55-95	50-95	40-95	25-50	2-25
	48-60	Silt loam, silty clay loam, silty clay	GM, SM, ML, CL	A-4, A-5 A-6, A-7	5-15	70-95	55-95	50-95	40-95	25-50	2-25
FV* Fluvaquent											
HaB, HaC,	0-7	Channery	ML,	A-2, A-4	0-15	60-85	60-80	60-75	35-55		

HaD Hazleton		sandy loam	GM, SM								
	7-36	Channery sandy loam, loam, very channery loam	GM, SM-SC ML, SC	A-2, A-4, A-1	0-50	60-90	45-90	35-70	20-55	<30	NP-8
	36-70	Channery loam, very channery sandy loam, very channery loamy sand	GM, SM, SC, GC-GM	A-2, A-1, A-4	0-60	60-80	55-75	25-65	15-50	<30	NP-8
HbB, HbD, HbF Hazleton	0-7	Very stony sandy loam	ML, GM,SM	A-4, A-2	5-15	60-85	50-80	50-70	35-55		
	7-36	Channery sandy loam, channery loam, loam	GM, SM-SC ML, SC	A-2, A-4, A-1	0-50	60-95	45-90	35-70	20-55	<30	NP-8
	36-70	Channery loam, very channery sandy loam, very channery loamy sand	GM, SM, SC, GC-GM	A-2, A-1, A-4	5-60	60-80	55-75	25-65	15-50	<30	NP-8
HzB Hazleton	0-7	Very bouldery sandy loam	ML, GM, SM	A-4, A-2	5-15	60-85	50-80	50-70	35-55		
	7-36	Channery sandy loam, channery loam, loam	GM,SM-SC ML, SC	A-2, A-4, A-1	0-50	60-95	45-90	35-70	20-55	<30	NP-8
	36-70	Channery loam, very channery sandy loam, very channery loamy sand	GM, SM, SC, GC-GM	A-2, A-1, A-4	5-60	60-80	55-75	25-65	15-50	<30	NP-8
Hzd Hazleton	0-7	Very bouldery sandy loam	ML, GM, SM	A-4, A-2	5-15	60-85	50-80	50-70	35-55		
	7-36	Channery sandy loam, channery loam, loam	GM, SM-SC ML, SC	A-2, A-4, A-1	0-50	60-95	45-90	35-70	20-55	<30	NP-8
	36-70	Channery loam, very channery sandy loam, very channery loamy sand	GM, SM, SC, GC-GM	A-2, A-1, A-4	5-60	60-80	55-75	25-65	15-50	<30	NP-8
HzF Hazleton	0-7	Very bouldery sandy loam	ML, GM, SM	A-4, A-2	5-15	60-85	50-80	50-70	35-55		
	7-36	Channery sandy loam, channery loam, loam	GM, SM-SC ML, SC	A-2, A-4, A-1	0-50	60-95	45-90	35-70	20-55	<30	NP-8
	36-70	Channery loam, very channery sandy loam, very channery loamy sand	GM, SM, SC, GC-GM	A-2, A-1, A-4	5-60	60-80	55-75	25-65	15-50	<30	NP-8
LeB, LeC, LeD Leck Kill	0-14	Channery silt loam	SM, ML, GM	A-2, A-4	0-5	70-85	60-80	50-80	35-70		
	14-45	Silt loam,	GM, SC,	A-4, A-2,	0-10	60-90	50-85	40-80	30-70	23-40	2-17

		channery loam, shaly silty clay loam	GC, CL	A-6							
	45-58	Very channery silt loam, very channery clay loam, very shaly loam	SM, GM, GP-GM SP-SM	A-2, A-1	0-30	30-70	10-30	8-30	6-25	25-40	2-13
	58	Unweathered bedrock									
LkB, LkD Leck Kill	0-14	Very stony silt loam	ML, CL, GM, SM	A-4	3-15	75-100	65-80	55-80	40-70		
	14-45	Silt loam, channery loam, shaly silty clay loam	GM, SC, GC, CL	A-4, A-2, A-6	0-10	60-90	50-85	40-80	30-70	23-40	2-17
	45-58	Very channery silt loam, very channery clay loam, very shaly loam	SM, GP-GM, GM, SP-SM	A-2, A-1	0-30	30-70	10-30	8-30	6-25	25-40	2-13
	58	Unweathered bedrock									
LmF Leck Kill	0-14	Channery silt loam	ML, SM, GM	A-4	0-5	70-100	60-90	50-80	35-70		
	14-45	Silt loam, channery loam, shaly silty clay loam	GM, SC, GC, CL	A-4, A-2, A-6	0-10	60-90	50-85	40-80	30-70	23-40	2-17
	45-58	Very channery silt loam very channery clay loam very shaly loam	SM, GM, GP-GM, SP-SM	A-2, A-1	0-30	30-70	10-30	8-30	6-25	25-40	2-13
	58	Unweathered bedrock									
MoA, MoB Monongahela	0-6	Silt loam	ML, SM, CL-ML, SM-SC	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	6-22	Loam, silt loam, clay loam	ML, CL CL-ML	A-4, A-6	0-10	90-100	90-100	80-100	70-90	20-40	5-15
	22-55	Loam, silt loam, gravelly sandy clay loam	ML, CL, SM, SC	A-4, A-6	0-10	80-100	75-100	70-95	45-95	20-40	1-15
	55-63	Stratified sandy loam to clay loam	ML, CL, SM, SC	A-4, A-6	5-20	75-100	60-100	60-95	40-95	20-40	1-15
NoA, NoB Nolo	0-11	Loam	ML	A-4	0-5	90-100	90-100	80-100	55-90		
	11-29	Silt loam, channery clay loam, channery sandy clay loam	ML	A-4, A-6	0-15	80-100	80-100	80-95	55-85	25-40	4-11
	29-55	Loam, channery sandy clay loam channery clay loam	ML, CL, SM, GC	A-4, A-6	0-15	60-100	60-90	55-85	35-70	25-40	4-11
	55	Weathered bedrock									

NsB Nolo	0-11	Very stony loam	ML	A-4	3-15	75-100	75-100	70-100	60-90		
	11-29	Silt loam, channery clay loam, channery sandy clay loam	ML, CL	A-6, A-4	0-15	80-100	80-100	80-95	55-85	25-40	4-11
	29-55	Loam, channery sandy clay loam, channery clay loam	ML, CL, SM, GC	A-4, A-6	0-15	60-100	60-90	55-85	35-70	25-35	4-11
	55	Weathered bedrock									
Ph Philo	0-50	Silt loam	ML, SM	A-4	0	95-100	80-100	70-90	45-80	20-40	1-10
	50-64	Stratified sand to silt loam	GM, SM, ML	A-2, A-4	0	60-95	50-90	40-85	30-85	20-40	1-10
Po Pope	0-26	Fine sandy loam	SM, ML, ML-CL	A-2, A-1, A-4	0-5	75-100	65-100	40-85	15-55	<20	NP-5
	26-61	Fine sandy loam, silt loam, gravelly fine sandy loam	SM, SM-SC, ML, GM	A-2, A-1, A-4	0-5	55-100	50-100	35-95	15-70	<30	NP-7
Pu Purdy	0-15	Silt loam	ML, CL	A-4, A-5 A-6, A-7	0	95-100	90-100	90-100	90-100	25-50	2-25
	15-50	Silty clay, clay, clay loam	ML, CL, CH	A-4, A-5 A-6, A-7	0	95-100	90-100	85-100	75-85	25-75	2-45
	50-65	Silty clay, clay loam, clay	ML, CL, CH	A-4, A-6, A-7	0	95-100	90-100	85-100	70-95	25-75	2-45
Qu* Quarries											
RgB*, RgC*, RgD*, RgF* Rayne	0-8	Channery silt loam	GM, ML, SM, CL	A-4	0-10	60-85	55-80	50-80	45-65		
	8-47	Loam, shaly silty clay loam, channery clay loam	GM, ML, GC, CL	A-4, A-6, A-2	0-15	60-95	55-85	40-85	30-60	20-40	2-15
	47-55	Channery sandy loam, shaly silt loam, very shaly silty clay loam	SM, ML, GM, GM-GC	A-4, A-2, A-1	0-35	40-90	15-80	15-75	10-60	20-35	NP-10
	55	Unweathered bedrock									
Gilpin	0-6	Channery silt loam	GM, SM, CL, CL-ML	A-2, A-4, A-6	0-30	50-90	45-85	35-75	30-70	20-40	4-15
	6-24	Channery loam, shaly silt loam, silty clay loam	GM, ML, CL, CL-ML	A-2, A-4, A-6	0-45	50-95	45-90	35-85	30-80	20-40	4-15
	24	Unweathered bedrock									
RpB*, RpD* Rayne	0-8	Very stony silt loam	GM, ML, SM, CL	A-4	5-15	60-85	55-80	50-80	45-65		
	8-47	Loam, shaly silty clay loam channery clay loam	GM,ML, SC, CL	A-4, A-6, A-2	0-15	60-95	55-85	40-85	30-60	20-40	2-15

	47-55	Channery sandy loam, very shaly silty clay loam	SC, ML, GM, GM-GC	A-4, A-2, A-1	0-50	40-90	15-80	15-75	10-60	20-35	NP-10
	55	Unweathered bedrock									
Gilpin	0-6	Very stony silt loam	GM, SC, ML, CL	A-2, A-4, A-6	10-40	50-90	45-85	35-75	30-70	20-40	4-15
	6-24	Shaly silt loam, channery loam, silty clay loam	GM, ML, CL, CL-ML	A-2, A-4, A-6	0-45	50-90	45-85	35-75	30-70	20-40	4-15
	24	Unweathered bedrock									
Ty Tyler	0-8	Silt loam	ML	A-4	0	100	100	95-100	80-95	30-40	4-10
	8-24	Silty clay loam, silt loam	CL	A-6, A-5 A-7, A-4	0	100	100	95-100	85-100	25-45	8-20
	24-52	Silty clay loam, silt loam, clay loam	CL	A-6, A-5 A-7, A-4	0	100	100	80-100	70-95	25-45	8-20
	52-60	Stratified loam to silty clay loam	CL, ML, CL-ML	A-6, A-5 A-7, A-4	0	95-100	90-100	75-100	60-90	20-45	4-18
UDA*, UDD*, UDF*, UOA*, Udorthents											
WhB, WhC, WhD Wharton	0-10	Silt loam	ML, CL	A-4, A-6	0-5	95-100	90-100	80-95	70-90		
	10-44	Clay loam, shaly silty clay loam, shaly clay	ML, CL, MH, CH	A-7, A-6, A-4	0-10	75-100	70-100	65-95	60-90	35-55	10-30
	44-65	Silty loam, shaly clay, very shaly silt loam	ML, SM, GM	A-4, A-6, A-7	0-20	60-100	50-100	45-95	40-90	30-45	5-15
WvB, WvD Wharton	0-10	Very stony silt loam	ML, CL	A-4, A-6	3-15	70-100	65-100	60-95	55-90		
	10-44	Clay loam, shaly silty clay loam, shaly clay	ML, CL, MH, CH	A-7, A-6, A-5, A-4	0-10	75-100	70-100	65-95	60-90	35-55	10-30
	44-65	Silt loam, shaly clay, very shaly silt loam	ML, SM, GM	A-4, A-5, A-6, A-7	0-20	60-100	50-100	45-95	40-90	30-45	5-15

* See description of the map unit for the composition and behavior characteristics of the map unit.

Table 15. Physical and Chemical Properties of Soils

[The symbol < means less than; > means greater than. Entries under "Erosion factors – T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated.]

Soil map name and unit	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct

AbB, AbC Albrights	0-7 7-18 18-65	0.6-2.0 0.6-2.0 0.2-.06	.0.16-0.20 0.10-0.14 0.04-0.08	4.5-5.5 4.5-5.5 4.5-6.5	Low Low Low	0.43 0.28 0.28	3-2	2.5-4.0
AgB Albrights	0-7 7-21 21-60	0.6-2.0 0.6-2.0 0.2-0.6	0.14-0.18 0.10-0.14 0.04-0.08	4.5-5.5 4.5-5.5 5.1-6.5	Low Low Low	0.37 0.28 0.28	3-2	2.5-4.0
AgD Albrights	0-7 7-18 18-65	0.6-2.0 0.6-2.0 0.2-0.6	0.14-0.18 0.10-0.14 0.04-0.08	3.6-5.5 3.6-5.5 4.5-6.5	Low Low Low	0.37 0.28 0.28	3-2	2.5-4.0
AhB, AhC Allegheny	0-10 10-40 40-60	0.6-2.0 0.6-2.0 0.6-6.0	0.12-0.22 0.13-0.18 0.03-0.08	3.6-5.5 3.6-5.5 3.6-5.5	Low Low Low	0.32 0.28 0.28	4	2.5-4.0
Ar Armagh	0-6 6-50 50-60	0.6-2.0 0.06-0.2 0.06-0.6	0.18-0..22 0.10-0.14 0.08-0.12	4.5-5.5 4.5-5.5 4.5-5.5	Low Moderate Moderate	0.43 0.28 0.17	3	2.5-4.0
AsB Armagh	0-6 6-50 50-60	0.6-2.0 0.06-0.2 0.06-.06	0.18-0.22 0.10-0.14 0.08-0.12	4.5-5.5 4.5-5.5 4.5-5.5	Low Moderate Moderate	0.43 0.28 0.17	3-2	2.5-4.0
At Atkins	0-9 9-46 46-60	0.6-2.0 0.06-0.2 0.2-6.0	0.14-0.22 0.14-0.18 0.08-0.18	4.5-5.5 4.5-5.5 4.5-5.5	Low Low Low			2.5-4.0
BeB, BeC, BeD Berks	0-9 9-29 29-38 38	0.6-6.0 0.6-6.0 2.0-6.0	0.08-0.12 0.04-0.10 0.04-0.10	4.5-5.5 4.5-5.5 4.5-6.0	Low Low Low	0.28 0.17 0.17	3	1.5-4.0
BkB*, BkC*, BkD*, BkF* Berks	0-9 9-29 29-38 38	0.6-6.0 0.6-6.0 2.0-6.0	0.08-0.12 0.04-0.10 0.04-0.10	4.5-5.5 4.5-5.5 4.5-6.0	Low Low Low	0.28 0.17 0.17	3	1.5-4.0
Weikert	0-7 7-14 14	2.0-6.0 2.0-6.0	0.08-0.14 0.04-0.08	4.5-5.5 4.5-5.5	Low Low	0.28 0.28	2	1.0-2.5
BnB, BnC Blairton	0-9 9-39 39	0.6-2.0 0.2-0.6 ——	0.12-0.16 0.08-0.14 ——	3.6-5.5 3.6-5.5 ——	Low Low ——	0.43 0.28 ——	3-2	1.5-3.0
BrA, BrB Brinkerton	0-10 10-24 24-46 46-66	0.6-2.01 0.6-2.0 0.06-0.2 0.06-0.6	0.18-0.24 0.14-0.18 0.08-0.12 0.14-0.18	4.5-5.5 4.5-5.5 4.5-5.5 5.1-6.5	Low Moderate Moderate Low	0.43 0.32 0.32 0.20	3-2	1.5-4.0
BtB Brinketon	0-10 10-24 24-46 46-66	0.6-2.0 0.6-2.0 0.06-0.2 0.06-0.6	0.18-0.24 0.14-0.18 0.08-0.12 0.14-0.18	4.5-5.5 4.5-5.5 4.5-5.5 5.1-6.5	Low Moderate Moderate Low	0.43 0.32 0.32 0.20	3-2	1.5-4.0
CaA, CaB, CaC Cavode	0-8 8-42 42-66	0.6-2.0 0.06-0.2 0.06-0.2	0.18-0.22 0.10-0.14 0.08-0.12	4.5-5.5 4.5-5.5 4.5-5.5	Low Moderate Moderate	0.43 0.28 0.28	3	2.0-3.5
CbB Cavode	0-8 8-42 42-66	0.6-2.0 0.06-0.2 0.06-0.2	0.18-0.22 0.10-0.14 0.08-0.12	4.5-5.5 4.5-5.5 4.5-5.5	Low Moderate Moderate	0.43 0.28 0.28	3	2.0-3.5
ChA, ChB Chavies	0-10 10-42 42-65	2.0-6.0 2.0-6.0 2.0-6.0	0.11-0.18 0.11-0.20 0.11-0.18	4.5-6.0 4.5-6.0 4.5-6.0	Low Low Low	0.24 0.24 0.24	4	1.5-3.0
CoB, CoC Cookport	0-12 12-22 22-40 40-62	0.6-2.0 0.6-2.0 0.2-0.6 0.2-0.6	0.12-0.16 0.12-0.16 0.08-0.12 0.08-0.12	4.5-5.5 4.5-5.5 4.5-5.5 4.5-5.5	Low Low Low Low	0.37 0.28 0.28 0.28	3	1.5-3.5
CpB, CpD	0-12	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.32	3	1.5-3.5

Cookport	12-22 22-40 40-62	0.6-2.0 0.2-0.6 0.2-0.6	0.12-0.16 0.08-0.12 0.08-0.12	4.5-5.5 4.5-5.5 4.5-5.5	Low Low Low	0.28 0.28 0.28 0.28		
DhB* Dekalb	0-12 12-35 35	2.0-6.0 2.0-20 —	0.08-0.12 0.06-0.12 —	4.5-5.5 4.5-5.5 —	Low Low —	0.24 0.17 —	3	1.0-3.5
Hazleton	0-7 7-36 36-70	2.0-6.0 2.0-20 2.0-20	0.10-0.14 0.08-0.12 0.04-0.10	3.6-5.5 3.6-5.5 3.6-5.5	Low Low Low	0.24 0.17 0.17	3-2	1.0-3.5
DkB* Dekalb	0-12 12-35 35	6.0-20 6.0-20 —	0.08-0.12 0.06-0.12 —	4.5-5.5 4.5-5.5 —	Low Low —	0.24 0.17 —	3	1.0-3.5
Hazleton	0-7 7-36 36-70	2.0-6.0 2.0-20 2.0-20	0.10-0.16 0.08-0.12 0.04-0.10	3.6-5.5 3.6-5.5 3.6-5.5	Low Low Low	0.24 0.17 0.17	3-2	1.0-3.5
ErB, ErC Ernest	0-10 10-19 19-48 48-60	0.6-2.0 0.6-2.0 0.06-0.6 0.06-0.6	0.14-0.20 0.12-0.16 0.08-0.12 0.08-0.12	4.5-5.5 4.5-5.5 4.5-5.5 4.5-5.5	Low Moderate Moderate Moderate	0.43 0.28 0.28 0.28	3	1.5-3.5
EsB, EsD Ernest	0-10 10-19 19-48 48-60	0.6-2.0 0.6-2.0 0.06-0.6 0.06-0.6	0.12-0.18 0.12-0.16 0.08-0.12 0.08-0.12	4.5-5.5 4.5-5.5 4.5-5.5 4.5-5.5	Low Moderate Moderate Moderate	0.32 0.28 0.28 0.28	3	1.5-3.5
FV* Fluvaquents								
HaB, HaC, HaD Hazleton	0-7 7-36 36-70	2.0-6.0 2.0-20 2.0-20	0.10-0.14 0.08-0.12 0.04-0.10	3.6-5.5 3.6-5.5 3.6-5.5	Low Low Low	0.24 0.17 0.17	3-2	1.0-3.5
HbB, HbD, HbF, HzB, HzD, HzF Hazleton	0-7 7-36 36-70	2.0-6.0 2.0-20 2.0-20	0.10-0.16 0.08-0.12 0.04-0.10	3.6-5.5 3.6-5.5 3.6-5.5	Low Low Low	0.24 0.17 0.17	3-2	1.0-3.5
LeB, LeC, LeD Leck Kill	0-14 14-45 45-58 58	0.6-6.0 0.6-6.0 0.6-6.0 —	0.14-0.18 0.12-0.16 0.04-0.08 —	4.5-7.3 4.5-7.3 4.5-6.0 —	Low Low Low —	0.20 0.17 0.28 —	3	2.5-4.0
LkB, LkD Leck Kill	0-14 14-45 45-58 58	0.6-6.0 0.6-6.0 0.6-6.0 —	0.14-0.20 0.12-0.16 0.04-0.08 —	4.5-7.3 4.5-7.3 4.5-6.0 —	Low Low Low —	0.20 0.17 0.28 —	3	2.5-4.0
LmF* Leck Kill	0-14 14-45 45-58 58	0.6-6.0 0.6-6.0 0.6-6.0 —	.016-0.20 0.12-0.16 0.04-0.08 —	4.5-7.3 4.5-7.3 4.5-7.3 —	Low Low Low —	0.28 0.17 0.28 —	3	2.5-4.0
MoA, MoB Monongahel a	0-6 6-22 22-55 55-63	0.6-2.0 0.6-2.0 0.2-0.6 0.2-0.6	0.18-0.24 0.14-0.18 0.08-0.12 0.08-0.12	4.5-5.5 4.5-5.5 4.5-5.5 4.5-5.5	Low Low Low Low	0.43 0.43 0.43 0.43	3	2.0-3.5
NoA, NoB Nolo	0-11 11-29 29-55 55	0.6-2.0 0.6-2.0 0.06-0.2 —	0.16-0.20 0.12-0.16 0.06-0.10 —	4.0-5.0 4.0-5.0 4.0-5.0 —	Low Low Low —	0.43 0.28 0.17 —	3-2	2.0-3.5
NsB Nolo	0-11 11-29 29-55 55	0.6-2.0 0.6-2.0 0.06-0.2 —	0.14-0.20 0.12-0.16 0.06-0.10 —	4.0-5.0 4.0-5.0 4.0-5.0 —	Low Low Low —	0.43 0.28 0.17 —	3-2	2.0-3.5
Ph Philo	0-50 50-64	0.2-2.0 2.0-20	0.12-0.20 0.06-0.10	4.5-6.0 4.5-6.0	Low Low	0.28 0.28	4	52.0-4.0
Po Pope	0-26 26-61	2.0-6.0 0.6-6.0	0.12-0.14 0.12-0.15	3.6-5.5 3.6-5.5	Low Low	0.28 0.28	5	2.0-4.0

Pu Purdy	0-15 15-50 50-65	0.2-0.6 0.06-0.2 0.06-0.2	0.18-0.24 0.12-0.18 0.10-0.16	3.6-5.5 3.6-5.5 3.6-5.5	Moderate Moderate Moderate	0.43 0.28 0.28	3	2.5-4.5
Qu* Quarries								
RgB*, RgC*, RgD*, RgF* Rayne	0-8 8-47 47-55 55	0.6-2.0 0.6-2.0 0.6-2.0 —	0.12-0.16 0.12-0.16 0.10-0.14 —	4.5-5.5 4.5-5.5 4.5-5.5 —	Low Low Low —	0.28 0.28 0.28 —	4	2.5-4.0
Gilpin	0-6 6-24 24	0.6-2.0 0.6-2.0 —	0.10-0.16 0.10-0.16 —	4.5-5.5 4.5-5.5 —	Low Low —	0.28 0.28 —	3	2.5-4.0
RpB*, RpD* Rayne	0-8 8-47 47-55 55	0.6-2.0 0.6-2.0 0.6-2.0 —	0.12-0.16 0.12-0.16 0.10-0.16 —	4.5-5.5 4.5-5.5 4.5-5.5 —	Low Low Low —	0.28 0.28 0.28 —	4	2.5-4.0
Gilpin	0-3 3-24 24	0.6-2.0 0.6-2.0 —	0.08-0.14 0.10-0.16 —	4.5-5.5 4.5-5.5 —	Low Low —	0.28 0.28 —	3	2.0-3.5
Ty Tyler	0-8 8-24 24-52 52-60	06-2.0 0.2-0.6 <0.2 0.2-0.6	0.18-0.22 0.16-0.20 0.04-0.12 0.04-0.12	3.6-6.5 3.6-5.5 3.6-5.5 4.5-6.0	Low Moderate Low Low	0.43 0.43 0.43 0.43	3	2.0-3.5
UDA*, UDD*, UDF*, UOA* Udorthents								
WhB, WhC, WhD Wharton	0-10 10-44 44-65	0.6-2.0 0.03-0.6 0.06-0.6	0.16-0.20 0.12-0.16 0.08-0.12	4.5-5.5 4.5-5.5 4.0-5.0	Low Moderate Moderate	0.43 0.28 0.17	3	2.0-3.5
WvB, WvD Wharton	0-10 10-56 56-65	0.6-2.0 0.06-0.6 0.06-0.6	0.14-0.20 0.12-0.16 0.08-0.12	4.5-5.8 4.5-5.5 4.0-5.0	Low Moderate Moderate	0.43 0.28 0.17	3	2.0-3.5

*** See description of the map unit for the composition and behavior characteristics of the map unit.**

WATER RESOURCES

Public Water Supplies

Berlin

The water supply of Berlin is controlled by the Municipal authority and is obtained from springs and wells about 3 miles east of the borough on the west slope of Allegheny Mountain. There are eight springs and four wells which feed two reservoirs having capacities of 750,000 and 500,000 gallons. All but one of the springs are located on the wooded west slope of Allegheny Mountain at estimated elevations between 2,600 and 2,700 feet. The water of these springs probably flows from sandstones of the lower Allegheny Group. The springs flow steadily except during prolonged dry spells. In emergencies, McLuckie spring is used. It is located in the first valley east of the crest of Allegheny Mountain at an estimated elevation of 2,630 feet. Water from this spring must be pumped over a saddle in the mountain at an approximate elevation of 2,790 feet. The water from McLuckic spring probably issues from the Loyalhanna limestone.

Two of the drilled wells are located north of the road over Allegheny Mountain; two of them south of it. These are probably all bottomed in the Pottsville Group in either sandstone or sandy shale. The best yield is 48 gallons per minute from a 278-foot deep well. All the water of the system passes through a chlorination and meter plant located about 21/2 miles east of Berlin. The average daily use of water in the borough in 1960 was 114,000 gallons per day. Water is delivered to the borough at a maximum pressure of 214 pounds per square inch.

Confluence

The Confluence water supply is controlled by a privately owned company. Since 1904, water has been obtained from an impoundment-type reservoir on Drake Run less than a half mile north of Draketown and about 31/4 miles north-northwest of Confluence. The collecting area for this reservoir is in the Allegheny Group.

The reservoir has a capacity of 1,200,000 gallons. It lies approximately 380 feet above the village of Confluence and supplies gravity-flow water at pressures ranging from 175 to 180 pounds per square inch. This pressure is reduced to 90 psi for home use. The water supply is adequate except during drought when use restrictions are invoked. Daily consumption ranges from 30,000 to 50,000 gallons per day. Supplies could be increased by drilling one or more wells where water would feed into the reservoir. The only treatment of the water is chlorination.

Garrett

The Garrett Water Company was established in 1803. The water supply came from two impoundments; the Bigby Run reservoir with a 3,000,000 gallon capacity located **3/4** of a mile southwest of the borough, and the Piney Run reservoir of 50,000 gallon capacity located one mile northwest of Garrett. There is gravity flow from both reservoirs. The fall from Bigby Run reservoir is about 225 feet providing a pressure of 85 psi at Garrett; the fall from Piney Run reservoir is about 315 feet making a pressure of 110 psi A well field 1 mile west of Garrett is also producing water for the borough.

The average daily water consumption in Garrett is estimated at 10,000 gallons, based on an average amount of 50 gallons per day per person. A more exact consumption figure is not available because the water is not metered, but is sold on the basis of a flat monthly rate.

Markleton

At the small village of Markleton, 14 houses are furnished free of charge with water piped from Isers Run (Town Line Run on U.S.O.S. Meyersdale quadrangle map), a Casselman River tributary. The intake is about one mile up the run from its junction with Casselman River in a heavily forested, uninhabited area on the west slope of Negro Mountain. Surface rocks in this upstream drainage area are in the Pottsville Group.

The water flows through an 8-inch diameter pipe originally installed to supply water to a tuberculosis sanitarium. The water is both adequate in supply and of excellent quality, requiring no treatment.

Meyersdale

The public water supply at Meyersdale dates back to 1888. It is currently under the direction of the Meyersdale Municipal Authority. The chief source of water in this system is Sand Spring reservoir of 800,000 gallons capacity. This reservoir is located about 11/4 miles southeast of Meyersdale on the west flank of Allegheny Mountain and is supplied by Sand Spring which has a daily flow of 200,000 gallons for eight months of the year.

The second principal source of water in the Meyersdale system is from Stamm Run, a tributary to Flaugherty Creek east of Allegheny Mountain. On Stamm Run there are two impoundment reservoirs, a larger one of 14,000,000 gallon capacity at an estimated elevation of 2,550 feet, and a smaller one of 3,000,000 gallon capacity at an estimated elevation of 2,250 feet. Stamm Run is a spring-fed stream flowing over mostly Pocono rocks outside the coal-bearing area east of Allegheny Mountain. In addition to the water from Stamm Run, water from three drilled wells also feeds into the lower Stamm Run reservoir. The Stamm Run water is gravity fed to Meyersdale lying at an elevation of about 2,000 feet.

Formerly, water for the Meyersdale system also came from Bear Run, a tributary of Flaugherty Creek entering from the north at Keystone, and from Blue Lick Creek, a stream about 11/2 miles north of Meyersdale. Neither the Bear Run nor Blue Lick water is now used for home supplies, but the Blue Lick storage facilities are maintained for fire protection. Water is pumped from Meyersdale into a reservoir north of the borough where it is available for extinguishing fires.

Rockwood

The public water supply in Rockwood has been maintained since 1906 by the Rockwood Water Company. The system includes a spring-fed reservoir, an impoundment just upstream from the reservoir, and two drilled wells, all of which are located about 3 miles south-southwest of the village on the lower slopes of Negro Mountain. The drainage area upslope from the reservoir is underlain mostly by rocks of the Pottsville Group. Little coal mining has ever been done in the drainage area, but one abandoned unsealed mine, probably in the Mercer coal, about a mile upslope from the reservoir does contribute some iron-bearing water to the system.

The main reservoir has a storage capacity of 4,000,000 gallons; the impoundment reservoir a capacity of 2,000,000 gallons. The two drilled wells yield 300 gallons per minute each. They are both 125 feet deep and probably bottom in lower Pottsville sandstones.

There is gravity feed from the reservoir at an estimated elevation of 2,330 feet to Rockwood whose lower elevations are around 1,825 feet. But one mile southwest of the village, the water is piped over a hill at an elevation of more than 2,100 feet so that some difficulty is encountered in obtaining ample water pressure in buildings located at the higher elevations in the borough. Rockwood's main source of water is from a well field 2 miles east of the munipality. All the water in the Rockwood system is chlorinated. The daily consumption in the borough is estimated at 85,000 gallons.

Salisbury

The single source of water in this system is the so-called Findley Spring located 21/2 miles southeast of the village. This is a reliable spring occurring on the southeast-facing slope of Piney Creek valley about 1,700 feet north of the Pennsylvania-Maryland state line, at an estimated elevation of 2,260 feet. The spring water probably issues from the Loyalhanna Formation whose outcrop position occurs on the hillside at this locality. The yield from the spring is 95 to 100 gallons per minute with little variation throughout the year.

Water flows to Salisbury by gravity, there being a total drop of 27 feet from the spring to the reservoir on the hillside cast of the main part of the village, At the Post Office (elevation 2,132 feet; U.S.G.S. benchmark) the water pressure is 52 psi. Some pumping is required to lift water to a few houses at the higher elevations.

The reservoir has a capacity of 87,250 gallons. Daily consumption ranges between 25,000 and 28,000 gallons. No chlorination or treatment of any kind is required for the water of the Salisbury system.

Somerset

The Somerset water supply was formerly obtained from wells in the Mahoning sandstone, but these wells now represent only a standby supply. They could not now meet the needs for water in the borough. The present supply comes from Laurel Hill Creek eight miles west of Somerset, where the water is stored in an impoundment reservoir. A quantity of 2,000,000 gallons per day is allocated to Somerset.

The water is piped to a filtration and chlorination plant on Coxes Creek at the south edge of the borough. It is delivered to consumers at an average pressure of 70 psi.

Springs and Wells

Both dug wells and drilled wells furnish water in Somerset County. Most of the dug wells were dug before portable drilling rigs were available; practically all wells are now drilled. The depth of 33 wells reported by Lohman (1938, p. 290-92) range from 19 to 1,000 feet and have an average depth of about 140 feet. They have yields ranging from one gallon per minute to 250 gallons per minute. The average yield from 23 of these wells is 30 gallons per minute; the most common yield is 5 gallons per minute, shown by 9 of the wells. Nineteen of the 23 wells have yields of 8 gallons per min- ute or less; thus it is 3 wells having yields of more than 100 gallons per minute and another of 76 gallons per minute which make the average yield as high as 30 gallons per minute. The most prolific yield of 250 gallons per minute is found in each of three wells about 3 miles south of Rockwood at the Rockwood Reservoir. These wells bottom in Pottsville (possibly the Connoquenessing) sandstone and are probably located in an open joint in the sandstone. It is reported that at a depth of 100 feet a void of 40-to-50 feet depth was encountered in drilling wells. There is no limestone in this part of the stratigraphic section in which a solution cavity of these propor- tions could have developed; thus, the joint explanation is the most plausible one. The large yield is probably the result of good permeability in the sand- stone itself allowing the water to move freely into the joint-type void.

Lohman (1938) gives no details on the flow of springs In southern Somerset County, but he does record one which furnishes part of the water supply for the County Home 2.7 miles east of Somerset, just north of the mapped area. This is a contact-type spring which issues from the shale above the upper Freeport coal. It yields from 5 to 10 gallons per minute in the summer months and up to 175 gallons per minute in the winter.

Two springs in the southern part of the county, not used for water supply, are worthy of note. One is the so-called Big Spring located 21/4 miles west-northwest of Mt. Davis in the valley of Cove Run (known to some as McClintock Run).

This stream has been ponded and is the site of the Deer Valley Y.M.C.A. Camp. At the spring a naturally formed pool overflows into Cove Run. The bottom of this pool contains a covering of white sand kept in constant agi- tation by the water issuing from the spring opening. This opening is prob- ably a tubular one in the Wymps Gap limestone (formerly Greenbrier) of the Mauch Chunk Formation. Though there are no limestone outcrops in the immediate vicinity of the spring, the Wymps Gap does crop out and is mined by the Keystone Lime Company 11/2 miles to the southeast. From this mine, near the axis of Negro Mountain antieline, the limestone dips northwesterly down Cove Run so that it should appear at the position of Big Spring. In the vicinity of the spring there is abundant rubble from the Pottsville outcrop of adjacent slopes, the Pottsville boulders having moved down over the Mauch Chunk slopes and then downstream in Cove Run by stream flow.

Another spring, also thought to be developed in the Wymps Gap lime stone is known as the Blue Hole and is located in the bed of Blue Hole Creek at its junction with Gary Run 2 miles upstream from Barronvale, Middle Creek Township. The Blue Hole is about 5 feet deep and contains bluish-colored water. The bottom of the hole is covered by a white sub- stance which is probably quartz sand. Water discharging from this spring immediately becomes part of the flow of Blue Hole Creek. No nearby outcrops of Wymps Gap limestone have been found, but because the spring is located at the correct stratigraphic position for this limestone and because the limestone is known to be a persistent bed from occurrences a few miles west on Laurel Hill and to the cast on Negro and Allegheny Mountains, it is highly probable that Blue Hole is a Wymps Gap limestone spring.

A type of spring which is common in southern Somerset County as throughout the whole Allegheny Plateau is the contact spring. Flow from such springs is controlled by a combination of a permeable and impermeable rock layer in contact with each other. In the Coal Measures which underlie a large portion of the mapped area, the more impermeable beds are beds of clay, overlain by layers of coal, shale, and sandstone which are permeable because of fractures or bedding planes or because of primary intergranular pore space. Surface water percolates downward through these upper layers until it reaches a clay bed. Because of the impermeability of the clay, the water is "backed up" and its flow is diverted laterally, essentially parallel to the contact plane (bedding plane) between the clay and its overlying bed, usually a coal seam. The water thus makes its way to the surface and issues as a spring. It is common to find a line of such springs along a hillside, marking the outcrop position of the coal bed and its under- clay. In fact, such springs are useful as a guide in geologic mapping to trace the outcrop position of coal beds where no actual outcrops occur. Such lines of springs do not, of course, always represent a coal-clay outcrop. The same situation may occur in alternating shales and sandstones such as are found in the noncoal-bearing Devonian and Mississippian rocks of the area. Some shale beds are impermeable enough to cause such contact springs.

Evaluation of Ground-Water Possibilities

Water in Sandstone and Conglomeratic Sandstone

Ground-water possibilities in sandstone and conglomeratic sandstone are better than in any other rock-type in southern Somerset County. Both of these rocks generally have good porosity and permeability, although these properties vary considerably from one bed to another and even within beds. As in other kinds of rock, the porosity results from openings of both primary and secondary origin.

Excepting limestone, sandstone and conglomeratic sandstone are the only rock types in southern Somerset County from which large yields of water of more than 50 gallons per minute can be expected. In 62 sandstone wells examined by Lohman (1938, p. 44) in south-central Pennsylvania, 24 were reported to yield from 50 to 100 gallons per minute; another 24 wells from 100 to 200 gallons per minute; 9 wells from 200 to 300 gallons per minute; 4 wells from 300 to 400 gallons per minute; and 2 wells more than 500 gallons per minute. One of these 2 wells is in Somerset County near Windber (p. 286) and has a yield of 570 gallons per minute. Lohman also points out (p. 44) that numerous sandstone wells in south-central Pennsylvania yield between 10 and 50 gallons per minute. Nearly 50 percent of the wells reported by Lohman (1938, p. 290-293) for southern Somerset County are sandstone wells. They have an average yield of 46 gallons per minute and a range from 2 to 250 gallons per minute. The fact that 60 percent of these sandstone wells have yields of less than 10 gallons per minute indicates that not all sandstone has good permeability.

Because those sandstones with the best permeability and the greatest continuity give the best yields, and because there are several sandstone beds in southern Somerset County having these characteristics, a knowledge of the stratigraphy and areal geology of a given locality is of importance.

Water in Shale

Shale does not generally yield large quantities of water. About 50 gallons per minute is the maximum expectable yield. Though it has considerable porosity, the pores are so small in shale that water cannot freely move through it. The rock will absorb or "take in" water but does not yield it readily. The better yields are found in shales that are well jointed, for joints allow water movement which cannot occur within the shale itself. However, joints in shale do not remain open to indefinite depths. Below depths of 200 or 300 feet, joints are probably sufficiently closed to greatly reduce permeability.

Water yield from most shale wells in south-central Pennsylvania ranges from 1 – 15 gallons per minute, but in some places it can be less than 1 gpm. Experience has shown that deepening a shale well does not generally increase the yield unless, of course, some other more permeable aquifer such as sandstone or limestone is en- countered. Water yields from shale wells is likely to be steady.

Shale is the most abundant rock type in southern Somerset County. It is present in all rock formations but is particularly abundant in the Jennings, Catskill, and Mauch Chunk Formations and in the Allegheny, Conemaugh and Monongahela Groups. Very few wells, if any, drilled in the mapped area have not encountered some shale. Nearly 18 percent of the wells in southern Somerset County reported by Lohman (1938, p, 290-293) are bottomed in shale and show an average yield of less than 5 gallons per minute. Another 14 percent produce from rock recorded as sandy shale with an average yield of 45 gallons per minute.

Water in Limestone

Limestone is a dense rock whose permeability results mostly from joints and bedding planes and the development of solution openings along these. If these openings are well developed, the rock may have excellent permeability and yield large quantities of water; if they are not, very poor yields may be obtained from limestone. Predicting where limestone will have good permeability is difficult; this can normally be determined only by drilling.

In southern Somerset County there are no extensive areas underlain by limestone as in some Pennsylvania counties. Instead, thin layers of limestone (the thickest is the 50-foot Loyalhanna) crop out in narrow inconspicuous bands, mostly on the fairly inaccessible flanks of antielinal and synclinal structures. Thin limestones in the upper Allegheny, Conemaugh, and Monongahela Groups, however, are found in synclinal areas within easy reach of the water-well drill.

Of 82 water wells in Somerset County reported by Lohman (1938, p. 286-293) only one near Garrett (well no. 921, p. 293) bottoms in lime- stone, and that has been abandoned because of poor yield. There are prob- ably a few domestic limestone wells in southern Somerset County, for which no information is available.

Two springs, Big Spring and Blue Hole Spring, thought to be developed in the Wymps Gap limestone of the Mauch Chunk Formation are described under the earlier discussion of "Springs and Wells." Two others, McLuckie Spring and Findley Spring, which are probably Loyalhanna limestone springs contribute to the water supply of Berlin and Salisbury, respectively, as previously described.

Water in Coal

Coal beds do not represent an important source of ground water in southern Somerset County. Only one of the wells reported by Lohman (1938, p. 292, well no. 911) for Somerset County bottoms in coal. That is in Addison Township at the horizon of the Little Pittsburgh coal. The well is 50 feet deep and yields 4 gallons per minute of potable water. Another well, an abandoned 19-feet-deep dug well at Markelton (p. 29 1, well no. 901) bottoms at the middle Kittanning coal horizon, but the material from which the water issues is reported as "soil or rock," not coal. The latter was once used as an observation well of the U. S. Geological Survey.

Potable water is generally found in coal beds, providing the coal has not been disturbed. Where the coal has been disturbed, sulfides within it (mostly pyrite) oxidize and form acidic sulfurous water. In coal-mining areas where wells penetrate several coal seams to reach a deeper aquifer in some other kind of rock, casing is generally placed in the hole to a level below the lowest coal in order to prevent any impure water in the coal from entering the well. Non-corrosive casing is most serviceable for the purpose because of the corrosive nature of acid water from the coal.

Water in Devonian Rocks

Devonian sandstone is found in both the Jennings Formation and in the Catskill red beds but is more prevalent in the Catskill. Catskill sandstones are generally fine-grained and "dirty," and have rather poor permeability. They are all quite similar and occur interbedded with mostly red and some green shales which are also quite similar, thus making the mapping of individual sandstones difficult. There are several conglomeratic sandstones in the Jennings Formation. One, about 20 feet thick, and about 1,600 feet below the Catskill red beds has been mapped by the writer. At the surface this rock has good permeability but its subsurface characteristics are not known. For the most part, sandstone beds in the Jennings are only a few inches thick and are interbedded with shale and siltstone, neither of which has good permeability.

Lohman (1938, p. 104-105) found the ground-water possibilities in the Jennings (Chemung) Formations and Catskill Formations to be similar. He states that "in general the Chemung and Catskill Formations are rather poor water-bearers, even to deep wells that encounter sandstone." Some wells bottoming in shale in these formations have better yields than others which bottom in sandstone, thus it is not worthwhile to try to predict the depth of any particular stratigraphic unit in these formations, except perhaps conglomeratic sandstones in the Jennings Formation. Lohman reports (p. 105) two industrial wells in Perry County which yield 80 to 85 gallons per minute from Chemung (Jennings) sandstones. More typical yields, how- ever, from both Jennings and Catskill wells are in the range from less than one gallon per minute up to 10 gallons per minute. A Jennings Formation well at New Baltimore (Lohman, 1938, p. 291, well no. 895), for example, yields from 3 to 5 gallons per minute. Wells drilled to a depth of several hundred feet in these formations are likely to encounter salt water. Shallow wells, however, produce water of good quality.

Water in Mississippian Rocks

In southern Somerset County, the Pocono is a 550-foot thick formation composed of sandstone and shale. In roughly the lower three-fourths of the formation, the sandstone beds are thin and are interbedded with abundant shale; in the upper one-fourth, sandstone is dominant over shale in a member which is thought to be the equivalent of the Burgoon sandstone. This sandstone is fine to medium grained with fairly good permeability. It is not as important a water-bearer as it might be, however, because where it is shallow enough to furnish good supplies of fresh water, it occurs in rather inaccessible areas. Whereas in synclinal areas that are more populated, the Pocono is deep enough to produce salt water.

Near its outcrop, the Pocono may not yield large supplies of water, but generally does have adequate water for domestic needs. Three Pocono wells (Lohman, 1938, p. 292) eight-tenths of a mile south of Keystone (near Meyersdale) used for supplementing the Meyersdale water supply, range in depth from 800 to 1,000 feet and yield 25 gallons per minute each. These penetrate the Pocono below the horizon of the Burgoon sandstone. In Bedford County, Lohman reports a yield of 35 gallons per minute in a Pocono well at Grandview on the Allegheny Front, Route 30 (1938, p. 136, well no. 1056), and 5 gallons per minute in a second Pocono well near Ogletown (1938, p. 130, well no. 960). All Pocono wells examined by Lohman supplied water of excellent quality.

The Loyalhanna limestone is a sandy limestone which maintains a thickness of about 50 feet throughout southern Somerset County. It is not important as a source of ground-water because of its restricted distribution and occurrence in relatively inaccessible areas. The Loyalhanna is probably a cavernous formation wherever it occurs at shallow depths. Solution openings such as would be expected in a well that might penetrate the Loyalhanna can be seen in the Keystone Lime Company quarry on Negro Mountain anticline.

In southern Somerset County, the Mauch Chunk is divisible into two members. The lower one contains the Wymps Gap limestone at its top and the Deer Valley limestone at its base with varying amounts of shale, calcareous shale, and shaly limestone in between. The upper member contains no limestone; it is composed of interbedded shale and sandstone. Toward the top of this upper member there is a persistent thin-bedded sandstone 20 or 25 feet in thickness. Water yields from this sandstone are not known but it should be a potential source of moderately good yields. Other thinner sandstones are found above and below it, but because most Mauch Chunk sandstones are the graywacke type of rock, their permeability is relatively poor.

Few data are available on ground-water yields from the Mauch Chunk Formation. Its largest outcrop area occurs along Negro Mountain antieline from Casselman River southwestward, and on the east slopes of Laurel Mountain. Both of these areas are sparsely populated.

Lohman (1938, p. 109, 286, and 295, well no. 849) reports a well near Windber in Somerset County which yields 230 gallons per minute from Mauch Chunk sandstone and 340 gallons per minute from the Pottsville Connoquenessing sandstone. Another Mauch Chunk well (Lohman, 1938, p. 109 and 287, well no. 855) near Central City yielded 400 gallons per minute, and a third at Johnstown, Cambria County, yields 180 gallons per minute. All these wells yield water containing excess iron, a condition which can be expected in all Mauch Chunk wells with the possible exception of those which produce from limestone beds within the formation.

In Huntingdon County, at Robertsdale, (Lohman, 1938, p. 109, 238, and 241, well no. 632) near Woodvale (p. 109 and 238, well no. 633) Loh- man reports two Mauch Chunk wells both of which bottomed in sandstone. These wells had very low yields of one-quarter gallon per minute or less.

Although no specific information is at hand, it is probable that good yields of water could be obtained from the Wymps Gap limestone and Deer Valley limestone in southern Somerset County. They are about 10 feet thick each, and where solution openings have developed in them, they should be very permeable. The Deer Valley is directly underlain by the 50-foot thick Loyalhanna Limestone which is also likely to be cavernous. The Wymps Gap limestone is present throughout all the Mauch Chunk belts of the mapped area, but the Deer Valley is restricted to the southern portion (Pl. 3). The best possibilities for finding good yields of water in the latter occur west and southwest of Mt. Davis. On the flanks of the Wellersburg syneline and the east flank of the Berlin syncline, the Mauch Chunk belt is thin because of a relatively steep dip, and is not of much importance as a water-bearer.

Water in Pennsylvanian Rocks

The Pottsville is the most prolific producer of ground water in southern Somerset County. This formation is composed of several sandstones which have good permeability and are continuous enough to be good aquifers. They are the lower and upper Connoquenessing sandstones (known as Connoquenessing where not differentiated), the Homewood sandstone, and, to a lesser extent, the Sharon sandstone whose occurrence is less well known than that of the others. Each of these sandstones is on the order of 20 to 40 feet thick.

The Pottsville Group crops out along forested ridges where water readily enters and moves down-dip into adjacent synclines so as to develop considerable head. In areas where the Kittanning coal seams are exposed, the Pottsville sandstones are about 100 to 200 feet below the surface. Where the Freeport coal seams are exposed, Pottsville sandstones are about 100 feet deeper. The deepest Pottsville occurs along the axis of the Berlin syncline and in the vicinity of Wellersburg where depths of more than 1,200 feet are common. It rises rapidly from the bottoms of these synclines and crops out on the flanking ridges (Negro Mountain, Allegheny Mountain, Big Savage Mountain, and Little Allegheny Mountain). The Pottsville sandstones also crop out on the east flank of Laurel Mountain and along Winding Ridge. They are several hundred feet deep in the Lower Youghiogheny and New Lexington synclines.

Yields of water that can expected from Pottsville sandstones range from 40 gallons per minute up to 300 or 400 gallons per minute. Lohman (p. 292, well no. 925) reports a 40 gallon per minute yield from a well one mile southeast of Meyersdale, a 100 gallon per minute yield from a well (no. 920) 0.8 of a mile northwest of Garrett, a 150 gallon per minute yield from a well (no. 902) 0.2 of a mile west of Rockwood, and a 250 gallon per minute yield from a well (no. 900) 3 miles south of Rockwood at the Rock- wood Reservoir site.

Although good yields can almost invariably be obtained from wells bot- toming in Pottsville sandstones, the quality of the water is generally rather poor. The water usually contains enough iron to be distasteful and to form a red precipitate, and enough hydrogen sulfide to impart an odor. Pottsville water is also hard water commonly. In wells deeper than about 300 feet, salt water may be encountered.

The Allegheny Group is widely distributed in southern Somerset County as an outcropping unit in some places, buried beneath the overlying Conemaugh in other places, and beneath both the Conemaugh and Monongahela strata in still other places. Allegheny rocks are either at the surface or at shallow depth at the villages of Somerset, Rockwood, Garrett, Fort Hill, Harnedsville, Listonburg, Casselman and Markleton.

Several water-bearing sandstones occur in the Allegheny Group. These include, in stratigraphic order from the base: The Clarion, Kittanning, Worthington (lower and upper), Freeport, and Butler sandstones. Sand- stones toward the base of the formation are generally more massive and perhaps more continuous than those toward the top and are, therefore, better aquifers. All of these sandstones occur in a sequence of shale, clay, coal, and in the upper part of the formation, limestone, The sandstone beds are commonly 15 to 20 feet thick, but where two or more are coalesced, sandstone thicknesses double or triple that amount may occur.

In some localities sandstones of the lower Allegheny are difficult to distinguish from those of the upper Pottsville. It may be that in some localities, wells reported to be in Pottsville may actually be in sandstones of the lower Allegheny.

Water yields from certain Allegheny wells in south-central Pennsylvania, according to Lohman (p. 113) may range from 50 to 150 gallons per minute. Allegheny wells reported by him for southern Somerset County (p. 291, well no. 897; p. 292, wells nos. 905, 906, 907) had yields of not more than 5 gallons per minute, except well no. 906, a 200-foot well at Confluence which had a yield of 120 gallons per minute.

The quality of water from the Allegheny Group is generally fairly good, but it may contain excessive iron and hydrogen sulfide. Where coal beds of the Allegheny have been extensively mined, areas may have been de- watered where ground water drained into the voids created by mining and then discharged at the surface through mine openings.

The Conemaugh Group has the most extensive surface areal distribu- tion of any rock unit in southern Somerset County. It is found mostly in syn- clinal structures in areas of considerable population, both urban and rural. The villages of Somerset, Berlin, Meyersdale, Salisbury, Confluence, Kingwood, New Lexington, Centerville, Boynton, and Wellersburg are all located on Conemaugh rocks. The first five of these communities have public water supplies obtained from sources other than the Conemaugh Group; but homes in the peripheral areas of all these communities are dependent on individual water supplies from the Conemaugh strata as are homes in the latter five villages listed above.

Seven water-bearing sandstones are distributed through the 900-foot- thick column of the Conemaugh Group. Listed in upward stratigraphic order they are the Maboning, Buffalo, Saitsburg, Grafton (lower and upper), Morgantown, and a sandstone in the upper Conemaugh which may be the Connellsville sandstone. All of these sandstones show lateral changes in thickness and lithology. They become shaly in some localities but are generally present as predominantly sandstone units on the order of 15 or 20 feet thick. They are interbedded with shale, clay, coal, and limestone. Generally, these Conemaugh sandstones will supply ample quantities of good quality water for domestic use at least, and can be reached by the drill at shallow depths over a wide area. Relatively little coal has been mined from the Conemaugh Group because most of its coal beds are either too thin or too impure to be mined extensively. Therefore, the draining of ground water supplies as the result of coal mining and the population of water by acid mine drainage is not as much of a problem in Conemaugh areas as in Allegheny areas.

Lohman reports II wells (1938, p. 290-292, wells nos. 894, 898, 899, 903, 904, 910, 915, 918, 922, 924, 927) which were in 1938 producing from Conemaugh rocks in southern Somerset County. The average yield from these I I wells was 20 gallons per minute; the range of yields between 4 and 90 gallons per minute; and the most common yield of 5 gallons per minute was shown by six wells. The largest yield was 90 gallons per minute from a well in the Morgantown sandstone at Meyersdale; the next largest yield of 76 gallons per minute was from a well in the Mahoning sandstone one mile east of Boynton.

The quality of Conemaugh Group water is fairly good. It is distinctly better than that of the Pottsville Group and is generally better quality than water from the Allegheny Group. From the standpoint of furnishing water of adequate quantity and quality, and from the standpoint of accessibility and areal distribution, the Conemaugh Group is among the important water- bearing units in southern Somerset County.

The Monongahela Group is of minor importance as a water-bearer in southern Somerset County because of its restricted areal distribution and because it occurs in sparsely populated upland areas. An exception is the patch of Monongahela on which the community of Berlin is built, but Berlin obtains its water supply from springs and wells a few miles east of the village.

Only about 200 feet of the Monogahela Group (roughly one-half the complete thickness) has been preserved from erosion, mostly in the Berlin syncline, but a small area does occur in the Wellersburg syncline. The Group is composed of shale, sandstone, clay, coal, and limestone. Two permeable limestone beds, the Redstone and Fishpot occur about 80 feet and 150 feet above the basal Pittsburgh coal respectively. The latter lime- stone has very restricted distribution because it occurs near the tops of the highest hills. Sandstones are only locally well developed in the Monongahela Group and are of minor importance.

Extensive mining in the Pittsburgh coal seam and also in the Blue Lick seam (locally called Redstone) has partially drained ground-water supplies from large areas in the Berlin syncline.

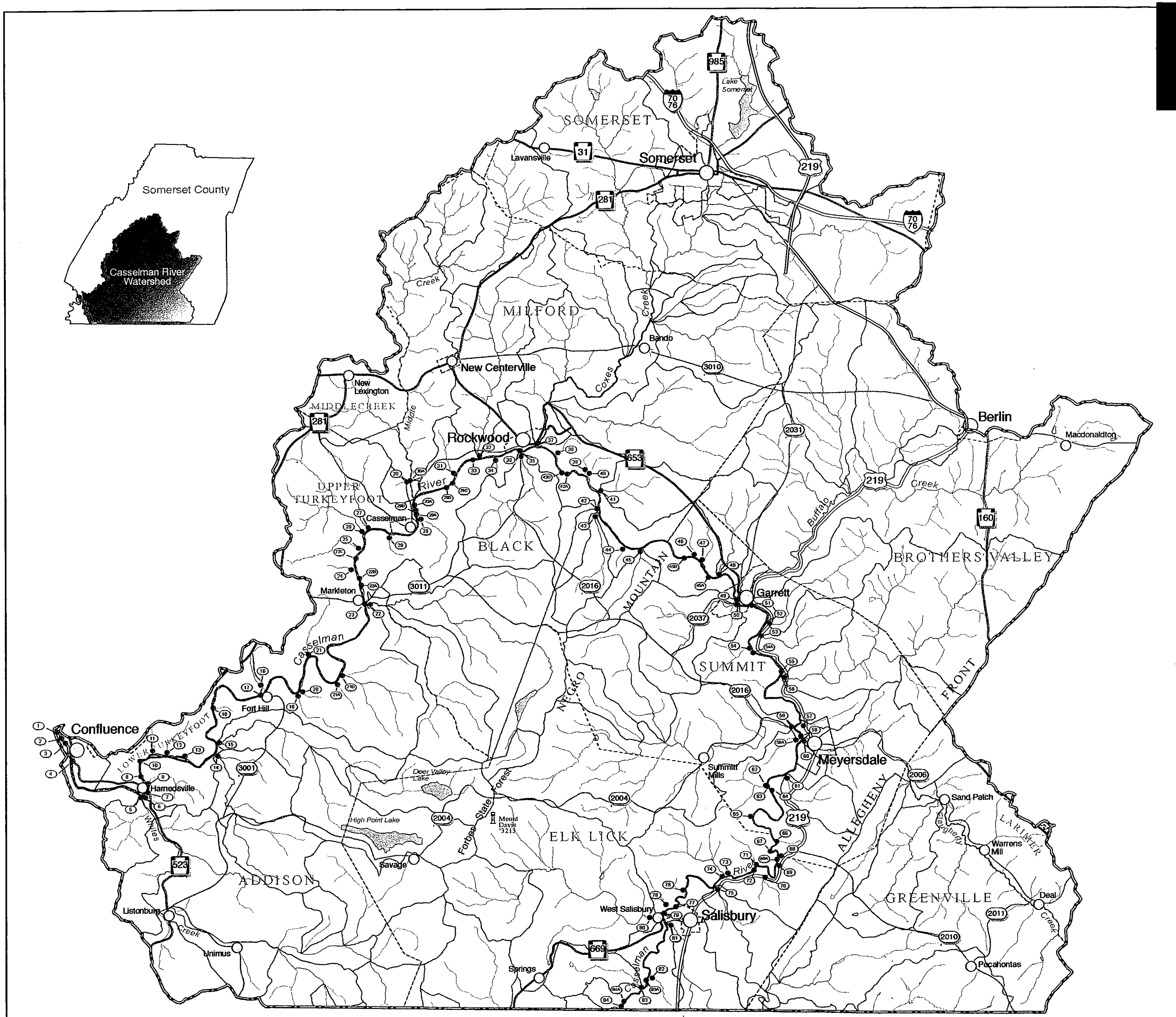
WELLHEAD PROTECTION AREAS

Section 1428 of the Federal Safe Drinking Act requires states to establish wellhead protection programs to protect public water supplies from contamination, ensure public health, and prevent the need for treatment of wells to comply with drinking water standards. The wellhead protection program administered by the Department of Environmental Protection is a proactive effort designed to apply proper management techniques and preventative measures to protect groundwater supplies. The following municipalities have developed local wellhead protection plans (the permit number is listed behind the name of the municipality); Berlin 45600289, Rockwood 4560020, Salisbury 4560041, & Somerset Borough 4560042.

WETLANDS

Wetlands are defined as areas which remain inundated or saturated at a frequency and duration sufficient to support a dominance of hydrophytic (i.e. water-loving) vegetation (Environmental Laboratory, 1987). The presence of steep, wooded slopes within the study area generally prohibit wetlands due to rapid drainage with negligible water retention time. Somerset County has 6,211 acres of wetlands or 0.9%. These wetlands occur naturally or may have been installed to treat polluted water. Wetlands within the basin are identified on the U.S. Fish and Wildlife Service's (USFWS) National Wetland Inventory (NWI) maps.

Water Quality Sampling Map
Casselman River Watershed



LEGEND

- (65) Water Quality Sampling Locations and ID Number
- Sub-Watershed Boundary
- Watershed Boundary
- River or Stream
- Municipal Boundary
- Town or Place Name

SOURCE: Casselman River Watershed Conservation Plan

North

1:12000

0 — 6.5 Kilometers

0 — 4 Miles

Mapping & GIS Compiled By:

LandVision
Planning and Mapping Services

National Research Center for Coal and Energy
P.O. Box 6064, Evansdale Drive
Morgantown, WV 26506

phone 304 293 2867 ex
fax 304 293 8177

Client: Casselman
Sample Date: 05/27/99
Sampled By: Client

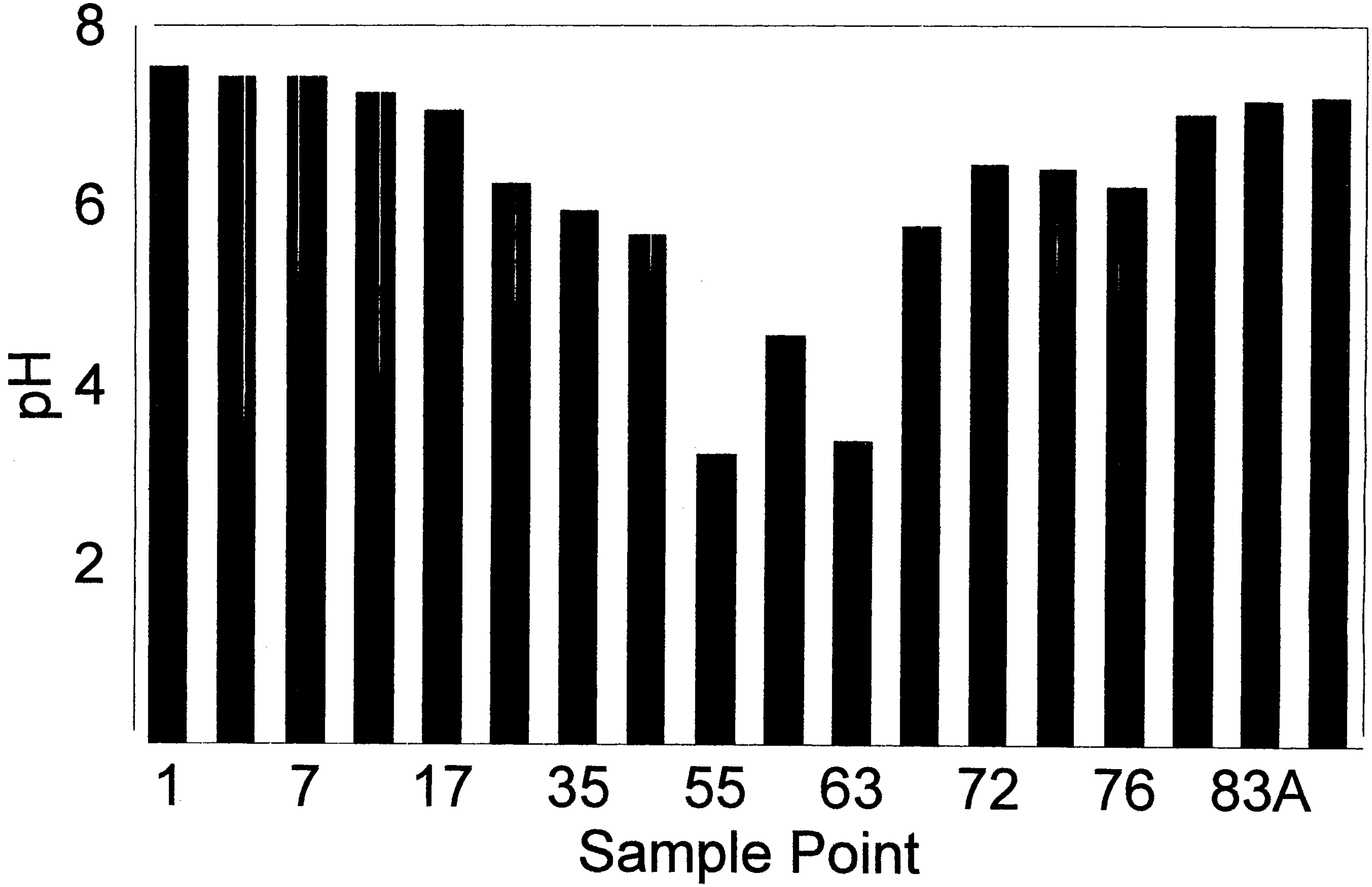
Project: Casselman
Date:

Method Number Sample ID	Lab ID	pH	Conductance	Alkalinity	Acidity	Ag	Al	As	Ba	Br-	Ca	Cd	Cl-	Cr	Fe	Mg	Mn	NH3	Ni	NO3	Pb	PO4-3	Se	SO4-2	Tl	TP
		S.U.	Umhos/cm	mg/l as CaCO3		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Analysis Date		05/10/99	05/10/99	05/10/99	05/10/99	08/11/99	06/16/99	07/12/99	07/12/99	07/12/99	06/16/99	07/12/99	08/04/99	07/12/99	06/16/99	06/16/99	06/16/99	08/04/99	07/12/99	07/12/99	07/12/99	08/16/99	07/12/99	08/04/99	07/12/99	08/04/99
1 Casselman R @ mouth	99-1026	7.64	379	18.72	2.78	<.05	1.041	0.705	0.641	<.1	43.66	<.1	17.3782	<.1	<.1	16.93	<.1	<.1	<.1	0.667	0.398	0.00497	0.676	111.6	<.1	0.0699
2 Laurel Hill Cr. @ mouth	99-1027	7.68	94	18.94	0.18	<.05	<.1	<.1	<.1	<.1	9.403	<.1	14.2866	<.1	<.1	1.838	<.1	<.1	<.1	0.55	<.1		<.1		<.1	0.0659
3 Casselman @ 281	99-1028	7.43	351	12.82	0.78	<.05	0.9864	<.1	<.1	<.1	48.99	<.1	13.6235	<.1	<.1	17.4	<.1	<.1	<.1	0.675	<.1		0.1442		<.1	0.0567
4 Unnamed Trib @ 523	dry																									
5 Unnamed Trib	99-1029	7.55	147	16.14	0	<.05	0.3358	<.1	<.1	<.1	16.45	<.1	18.4138	<.1	<.1	4.068	<.1	0.2366	<.1	0.628	<.1		<.1		<.1	0.1203
6 Unnamed Trib	99-1030	7.49	215	51.08	0	<.05	0.6077	<.1	<.1	<.1	31.31	<.1	19.0761	<.1	<.1	6.64	<.1	0.121	<.1	0.38	<.1		<.1		<.1	0.0532
7 Casselman @ 523	99-1031	7.43	349	13.66	10.66	<.05	1.016	<.1	<.1	<.1	47.5	<.1	15.4898	<.1	<.1	17.59	<.1	0.0659	<.1	0.736	<.1		0.1149		<.1	0.0665
8 Unnamed Trib	99-1032	7.57	113	48.14	0	<.05	0.2983	<.1	<.1	<.1	19.5	<.1	0.0549	<.1	<.1	4.046	<.1	<.1	<.1	0.416	<.1		<.1		<.1	0.1645
9 Casselman @ RR	99-1033	7.25	353	13.66	12.32	<.05	1.004	<.1	<.1	<.1	46.91	<.1	14.0207	<.1	<.1	16.79	<.1	<.1	<.1	0.718	<.1		<.1		<.1	0.0681
10 Unnamed Trib	99-1034	7.2	95	19.4	0	<.05	0.1756	<.1	<.1	<.1	12.73	<.1	6.9809	<.1	0.3639	2.029	<.1	1.0365	<.1	0.71	<.1		<.1		<.1	0.069
11 Unnamed Trib	99-1035	7.26	112	1.28	17.84	<.05	0.202	<.1	<.1	<.1	16.11	<.1	0.4749	<.1	<.1	3.046	<.1	0.1097	<.1	0.409	<.1		<.1		<.1	0.1307
12 Unnamed Trib	99-1036	7.34	120	41.66	0	<.05	2.782	<.1	<.1	<.1	19.51	<.1	0.6743	<.1	1.438	6.034	1.753	0.0026	<.1		<.1	0.01121	<.1	10.3607	<.1	0.1412
13 Unnamed Trib	99-1037	7.27	450	40.72	0	<.05	1.432	<.1	<.1	<.1	63.9	<.1	3.1678	<.1	<.1	17.65	0.1254	<.1	<.1	0.68	<.1		0.1327		<.1	0.0963
14 Unnamed Trib	dry																									
15 McClintock Run Mouth	99-1038	7.2	54	38.62	0	<.05	0.2897	<.1	<.1	<.1	4.64	<.1	1.0307	<.1	<.1	1.608	0.1635	0.0132	<.1	0.423	<.1		<.1	18.78	<.1	0.1052
16 Unnamed Trib	99-1039	7.23	73	1.8	14.04	<.05	0.2298	<.1	<.1	<.1	8.763	<.1	4.8798	<.1	<.1	1.598	<.1	`.0994	<.1	0.514	<.1	0.31	<.1	19.72	<.1	0.0788
17 Casselman @ Fort Hill	99-1040	7.05	378	9.38	19.6	<.05	1.184	<.1	<.1	<.1	42.17	<.1	13.4019	<.1	<.1	15.67	0.4305	0.1295	<.1	0.688	<.1	<.1	0.1155	107.908	<.1	0.0686
18 Unnamed Trib	99-1041	7.18	281	13.76	1.78	<.05	0.7452	<.1	<.1	<.1	29.46	<.1	38.1304	<.1	<.1	6.831	<.1	<.1	<.1	1.085	<.1	<.1	0.1219	44.58	<.1	0.05
19 Unnamed Trib	99-1042	7.16	240	42.68	0	<.05	1.222	<.1	<.1	<.1	48.17	<.1	1.3681	<.1	<.1	2.834	<.1	0.1642	<.1	0.353	<.1	0.204	<.1	103.72	<.1	0.108
20 Unnamed Trib	dry																									
21 Unnamed Trib	99-1043	7.22	380	11.6	8.12	<.05	1.592	<.1	<.1	<.1	56.78	<.1	6.9644	<.1	<.1	19.77	<.1	0.0153	<.1	0.797	<.1	<.1	<.1	515.914	<.1	0.1102
21 A Unnamed Trib	dry																									
21 B Unnamed Trib	dry																									
22 Town Line Run @ mouth	99-1044	7.38	200	43.08	0	<.05	0.5891	<.1	<.1	<.1	21.5	<.1	24.3911	<.1	<.1	3.98	<.1	0.0805	<.1	2.645	<.1	<.1	<.1	30.32	<.1	0.113
22A Unnamed Trib	99-1045	7.41	184	49.96	0	<.05	0.6375	<.1	<.1	<.1	24.31	<.1	<1	<.1	<.1	6.923	<.1	0.0021	<.1	0.334	<.1	<.1	<.1	23.8213	<.1	0.0911
22B Unnamed Trib	99-1046	3.59	841	0	60.38	<.05	7.98	<.1	<.1	<.1	113.2	<.1	0.567	<.1	0.769	21.92	2.764	0.0023	<.1	0.338	0.227	<.1	0.871	316.132	<.1	0.1312
22C Unnamed Trib	99-1047	5.82	43	12.76	3.26	<.05	0.329	<.1	<.1	<.1	6.798	<.1	1.6929	<.1	0.2065	1.764	<.1	0.0644	<.1	0.737	<.1	<.1	<.1	9.73	<.1	0.1272
23 Casselman R @ Markleton	99-1048	6.24	357	12.66	15.04	<.05	1.351	<.1	<.1	<.1	42.74	<.1	19.0506	<.1	<.1	15.76	0.4244	<.1	<.1	0.709	<.1	<.1	<.1	125.86	<.1	0.075
24 Unnamed Trib	99-1049	6.28	37	12.44	8.98	<.05	0.1329	<.1	<.1	<.1	4.298	<.1	4.2597	<.1	<.1	1.262	<.1	0.1531	<.1	0.457	<.1	0.219	<.1	12.06	<.1	0.0418
25 Unnamed Trib	99-1050	6.4	71	23.02	6.44	<.05	0.2104	<.1	<.1	<.1	6.25	<.1	5.2995	<.1	0.1819	1.761	<.1	<.1	<.1	0.95	<.1	0.287	<.1	7.172	<.1	0.0688
26 Unnamed Trib	99-1051	6.63	76	13.7	2.24	<.05	0.2196	<.1	<.1	<.1	8.117	<.1	4.3282	<.1	<.1	1.819	<.1	0.0928	<.1	1.384	<.1	1.384	<.1	8.66	<.1	0.0748
27 Unnamed Trib	99-1052	6.66	95	23.1	0	<.05	0.3478	<.1	<.1	<.1	10.96	<.1	4.2037	<.1	0.5026	2.857	<.1	0.1241	<.1	2.238	<.1	0.27	<.1	9.1	<.1	0.1656
28 Unnamed Trib	99-1053	6.69	208	19.78	9.6	<.05	0.7668	<.1	<.1	<.1	28.99	<.1	0.9207	<.1	<.1	6.905	<.1	0.0381	<.1	1.075	<.1	1.075	<.1	56.602	<.1	0.0777
29 Unnamed Trib	99-1054	6.86	370	37.38	0	<.05	1.227	<.1	<.1	<.1	49.12	<.1	3.4122	<.1	<.1	18.73	<.1	0.1055	<.1	0.687	<.1	<.1	<.1		<.1	0.0485
29A Unnamed Trib	dry																									
29B Unnamed Trib	99-1055	6.62	222	21.04	5.14	<.05	0.8476	<.1	<.1	<.1	28.34	<.1	71.4949	<.1	<.1	8.751	<.1	<.1	<.1	4.2014	<.1	<.1	<.1	54.137	<.1	0.0675
29C Unnamed Trib	99-1056	6.81	108	10.76	4.48	<.05	12.88	<.1	<.1	<.1	27.7	<.1	7.7369	0.15	6.404	15.47	11.58	<.1	<.1	4.2014	<.1	0.08316	<.1	11.801	<.1	0.088
29D Unnamed Trib	dry																									
30 Middle Creek	99-1057	7.2	172	28.08	0	<.05	0.69	<.1	<.1	<.1	17.86	<.1	14.5254	<.1	0.3173	5.539	<.1	<.1	<.1	0.787	<.1	<.1	<.1	34.71	<.1	0.082
30A Unnamed trib to M.Cr.	99-1058	7.25	331	65.96	0	<.05	1.332	<.1	<.1	<.1	64.42	<.1	1.5288	<.1	<.1	12.79	<.1	<.1	<.1	0.79	<.1	<.1	<.1	75.165	<.1	0.0978
31 Unnamed Trib	99-1059	7.29	154	22.7	0	<.05	0.5239	<.1	<.1	<.1	18.37	<.1	8.7644	<.1	0.1379	4.906	<.1	<.1	<.1	1.09	<.1	<.1	<.1	36.74	<.1	0.0766
32 South Glade Creek	99-1060	7.66	619	84.52	0	<.05	2.251	<.1	<.1	<.1	99.43	<.1	5.9966	<.1	<.1	30.12	<.1	0.202	<.1	0.38	<.1	<.1	0.1333	176.76	<.1	0.0538
33 Unnamed Trib	99-1061	3.57	619	0	63.18	<.05	6.211	0.1011	<.1	<.1	49.75	<.1	11.0432	<.1	<.1	18.91	1.176	0.1464	0.12	3.823	<.1	0.461	0.1318	36.68	<.1	0.1836
33A Unnamed Trib	99-1062	5.89	106	17.62	0	<.05	0.3409	<.1	<.1	<.1	13.23	<.1	<1	<.1	<.1	3.143	<.1	0.0762	0.1346	0.57	<.1		0.1577	31.27	0.1034	0.1248
34 Unnamed Trib	99-1063	5.13	697	1.6	20.06	<.05	2.507	<.1	<.1	<.1	79.63	<.1	12.5779	<.1	<.1	25.31	0.6201	<.1	<.1	1.619	<.1		<.1	200.72	<.1	0.0754
35 Casselman @ Rockdale Road	99-1064	5.94	308	11.32	6.52	<.05	0.9107	<.1	<.1	<.1	31.3	<.1	12.608	<.1	<.1	11.24	0.3854	<.1	<.1	0.725	<.1		<.1	73.7722	<.1	0.0604
36 Unnamed Trib	99-1065	6.27	86	13.84	0	<.05	0.2873	<.1	<.1	<.1	8.729	<.1	7.695	<.1	<.1	1.728	<.1	0.1933	<.1	0.855	<.1		<.1	15.518	<.1	0.0829
36A mine seep @ wier	99-1066	3.24	590	0	113.28	<.05	11.37	<.1	<.1	<.1	26.26	<.1	0.9269	<.1	3.939	8.113	1.079	<.1	<.1	0.1538	<.1		<.1		<.1	0.1874
36B Unnamed Trib	99-1067	5.33	28	2.6	10.84	<.05	<.1	<.1	<.1	<.1	2.481	<.1	0.8147	<.1	<.1	0.9566	<.1	0.0244	<.1	0.296	<.1		<.1	8.153	<.1	0.0501
37 Coxes Creek @ mouth	99-1068	6.15	383	22.18	0	<.05	1.719	<.1	<.1	0.21	42.98	<.1	38.857	<.1	0.3861	14.28	0.4066	<.1	<.1	1.134	<.1		0.1661	82.856	<.1	0.0513
38 Swamer Run	99-1069	6.41	267	26.18	0	<.05	0.87	<.1	<.1	<.1	32	<.1	6.4327	<.1	<.1	12.59	<.1	0.1234	<.1	0.513	<.1		<.1	64.316	<.1	0.0576
39 Hoover Run	dry																									
40 Brent Run	dry																									
41 Welmer Run	dry																									
42 Stoney Batter Run	dry																									
42A Unnamed Trib	99-1070	6.61	106	13.72	4.88	<.05	0.1169	<.1	<.1	<.1	3.954	<.1	1.7543	<.1	<.1	2.099	<.1	<.1	<.1	0.416	<.1		<.1	36.64	<.1	0.0566
42B Unnamed Trib	99-1071	5.89	242	1.74	11.5	<.05	<.1	<.1	<.1	0.21	1.465	<.1	0.7988	<.1	<.1	0.7529	<.1	<.1	<.1	0.315	<.1		<.1	7.77	<.1	0.0596
43 Shafer Run	99-1072	6.27	59	7.72	6.66	<.05	<.1	<.1	<.1	<.1	5.643	<.1	0.7577	<.1	<.1	2.653	<.1	0.1443	<.1	0.357	<.1		<.1	18.93	<.1	0.0898
44 Unnamed Trib	dry																									
45 Lick Run	99-1073	4.58	169	0	17.3	<.05	2.451	<.1	<.1	0.199	9.034	<.1	2.1717	<.1	<.1	8.116	1.272	0.0099	<.1	0.343	<.1	0.247	0.1154	46.8903	0.1281	0.1176
45A Unnamed Trib	99-1074	5.93	200	9.96	15.18	<.05	0.3702	<.1	<.1	<.1	14.89	<.1	4.3123	<.1	<.1	6.088	<.1	<.1	<.1	0.253	<.1	<.1	<.1	37.03	<.1	0.0757
45B Unnamed Trib	99-1075	4.45	71	0	3.7	<.05	1.257	<.1	<.1	<.1	3.003	<.1	0.8603	<.1	<.1	1.157	0.3526	0.1539	<.1	0.234	<.1	<.1	<.1	26.595	<.1	0.0744
46 Unnamed Trib	dry																									
47 Unnamed Trib	dry																									
48 Piney Run	99-1076	4.29	246	0	16.5	<.05	9.484	<.1	0.222	<.1	25.66	<.1	1.053	<.1	<.1	9.764	2.818	<.1	<.1	0.418	0.632	<.1	0.366	77.2128	<.1	0.0801
49 Casselman DS of Bigby Cr	99-1077	5.68	200	4.78	46.34	<.05	1.104	<.1	<.1	<.1	26.82	<.1	2.2925	<.1	0.8235	6.8	2.711	0.0573	<.1	0.373	1.069	<.1	<.1	59.3395	<.1	0.0899
50 Bigby Creek	99-1078	6.01	329	11.32	7.08	<.05	0.9691	0.1358	<.1	<.1	36.03	<.1	13.0073	<.1	0.3046	13.03	0.6319	0.0522	<.1	0.65	<.1	<.1	0.1355		<.1	0.0908
51 Buffalo Creek	99-1079	6.67	404	52.12	0	<.05	0.9514	0.1065	<.1	<.1	36.42	<.1	5.3269	<.1	<.1	14.08	<.1	0.2294	<.1	0.661	<.1	<.1	0.136		<.1	0.0576
52 Swamp Creek	99-1080	6.56	616	19.36	0.58	<.05	2.011	0.1332	<.1	<.1	76.93	<.1	9.8504	<.1	<.1	33.52	1.277	0.1194	<.1	0.622	0.178	<.1	0.2602	233.63	0.2708	0.1087
53 Unnamed Trib	99-1081	7.17	347	91.54	0	<.05	1.107	<.1	<.1	<.1	43.2	<.1	6.4342	<.1	<.1	17.97	<.1	0.0301	<.1	0.377	0.1256	<.1	0.1665	59.223	<.1	0.0465
54 Unnamed Trib	99-1082	7.31	240	63.78	0	<.05	0.8459	0.1033	<.1	<.1	32.08	<.1	10.3436	<.1	<.1	6.659	<.1	<.1	<.1	0.541	0.1078	<.1	<.1	42.43	0.1278	0.0543
54A Unnamed Trib	99-1083	6.83	936	8.68	6	<.05	3.879	0.2205	<.1	<.1	144.6	<.1	6.1127	<.1	<.1	48.43	0.8032	0.1132	<.1	1.327	0.1897	<.1	0.3278	496.61	0.4751	0.0487
55 Cassselman @ Petenbrink Rd	99-1084	3.23	988	0	116.72	<.05	9.393	0.22	<.1	<.1	106.2	<.1	1.031	<.1	10.04	24.87	1.698	1.0459	<.1	<2	0.1865	0.03868	0.337	411.54	0.2887	0.0881
56 Blue Lick Creek	99-1085	5.51	306	6.52	12	<.05	0.8823	<.1	<.1	<.1	30.44	<.1	13.2766	<.1	0.5888	10.56	0.6402	<.1	<.1	0.6276	0.1129		0.1516	75.465	0.1563	0.0582
57 Unnamed Trib	99-1086	6.47	752	64.34	0	<.05	3.789	0.396	<.1	<.1	101.3	<.1	6.9432	<.1	0.367	38.59	0.865	<.1	<.1	0.437	0.891	<.1	0.103	288.68	0.504	0.0971
58 Elklick Creek	99-1087	6.45	641	12.76	6.96	<.05	2.253	0.3572	<.1	<.1	83.3	<.1	9.5407	<.1	0.1508	62.19	2.112	<.1	<.1	0.846	0.2231	<.1	0.4048	412.71	0.5742	0.0722
58A Unnamed Trib	99-1088	6.73	194	25.34	0	<.05	0.6623	<.1	<.1	<.1	23.45	<.1	4.87	<.1	<.1	7.631	0.2479	0.1366	<.1	0.623	0.1489	<.1	0.1388	53.096	0.1369	0.0647
59 Casselman @ Fairground Rd	99-1089	4.57	1575	0	96.2	<.05	18.31	0.5165	<.1	<.1	315.2	<.1	4.0467	<.1	0.3257	85.19	5.485	0.0143	0.2511	0.348	0.3	<.1	0.6258		0.919	0.085
60 Flaugherty Creek	99-1090	5.08	404	1.7	21.3	<.05	1.866	0.1912	<.1		40.65	<.1	13.8992	<.1	2.043	15.47	1.214	0.1398	<.1	0.5551	0.2463	0.00535	0.268	116.53	0.2958	0.0513
61 Miller Run	99-1091	6.28	109	18.74	0	<.05	0.4793	<.1	<.1		10.7	<.1	7.0858	<.1	<.1	3.003	<.1	<.1	<.1		0.1698		<.1		<.1	0.065
62 Shaw Mines Run	99-1092	7.83	449	62.12	0	<.05	1.541	0.1431	<.1		67.63	<.1	16.6976	<.1	<.1	15.9	<.1	<.1	<.1		0.1339		0.1981		0.2668	0.1725
63 Casselman @Shaw Mines Rd	99-1093	3.38	2040	0	280.88	<.05	27.93	0.7946	<.1		294.8	<.1	1.5567	0.1211	50.26	118.8	11.98	3.5868	0.494	0.0089	0.5078	0.04676	0.7823	870.95	1.08	0.1086
64 Unnamed Trib	99-1094	6.46	254	8.72	12.16	<.05	0.7156	0.161	<.1		26.76	<.1	13.8378	<.1	<.1	10.2	0.6553	<.1	<.1		0.1948		0.2608		0.1778	0.0645
65 Wier 11	Locked																									
66 Unnamed Trib	99-1095	5.88	349	8.72	12	<.05	1.214	0.1512	<.1		38.71	<.1	14.3835	<.1	<.1	16.16	2.267	1.986	0.1441		0.203		0.2184		0.3299	0.1325
67 Casselman @ Miller Rd	99-1096	5.77	237	3.58	19.16	<.05	2.285	<.1	<.1		25.03	<.1	3.0091	<.1	5.386	12.91	2.875	0.3402	<.1	0.0852	<.1	0.004729	<.1	95.432	<.1	0.0659
68 Unnamed Trib	99-1097	6.03	259	12.4	8.92	<.05	0.7236	<.1	<.1		25.68	<.1	13.4508	<.1	<.1	9.825	0.7359	0.0293	<.1		<.1		<.1		<.1	0.0547
69 Unnamed Trib	99-1098	5.32	207	3.76	20.42	<.05	0.7303	<.1	<.1		22.79	<.1	4.0687	<.1	0.5091	10.86	0.9301	0.0969	<.1		<.1		<.1		<.1	0.0692

Sample ID	Lab ID	pH	Conductance	Alkalinity	Acidity	Ag	Al	As	Ba	Br-	Ca
69A Unnamed Trib	99-1099	4 75	120	0	17 92	<.05	1.15	<.1	<.1		11.66
70 Unnamed Trib	99-1100	3 57	984	0	191.06	<.05	24 8	0 3074	<.1		76.77
71 Unnamed Trib	99-1101	4 79	418	1.66	43.84	<.05	3 761	<.1	<.1		32 32
72 Casselman @ Moser Rd	99-1102	6.45	182	60.86	0	<.05	0.6634	<.1	<.1		25.64
73 Casselman @ Boynton	99-1103	6.4	249	14.98	0	<.05	0.7858	<.1	<.1		24.97
74 Coal Run	99-1104	3.05	273	0	380.72	<.05	32.57	0.6261	<.1		322.3
75 Piney Creek	99-1105	5 65	181	11.12	0	<.05	0.6377	<.1	<.1		15.8
76 Casselman @ Salisbury	99-1106	6.21	145	15.72	0	<.05	11.1	<.1	<.1		19.12
77 Unnamed Trib	99-1107	2.91	1950	0	347.48	<.05	26.33	0.4531	<.1		114.2
77A Unnamed Trib	99-1108	5 68	174	10 68	6.64	<.05	0 6437	<.1	<.1		16.17
78 Unnamed Trib	99-1109	6.59	223	62.68	0	<.05	0.7402	<.1	<.1		28.55
79 Casselman @ W.Salisbury	99-1110	7.01	688	86.62	0	<.05	1.891	<.1	<.1		75.11
80 Unnamed Trib	99-1111	7.1	168	17.16	0	<.05	0.7223	<.1	<.1		17.3
81 Unnamed Trib	99-1112	7.03	167	16 1	0	<.05	0.9262	<.1	<.1		18.35
82 Unnamed Trib	99-1113	7.04	233	18.24	0	<.05	0.3803	<.1	<.1		15.16
83 Flag Run	99-1114	7.08	218	33.82	0	<.05	0.4441	<.1	<.1		17.21
83A Casselman DS 83	99-1115	7.16	292	51.62	0	<.05	1.279	<.1	<.1		48.64
84 Casselman @ State Line	99-1116	7.2	173	17.42	0	<.05	0.6829	<.1	<.1		18.6
84A Unnamed Trib	99-1117	7.25	139	19 6	0	<.05	0.371	<.1	<.1		13.2
Well at Broadway Bridge	99-1118	3.35	1545	0	232.76	<.05	35.91	0.1857	<.1		268.2
	99-1119	6.37	597	223.82	0	<.05	1.125	<.1	<.1		45.38

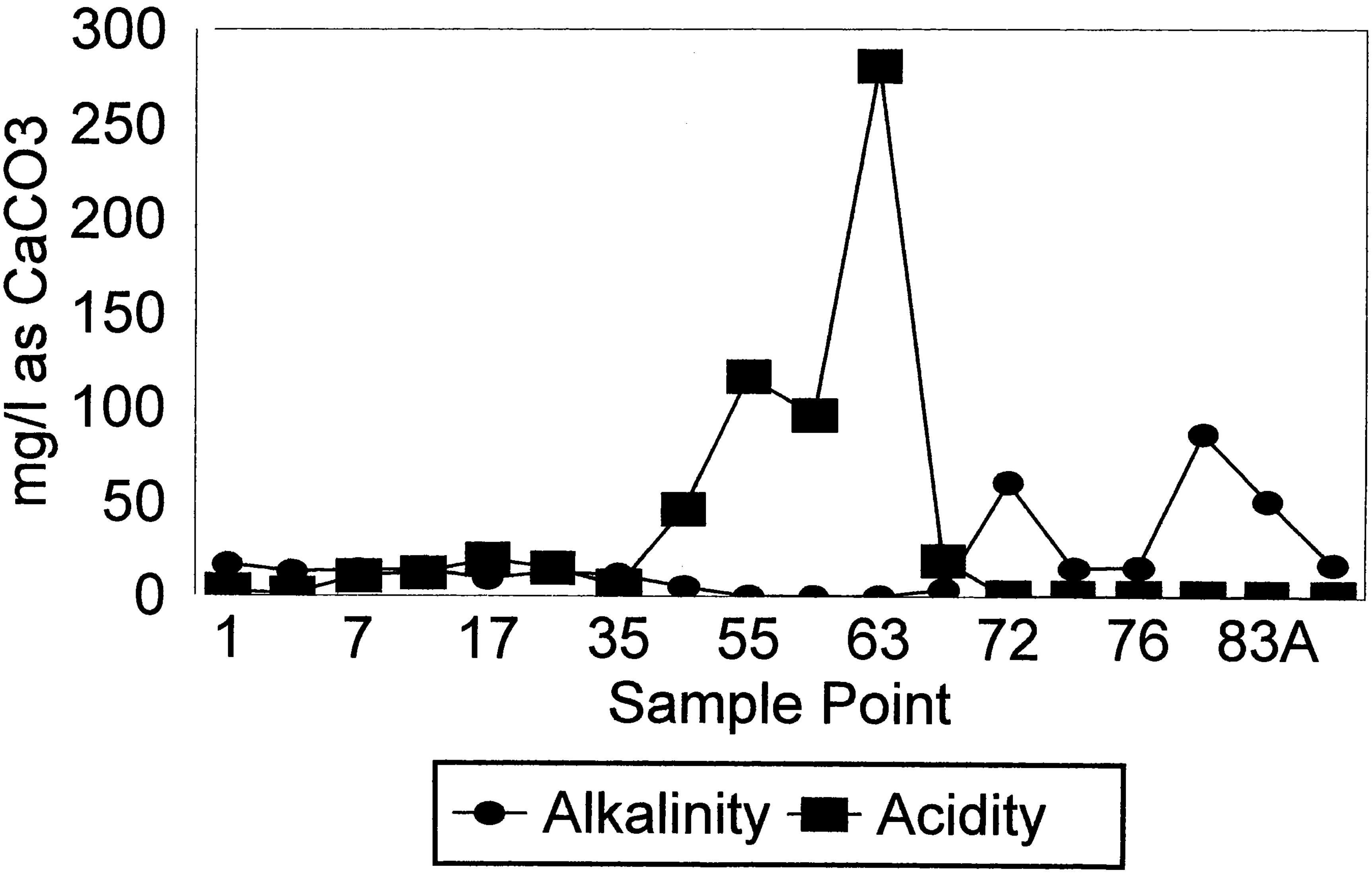
Sample ID	Lab ID	Cd	Cl-	Cr	Fe	Mg	Mn	NH3	Ni	NO3	Pb	PO4-3	Se	SO4-2	Tl	TP
69A Unnamed Trib	99-1099	<.1	0 9886	<.1	<.1	5.943	0 7499	0 0504	<.1		<.1		<.1		<.1	0.085
70 Unnamed Trib	99-1100	<.1	1.732	<.1	1 949	57.4	12 98	0 0884	<.1		<.1	0 03956	0 3329		0 4591	0 0444
71 Unnamed Trib	99-1101	<.1	6 7977	<.1	0 0072	26 43	4 703	6 1703	<.1	0 1014	<.1	0 01346	0 167	164 77	<.1	0 0578
72 Casselman @ Moser Rd	99-1102	<.1	1.1234	<.1	<.1	8.123	<.1	<.1	<.1		<.1		<.1		<.1	0 0673
73 Casselman @ Boynton	99-1103	<.1	13.2469	<.1	0.1096	9.43	0.5651	0.0445	<.1		<.1		<.1		<.1	0 0655
74 Coal Run	99-1104	<.1	10.306	<.1	38.66	174.1	19.86	1.8571	<.1	0.3461	<.1	0.03911	0.4162	866 22	1.351	0.0641
75 Piney Creek	99-1105	<.1	13.4328	<.1	<.1	3.935	<.1	0.0479	<.1	0.9076	<.1		<.1	11.0418	<.1	0 0639
76 Casselman @ Salisbury	99-1106	<.1	0.1418	<.1	9.694	12.5	8.536	0.1418	<.1	2 3559	<.1	0.003137	<.1	884 29	<.1	0.0579
77 Unnamed Trib	99-1107	<.1	4.7824	<.1	48.22	96 8	9.131	4 7824	<.1		0 1189	0.05522	0 5149		0 8745	0 0712
77A Unnamed Trib	99-1108	<.1	<1	<.1	<.1	4 055	<.1	<.1	<.1		<.1		<.1		<.1	0 0565
78 Unnamed Trib	99-1109	<.1	0.2414	<.1	<.1	2.438	<.1	0.2414	<.1		<.1		<.1		<.1	0 0869
79 Casselman @ W.Salisbury	99-1110	<.1	1.1768	<.1	<.1	12.11	<.1	1.1758	<.1		<.1		<.1		<.1	0 0685
80 Unnamed Trib	99-1111	<.1	0.2596	<.1	<.1	4.238	<.1	0.2596	<.1		<.1		<.1		<.1	0.0559
81 Unnamed Trib	99-1112	<.1	0.0679	<.1	<.1	5.228	<.1	0.0679	<.1		<.1		<.1		<.1	0 0613
82 Unnamed Trib	99-1113	<.1	0.3358	<.1	<.1	5 676	<.1	0.3358	<.1		<.1		<.1		<.1	0 0541
83 Flag Run	99-1114	<.1	0.2581	<.1	<.1	3.507	<.1	0.2581	<.1		<.1		<.1		<.1	0 0631
83A Casselman DS 83	99-1115	<.1	0.07601	<.1	<.1	5.574	<.1	0.076	<.1		<.1		<.1		<.1	0.0683
84 Casselman @ State Line	99-1116	<.1	0.1384	<.1	<.1	3.847	<.1	0 1384	<.1		<.1		<.1		<.1	0.0646
84A Unnamed Trib	99-1117	<.1	<1	<.1	<.1	3.426	<.1	<.1	<.1		<.1		<.1		<.1	0.0641
Well at Broadway Bridge	99-1118	<.1	8.9894	<.1	8.976	18.55	1.119	8.9894	<.1	1.1789	<.1	0.088718	0.1374	715.24	<.1	0 2264
	99-1119	<.1	8.3476	<.1	1.387	9.675	<.1	8 3476	<.1	1.2668	<.1	0 01655	<.1	12 964	<.1	0.0678

Casselman River pH



Casselman River

Alkalinity vs Acidity



BIOLOGICAL RESOURCES

The forested tracts of land that cover more than 75 percent of the watershed land area provide excellent habitat for wildlife, including at least 43 threatened or endangered species. These forests, which mostly occur on the steeply sloped hills along the river, also provide a buffer that protects the river from excessive runoff and helps slow the force of flood waters during storms.

While coldwater species, such as rainbow trout, are frequently stocked in the river by area sportsmen's clubs, it also maintains its own breeding populations of popular warmwater gamefish, like the smallmouth bass. Residents have also observed northern pike in the Casselman around Rockwood. The recreational fishing industry is one of the prime opportunities for economic expansion along the Casselman River.

Threatened or Endangered Species from the PNDI

1. ACONITUM RECLINATUM - WHITE MONKSHOOD
2. ACONITUM UNCINATUM - BLUE MONKSHOOD
3. ANEIDES AENEUS - GREEN SALAMANDER
4. ASTER RADULA - ROUGH-LEAVED ASTER
5. BAT HIBERNACULUM - WINTER BAT COLONY
6. CASTILLEJA COCCINEA - SCARLET INDIAN-PAINTBPLJSH
7. CATOSTOMUS CATOSTOMUS - LONGNOSE SUCKER
8. CIMICIFUGA AMERICANA - MOUNTAIN BUGBANE
9. CYMOPHYLLUS FRASERI - FRASER'S SEDGE
10. ERIMYSTAX X-PUNCTATUS - GRAVEL CHUB
11. EUMECES ANTHRACINUS - COAL SKINK
12. FILIPENDULA RUBRA - QUEEN-OF-THE-PRAIRIE
13. GLYCERIA OBTUSA - BLUNT MANNA-GRASS
14. HYPERICUM DENSIFLORUM - BUSHY ST. JOHN'S-WORT
15. LISTERA CORDATA - HEART-LEAVED TWAYBLADE
16. LISTERA SMALLII - KIDNEY-LEAVED TWAYBLADE
17. LUZULA BULBOSA - SOUTHERN WOOD-RUSH
18. MARSHALLIA GRANDIFLORA - LARGE-FLOWERED MARSHALLIA
19. MENZIESIA PILOSA - MINNIEBUSH
20. MUHLENBERGIA UNIFLORA - FALL DROPSEED MUHLY
21. MYOTIS LEIBII - EASTERN SMALL-FOOTED MYOTIS
22. MYOTIS SEPTENTRIONALIS - NORTHERN MYOTIS
23. NAJAS GRACILLIMA - BUSHY NAIAD
24. NEOTOMA MAGISTER - ALLEGHENY WOODRAT
25. ORONTIUM AQUATICUM - GOLDEN CLUB
26. OXYDENDRUM ARBOREUM - SOURWOOD
27. OXYPOLIS RIGIDIOR - STIFF COWBANE
28. PINUS STPOBUS-TSUGA CANADENSIS (HYDPIC) - WHITE PINE-EASTERN HEMLOCK
29. PINUS STROBUS-TSUGA CANADENSIS (MESIC) - WHITE PINE-HEMLOCK FOREST MOIST)
30. PLATANTHERA CILIARIS - YELLOW-FRINGED ORCHID
31. PLATANTHERA PERAMOENA - PURPLE-FRINGELESS ORCHID
32. PRUNUS ALLEGHANIENSIS - ALLEGHANY PLUM
33. PYRULARIA PUBERA - BUFFALO-NUT
34. RUBUS SETOSUS - SMALL BRISTLEBERRY
35. SALIX PETIOLARIS - MEADOW WILLOW

36. SAXIFRAGA MICRANTHIDIFOLIA - LETTUCE SAXIFRAGE
37. SOLIDAGO ROANENSIS - TENESSEE GOLDEN-ROD
38. SOREX PALUSTRIS PUNCTULATUS - SOUTHERN WATER SHREW
39. STYGOBROMUS ALLEGHENIENSIS - ALLEGHENY CAVE AMPHIPOD
40. THRYOMANES BEWICKII ALTUS - APPALACHIAN BEWICK'S WREN
41. TRAUTVETTERIA CAROLINIENSIS - CAROLINA TASSEL-RUE
42. VIBURNUM TRILOBUM - HIGHBUSH-CRANBERRY
43. VIOLA APPALACHIENSIS - APPALACHIAN BLUE VIOLET

Wildlife

The abundance of some kinds of wildlife in Somerset County is related to the kinds of soils present. The relationships, however, are not always easily distinguished. Soils affect wildlife by their influence on the vegetation that supplies food and cover.

Under natural conditions, the distribution of various kinds of vegetation in an area depends on the pattern or combination of soils. An area is inhabited by the kinds of wildlife whose habitat requirements are met by the vegetation in the area. If the natural conditions in the area are altered by drainage or other methods of farm and woodland management, the kinds and patterns of vegetation change. In turn, the kinds and numbers of wildlife change.

The main species of game in the county are white-tailed deer, black bear, gray squirrels, fox squirrels, red squirrels, cottontail rabbits, ruffed grouse, bobwhite quail, turkey, ring-necked pheasant, woodcock, and waterfowl. Important furbearers are the beaver, muskrat, raccoon, and fox. A large variety of other wildlife is also present, including songbirds, reptiles, amphibians, and small mammals. Both game and nongame species are important to man. Together they contribute to maintaining the diversity and stability of ecosystems in the county.

White-tailed deer are throughout Somerset County. They are considered forest species, but they neither prefer nor do well in large, mature forests. They prefer a combination of brush or young trees, smaller areas of mature trees, and small open areas.

Gray squirrels, cottontail rabbits, and ruffed grouse are also throughout the county. Ruffed grouse prefer young brushy stands of trees and open areas similar to those that white-tailed deer frequent. Squirrels are especially common in areas that have mature, nut-producing trees. Cottontail rabbits are mostly in areas of present or past agricultural activity. Abandoned farms, growing up in brush, generally have a high population of cottontail rabbits.

Black bear prefer forests that have mixed stands of conifers and hardwoods of various ages. They prefer areas that have ample water sources in streams, ponds, and lakes. In Somerset County, bear are mostly in the Hazleton-Cookport and Leck Kill-Albrights soil associations.

Muskrat, beaver, and river otter live along rivers, lakes, and ponds. Muskrats are throughout the county, whereas river otter and beaver are generally in the more remote areas.

Bobwhite quail and ring-necked pheasant are in the central part of Somerset County. Quail are in a small area almost entirely within the Hazleton-Cookport soil association. Ring-necked pheasant are in a larger area mostly within the Rayne-Gilpin-Wharton-Cavode, Berks- Weikert, and Leck Kill-Albrights soil associations.

The distribution and abundance of wildlife in Somerset County have been greatly affected by patterns of land use, especially the increasing urban development. The distribution of species such as the black bear and river otter is affected more by man's activities and development than by the soil type or vegetation.

Birds of Somerset County

Loons
- Red-throated Loon
- Common Loon

Grebes & Cormorants
- Pied-billed Grebe
- Horned Grebe
- Red-necked Grebe
- Double-crested Cormorant

Herons
- American Bittern
- Least Bittern
- Great Blue Heron
- Great Egret
- Little Blue Heron
- Green Heron
- Black-crowned Night-Heron

Waterfowl
- Tundra Swan
- Mute Swan
- Snow Goose
- Brant
- Canada Goose
- Wood Duck
- Green-winged Teal
- American Black Duck
- Mallard
- Northern Pintail
- Blue-winged Teal
- Northern Shoveler
- Gadwall
- American Wigeon
- Canvasback
- Redhead
- Ring-necked Duck
- Greater Scaup
- Lesser Scaup
- Oldsquaw
- Black Scoter
- Surf Scoter
- White-winged Scoter
- Common Goldeneye
- Bufflehead
- Hooded Merganser
- Common Merganser
- Red-breasted Merganser
- Ruddy Duck

Vultures
- Black Vulture
- Turkey Vulture

Hawks
- Osprey
- Bald Eagle
- Northern Harrier
- Sharp-shinned Hawk
- Cooper's Hawk
- Northern Goshawk
- Red-shouldered Hawk
- Broad-winged Hawk
- Red-tailed Hawk
- Rough-legged Hawk
- Golden Eagle
- American Kestrel
- Merlin
- Peregrine Falcon

Gallinaceous Birds
- Ring-necked Pheasant
- Roughed Grouse
- Wild Turkey
- Northern Bobwhite

Rails
- Virginia Rail
- Sora
- Common Moorhen
- American Coot

Plovers & Sandpipers
- Black-bellied Plover
- American Golden-plover
- Semipalmated Plover
- Killdeer
- Greater Yellowlegs
- Lesser Yellowlegs
- Solitary Sandpiper
- Spotted Sandpiper
- Upland Sandpiper
- Ruddy Turnstone
- Red Knot
- Sanderling
- Semipalmated Sandpiper
- Western Sandpiper
- Least Sandpiper
- White-rumped Sandpiper
- Baird's Sandpiper
- Pectoral Sandpiper
- Dunlin
- Stilt Sandpiper
- Short-billed Dowitcher
- Long-billed Dowitcher
- Common Snipe
- American Woodcock

Gulls & Terns
- Bonaparte's Gull
- Ring-billed Gull

Herring Gull
Casbian Tern
Common Tern
Forster's Tern
Black Tern

Doves
- Rock Dove
- Mourning Dove

Cuckoos
- Black-billed Cuckoo
- Yellow-billed Cuckoo

Owls
- Barn Owl
- Eastern Screech-Owl
- Great Horned Owl
- Snowy Owl
- Barred Owl
- Long-eared Owl
- Short-eared Owl
- Northern Saw-whet Owl

Goatsuckers
- Common Nighthawk
- Whip-poor-will

Swifts & Hummingbirds
- Chimney Swift
- Ruby-throated Hummingbird

Kingfishers
- Belted Kingfisher

Woodpeckers
- Red-headed Woodpecker
- Red-bellied Woodpecker
- Yellow-bellied Sapsucker
- Downy Woodpecker
- Hairy Woodpecker
- Northern Flicker
- Pileated Woodpecker

Flycatchers
- Olive-sided Flycatcher
- Eastern Wood-Pewee
- Yellow-bellied Flycatcher
- Acadian Flycatcher
- Alder Flycatcher
- Willow Flycatcher
- Least Flycatcher
- Eastern Phoebe
- Great Crested Flycatcher
- Eastern Kingbird

Larks
- Horned Lark

Swallows
- Purple Martin
- Tree Swallow
- N. Rough-winged Swallow
- Bank Swallow
- Cliff Swallow
- Barn Swallow

Jays & Crows
- Blue Jay
- American Crow
- Common Raven

Chickadees
- Black-capped Chickadee
- Carolina Chickadee
- Tufted Titmouse

Nuthatches
- Red-breasted Nuthatch
- White-breasted Nuthatch

Creepers
- Brown Creeper

Wrens
- Carolina Wren
- House Wren
- Winter Wren
- Sedge Wren
- Marsh Wren

Kinglets & Gnatcatchers
- Golden-crowned Kinglet
- Ruby-crowned Kinglet
- Blue-gray Gnatcatcher

Thrushes
- Eastern Bluebird
- Veery
- Gray-cheeked Thrush
- Swainson's Thrush
- Hermit Thrush
- Wood Thrush
- American Thrush

Thrashers
- Gray Catbird
- Northern Mockingbird
- Brown Thrasher

Pipits
- American Pipit

Waxwings
- Cedar Waxwing

Shrikes
- Northern Shrike

Starlings
- European Starling

Vireos
- White-eyed Vireo
- Blue-headed Vireo
- Yellow-throated Vireo
- Warbling Vireo
- Philadelphia Vireo
- Red-eyed Vireo

Warblers
- Blue-winged Warbler
- Golden-winged Warbler
- Tennessee Warbler
- Orange-crowned Warbler
- Nashville Warbler

Northern Parula
Yellow Warbler
Chestnut-sided Warbler
Magnolia Warbler
Cape May Warbler
Black-throated Blue Warbler
Yellow-rumped Warbler
Black-throated Green Warbler
Blackburnian Warbler
Yellow-throated Warbler
Pine Warbler
Prairie Warbler
Palm Warbler
Bay-breasted Warbler
Blackpoll Warbler
Cerulean Warbler
Black-annd-White Warbler
American Redstart
Prothonotary Warbler
Worm-eating Warbler
Ovenbird
Northern Waterthrush
Louisiana Waterthrush
Kentucky Warbler
Connecticut Warbler
Mourning Warbler
Common Yellowthroat
Hooded Warbler
Wilson's Warbler
Canada Warbler
Yellow-breasted Chat

Tanagers
- Scarlet Tanager

Finches
- Northern Cardinal
- Rose-breasted Grosbeak
- Blue Grosbeak
- Indigo Bunting
- Dickcissel
- Pine Grosbeak
- Purple Finch
- House Finch
- Red Crossbill
- White-winged Crossbill
- Common Redpoll
- Pine Siskin
- American Goldfinch
- Evening Grosbeak

Sparrows & Towhees
- Eastern Towhee
- American Tree Sparrow
- Chipping Sparrow
- Field Sparrow
- Vesper Sparrow
- Savannah Sparrow
- Grasshopper Sparrow
- Henslow's Sparrow
- Fox Sparrow
- Song Sparrow
- Lincoln's Sparrow
- Swamp Sparrow
- White-throated Sparrow
- White-crowned Sparrow
- Dark-eyed Junco

Longspurs & Buntings
- Lapland Longspur
- Snow Bunting

Blackbirds & Orioles
- Bobolink
- Red-winged Blackbird
- Eastern Meadowlark
- Rusty Blackbird
- Common Grackle
- Brown-headed Cowbird
- Orchard Oriole
- Baltimore Oriole

Weaver Finches
- House Sparrow

Somerset County Mammals

Common Opposum
Whitetail Deer
Eastern Cottontail Rabbit
Allegheny Cottontail Rabit
Star-nosed Mole
Hairy-tailed Mole
Short-tailed Shrew
Least Shrew
Pigmy Shrew
Grey Shrew
Smokey Shrew
Masked Shrew
Coyote
Grey Fox
Red Fox
Black Bear
Raccoon
Bobcat
Eastern Spotted Skunk
Common Striped Skunk
River Otter
Least Weasel
Mink
Long-tailed Weasel
Hoary Bat
Red bat
Evening Bat
Big brown bat

Silver-haired Bat
Eastern Pipistrelle
Lieb's bat
Social Bat
Keen's Bat
Little Brown Bat
Woodchuck
Northern Flying Squirrel
Southern Flying Squirrel
Eastern Chipmunk
Red Squirrel
Eastern Fox Squirrel
Eastern Grey Squirrel
Beaver
Meadow Jumping Mouse
Woodland Jumping Mouse
House mouse
Norway rat
Florida Packrat
Deer Mouse
Wood Mouse
Muskrat
Southern Bog Lemming
Pine Vole
Yellow-cheeked Vole
Meadow Vole

Amphibians of Somerset County

American Toad
Woodhouse's Toad
Grey Treefrog
Spring Peeper
Mountain Chorus Frog
Wood Frog
Green Frog
Pickerel Frog
Northern Leopard Frog
Bullfrog
Mudpuppy
Hellbender
Eastern Newt
Marbled Salamander
Spotted Salamander
Jefferson's Salamander
Mountain Dusky Salamander
Seal Salamander
Dusky Salamander
Four-toed Salamander
Spring Salamander
Red Salamander
Two-lined Salamander
Longtail Salamander
Redback Salamander
Netting and Mittleman Ravine Salamander
Slimy Salamander
Fowler and Dunn Wehrle's Salamander

Reptiles of Somerset County

Snapping Turtle
Spiny Softshell
Stinkpot
Eastern Box Turtle
Wood Turtle
Painted Turtle
Five-lined Skink
Eastern Fence Lizard
Coal Skink
Timber Rattlesnake
Copperhead
Eastern Ribbon Snake
Common Garter Snake
Milk Snake
Redbelly Snake
Brown Snake
Worm Snake
Eastern Hognose Snake
Northern Water Snake
Racer
Rat Snake
Ring Snake
Smooth Green Snake

Wildlife habitat

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 13, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

Grain and seed crops are seed producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and ragweed.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of native plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dog- wood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruit like cones. Soil proper- ties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetlands as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, rushes, sedges, and reeds.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow.

Tributaries to the Casselman Containing Aquatic Life

Bigby Creek

Drainage area - 11 Km^2
Length – 4 Km
Enters Casselman at mile 29.3
pH 7.2, Conductivity 215, Alkalinity 26, Hardness 88, Dissolved Oxygen 8.0
Fish Species include; Rainbow Trout, Brown Trout, Blacknose Dace, White Sucker, Creek Chub and Bluegill
AMD in a tributary

Bigby Lake

Surface Area – 5 acres
Dam Height – 15 feet
pH 7.2, Conductivity 215, Alkalinity 26, Hardness 88, Dissolved Oxygen 8.0
Fish Species include; Rainbow Trout, Brown Trout, Blacknose Dace, White Sucker, Creek Chub and Bluegill

Blue Lick Creek

Drainage area - 40 Km^2
Length – 12 Km
Enters Casselman at mile 32.5
pH 6.9, Alkalinity 15, Hardness 46, Dissolved Oxygen 10.0
Fish Species include; Brown Trout, Blacknose Dace, White Sucker, Creek Chub and Mottled Sculpin

Buffalo Creek

Drainage area - 35 Km^2
Length – 19.9 Km
Enters Casselman at mile 31
pH 7.1, Conductivity 916, Alkalinity 18, Hardness 326
Fish Species include; White Sucker, River Chub, Rock Bass, Blacknose Dace, Bluntnose Minnow, Common Shiner, Creek Chub, Johnny Darter, Largemouth Bass, Mottled Sculpin, Northern Hog Sucker, and Pumkinseed
AMD in Headwaters

Christner Run – Trib. to Whites Creek

Drainage area - 6 Km^2
Length – 3 Km
pH 7.1, Conductivity 182, Alkalinity 19, Hardness 34
Fish Species include; Native Brook Trout, Blacknose Dace, White Sucker, and Mottled Sculpin

Coxes Creek

Drainage area - 168 Km^2
Length – 10 Km
Enters Casselman at mile 22.2
pH 7.3, Conductivity 450, Alkalinity 36, Hardness 140
Fish Species include; White Sucker, River Chub, Rock Bass, Blacknose Dace, Bluntnose Minnow, Creek Chub, Johnny Darter, Mottled Sculpin, Northern Hog Sucker, Pumkinseed, Common Carp, Rosyface Shiner, Brown Bullhead, Stonecat, Banded Killfish, Bluegill, Greenside Darter, and Brown Trout
AMD in Headwaters

Cucumber Run

Length – 3 miles
pH 6.5, Conductance 54, Alkalinity 48
Fish Species – Native Brook Trout

Elk Lick Creek

Drainage area - 47 Km^2
Length – 12 Km
Enters Casselman at mile 34.6
pH 7.0, Dissolved Oxygen 8.0, Alkalinity 16, Hardness 68
Fish Species include; White Sucker, Longnose Sucker, River Chub, Longnose Dace, Blacknose Dace, Bluntnose Minnow, Creek Chub, Johnny Darter, Mottled Sculpin, Northern Hog Sucker, Common Shiner, Brown Bullhead, Brown Trout, and Brook trout
AMD in Headwaters

Enos Run – Trib to Whites Creek

Drainage area - 11 Km^2
Length – 2 Km
pH 6.9, Conductivity 198, Alkalinity 8, Hardness 13
Fish Species include; Native Brook Trout

Faidley Run – AKA Shultz Mill Run

Length – 2 miles
Fish Species include – Stocked Trout

Flaugherty Creek

Drainage area - 68 Km^2
Length – 20 Km
Enters the Casselman at mile 35
pH 7.0, Alkalinity 23, Hardness 40, Dissolved Oxygen 8.0
Fish Species include; Brown Trout, Brook Trout, Rainbow Trout, Common shiner, Bluntnose Dace, Blacknose Dace, Longnose Dace, Creek Chub, Longnose Sucker, White Sucker, Pumpkinseed, Bluegill, and Mottled Sculpin

Glade Run – Trib to McClintock Run

Drainage area - 13 Km^2

Length – 4 Km
pH 7.3, Alkalinity 57, Hardness 72, Dissolved Oxygen 10.2
Fish Species include; Brook Trout, Smallmouth Bass, River Chub, Common Shiner, Central Stoneroller, Banded Killfish, Bluntnose Minnow, White Sucker, Mottled Sculpin, Creek Chub. Yellow Perch, Blacknose Dace, Brown Bullhead

High Point Lake
Surface Area – 136.8 hectares
Elevation 981m
Alkalinity 28
Fish Species include; Walleye, Bluegill, Pumpkinseed, Brown Bullhead, Smallmouth Bass, Largemouth Bass, Yellow Perch, Black Crappie, Northern Pike, Golden Shiners, Panfish, Alewife, and Tiger Muskellunge

Iser's Run – Trib to Townline Run
Drainage area - 10 Km^2
Length – 8 Km
pH 6.5, Alkalinity 2, Hardness 11
Fish Species include; Native Brook Trout, Mottled Sculpin, Blacknose Dace, Creekchub, and Longnose Dace

Kimberly Run – Trib to Coxes Creek
Drainage area - 27 Km^2
Length – 8 Km
pH 8.2, Alkalinity 127, Hardness 524, Dissolved Oxygen 7.8
Fish Species include; Brook trout, Brown trout, Blacknose Dace, Mottled Sculpin, Creek Chub, White Sucker, and Johnny Darter

Lick Run
Drainage area - 5 Km^2
Length – 3.4 Km
Enters Casselman at mile 26.3
pH 6.9, Alkalinity 10, Hardness 37, Conductivity 124
Fish Species include; Native Brook Trout

Rockwell Lake – Isers Run Dam
pH 6.5, Alkalinity 14
Fish Species include; Native Brook Trout
Tribs to Rockwell Lake
Vought Run
pH 6.5, Alkalinity 3.0
Wagner Spring
pH 6.5, Alkalinity 18.0

Somerset Lake
Surface Area – 252 acres
Elevation 644m
Average Depth 2.3m
Maximum Depth 18 feet
pH 7.0, Alkalinity 26, Conductivity 215, Dissolved Oxygen 7.4
Fish Species include; Walleye, Bluegill, Pumpkinseed, Brown Bullhead, Largemouth Bass, Yellow Perch, Black Crappie, Northern Pike, Golden Shiners, Tiger Muskellunge, Muskellunge, White Sucker, Goldfish, Gizzard Shad, Common Carp, Channel Catfish, Palomino Trout, and Bowfin

SOCIO-ECONOMIC PROFILE

The communities that have U.S. Census data in the watershed are Addison, Berlin, Confluence, Fort Hill, Garrett, Markleton, Meyersdale, Rockwood, Salisbury, Somerset, and Springs. The census data is listed in the following tables.

	Population	# Employed	Ave. Income	Private water	Private sewage	Public water	Public sewage
Addison	2067	1034	23919	736	850	35	393
Berlin	4443	1875	26167	701	863	1010	848
Confluence	850	256	14402	10	11	385	393
Fort Hill	316	124	23654	142	142	0	0
Garrett	536	164	16071	14	222	330	122
Markleton	270	106	21563	107	105	2	4
Meyersdale	9277	3543	20524	3525	3773	5128	4880
Rockwood	5125	2519	21306	1239	1881	1266	1284
Salisbury	700	294	19702	14	222	330	122
Somerset	18303	7787	23415	3525	3773	5128	4880
Springs	82	35	26071	13	31	20	2

Numbers in job types

	Agriculture Forestry & Fisheries	Mining	Construction	Manufacturing	Wholesale trade	Retail trade	Health care
Addison	71	72	71	156	59	135	21
Berlin	171	102	154	296	52	247	201
Confluence	5	0	37	23	2	72	21
Fort Hill	15	3	17	30	7	12	10
Garrett	0	9	8	48	4	29	19
Markleton	8	0	9	36	2	15	9
Meyersdale	350	146	252	791	90	511	408
Rockwood	157	58	190	414	57	304	150
Salisbury	4	10	22	82	4	57	30
Somerset	264	223	593	1328	337	1407	1008
Springs	8	2	2	6	0	6	3

Transportation

Several major federal and state highways serve the watershed. Among these are the Pennsylvania turnpike, U.S. Routes 219,and 40, State Highways 31,160, 281, 653, 669, and 523. The closest public airport is the Somerset County Airport near Friedens, PA. Commuter air transport is available at the Johnstown Airport, Johnstown, PA and Cumberland Airport, Cumberland, MD. The major airport used for travel is the Pittsburgh International Airport, Pittsburgh, PA. Greyhound also has a service schedule for Somerset, PA. Trucking facilities are available for shipping freight and the area is also served by one railroad.

Preliminary Management Options

After carefully analyzing the data gathered in the preparation of this report and considering the input of the project manager, Steering Committee, and watershed residents, we have developed a series of management options. These management options, which are identified as preliminary until further public comment is received, are intended to address the many issues identified in the analysis phase of the project.

The preliminary management options are as follows:

<u>Study Watershed Characteristics</u>

- Protect prime agricultural soils currently being farmed.
- Conduct an income survey in all towns within the study area to determine eligibility for federal Community Development Block Grant funding.

<u>Land Resources</u>

- Conduct an inventory of abandoned industrial sites, and identify their redevelopment potential and eligibility status for PA Act 2 (Industrial Site Reuse).
- Inventory undeveloped, non-farm, prime agricultural soil areas for potential development opportunities.
- Develop a plan to identify, quantify and remove mine tailing piles and trash dumps.
- Implement a survey of abandoned mines within the study area to develop a reclamation strategy.
- Create a volunteer trash removal program to ensure continued maintenance along the river corridor and trail.
- Maintain and improve the visual quality of the river corridor by requiring a vegetative barrier along the river's edge and protecting the scenic view from the river and trail.
- Identify areas that may qualify for conservation easments or protection

<u>Geological Resources</u>

- Re-mining should be encouraged to remove acid mine drainage causing materials from abandoned mines and spoil piles

<u>Water Resources</u>

- Develop a water quality monitoring program.
- Link the communities along the trail with a supply line to provide potable water to communities that may need additional during a drought
- Encourage deficient municipalities to develop a formal sewage treatment plan.
- Prioritize the construction of sewage treatment facilities, facility upgrades, and sewer line extensions through data obtained from the water quality monitoring program.
- Coordinate with county conservation district, landowners, and farmers to review and enforce sedimentation control regulations and techniques.
- Coordinate with local officials to manage stormwater.
- Implement erosion control measures in areas which have exposed banks.
- Protect natural and free-flowing streams.
- Develop programs to abate acid mine drainage
- Control nonpoint source pollution and prevent pollution incidents by requiring adequate product and waste handling safeguards
- Provide dry hydrants for local fire protection

Biological Resources

- Develop a fish stocking program which concentrates on both trout and popular warmwater gamefish species such as smallmouth bass, walleye, and muskellunge.
- Keep the river unrestricted for fishing
- Develop in-stream structures to support aquatic life.
- Increase habitat for game and nongame species.
- Protect wetlands, wild areas, natural areas, and other fragile areas.

Cultural Resources

Recreational

- Complete the trail.
- Develop spur trails.
- Create tourist information centers.
- Develop a travel link for tourists to move between study area communities, using trails, roads, railroads, and the river.
- Develop additional boat launches in underserved locations.
- Promote the Casselman River in fishing, hunting, canoeing, bicycling magazines.
- Provide picnic tables, benches, and fire rings at scenic areas along the trail
- Repair Pinkerton Tunnel for the trail
- Provide camping areas along the trail
- Provide restroom facilities at trail access and parking areas
- Construct maintenance ditches large enough to handle water runoff
- Provide more parking areas and access for fishing

Archaeological/Historical

- Preserve existing historical structures within the study area and integrate these sites with local communities and recreational activities.
    - Study the archaeology of Fort Hill with modern techniques.
    - Develop a plan to promote development of culturally and historically significant buildings and properties

Education

- Continue Envirothons for high school students.
- Interpretive signs along the trail to educate the public about the issues concerning the river and local geology.
- Schedule a series of public presentations on various river-related topics which may include erosion and sedimentation control techniques, citizen water quality monitoring programs, cultural and historical significant areas and structures, and recreation opportunities (coordinate with local historical societies and sporting groups.)

Action Plan Summary Table

Action Items	Measures and Approach	Potential Management Agent	Funding Options	Priority Level	Phasing and Timetable
Land Resources					
Protect prime agricultural soils	Institute a program to prevent the loss of prime farmlands	Somerset Conservation District and the PA extension service	Clean and Green, NRCS, USDA	1	2001-2002
Inventory AML sites and Identify redevelopment or restoration potential	Develop a program to identify prior industrial or mined sites that can be redeveloped for industry or restored to original condition	Somerset Conservation District, Somerset Chamber of Commerce, Somerset County Conservancy, Southern Alleghenies Conservancy, & RC&D	NRCS, Clean and Green, PA DEP, PA DCNR, RAMP, ACSI, EPA, USGS	1	2001-2002
Inventory coal refuse piles and trash dumps (landfills)	Develop a program to identify and remove caol refuse piles and trash dumps	Somerset Conservation District, Somerset County Conservancy, Southern Alleghenies Conservancy, & RC&D	PA DEP, RAMP, NRCS, EPA, Private Foundations	1	2001-2002
Inventory Underground Storage Tank Sites and old Gas Stations	Develop a program to identify and remediate UST sites.	Somerset County Planning Commission, Somerset Conservation District, Somerset County Conservancy, PA DEP, Somerset County Redevelopment Authority	Growing Greener, EPA	1	2001-2002
Land Use Planning	Promote a land use planning program for critical areas: steep slopes, wetlands, logging, and floodplains	Somerset County Planning Commission, Somerset Conservation District	State Planning Assistance Grants, PA Environmental Education Act, ASFS	1	2001-2002
Inventory non-prime farmland	Identify non-agricultural lands for development or preservation	Somerset Conservation District, Somerset County Conservancy	Private Foundations	2	2002-2003
Maintain or improve visual quality along the Allegheny Highlands Trail and river valley	Develop a program to encourage land owners along the trail and river to leave or plant a vegetative barrier beside the trail and river	Municipalities, Somerset County Conservancy, Somerset County Parks & Recreation Board	NRCS, Clean and Green, PA DEP, PA DCNR, RAMP, ACSI, EPA	2	2002-2003
Identify areas that may qualify for conservation easements or protection (Big Spring at Mt. Davis and the Former Somerset State Hospital Property)	Develop a program to encourage property owners containing significant ecological value to donate, sell, or place an easement on the property for future protection and use	Somerset County Conservancy, Southern Alleghenies Conservancy	Private Foundations, Nature Conservancy, Western PA Conservancy,	3	2004-2005
Geological Resources					
Re-mining	Develop a program to encourage re-mining where-ever it is feasible, this will remove and treat any acid causing material from abandoned mines	PA DEP, USDI-OSM	Self Supporting (the sale of coal will pay for the cost of day-lighting the mine)	1	2001-2003

Action Items	Measures and Approach	Potential Management Agent	Funding Options	Priority Level	Phasing and Timetable
Water Resources					
Water quality monitoring & Aquatic life monitoring	Develop a water quality & Aquatic life monitoring programs	Casselman River Watershed Association, Somerset County Conservancy, Yough River Watch, Casselman River Conservancy	NRCS, Clean and Green, PA DEP, PA DCNR, RAMP, ACSI, EPA	1	2000-2005
Acid mine drainage	Develop programs to abate acid mine drainage	Somerset Conservation District, Somerset County Conservancy, Casselman River Watershed Association, Southern Alleghenies Conservancy	NRCS, Clean and Green, PA DEP, ACSI, EPA	1	2000-2005
sewage treatment planning	Encourage deficient municipalities to develop a formal sewage treatment plan	Somerset County Planning Commission, PA DER, Municipalities, EPA, Somerset County Redevelopment Authority	PA DEP, EPA, Penn Vest	1	2000-2005
Prioritize the construction of sewage treatment facilities, facility upgrades, and sewer line extensions	Use data obtained from the water quality monitoring program.	Somerset County Planning Commission, PA DER, Municipalities, Somerset County Redevelopment Authority	PA DEP, EPA	1	2000-2001
Sedimentation control	Coordinate with county conservation district, Timber Companies, landowners, and farmers to review and enforce sedimentation control regulations and techniques	Somerset Conservation District, Somerset County Conservancy, Casselman River Watershed Association, PA Game Commission, USDA-NRCS	NRCS, Clean and Green, PA DEP	1	2000-2004
Stormwater management	Coordinate with local officials to manage stormwater	Municipalities	NRCS, Clean and Green, PA DEP	2	2003-2004
Erosion control	Implement erosion control measures in areas which have exposed banks	Somerset Conservation District, County Extension, PA Game Commission, PA Fish and Boat Commission	NRCS, Clean and Green, PA DEP	2	2003-2004
Free-flowing streams	Protect natural and free-flowing streams	PA DEP, Somerset Conservation District, PA Fish and Boat Commission, Trout Unlimited, PA Federation of Sportsmen	NRCS, Clean and Green, PA DEP	2	2003-2004
Nonpoint source pollution and Pollution prevention	Control nonpoint source pollution and prevent pollution incidents by requiring adequate product and waste handling safeguards	PA DEP, Somerset Conservation District, USDA-NRCS	NRCS, Clean and Green, PA DEP, PA DCNR, EPA	2	2003-2004
Wellhead & Aquifer protection plans	Update wellhead protection plans, Develop an aquifer protection plan	Municipalities	PA DEP, EPA	3	2004-2005
Wetlands	Identify and protect wetlands, Natural and Man-made	District, Somerset County Conservancy, Casselman River Watershed Association	NRCS, Clean and Green, PA DEP, PA DCNR, EPA	3	2004-2005
Dry hydrants	Provide dry hydrants for fire protection	Municipalities, Local Fire Departments	Local Fire Departments, Municipalities, Private Foundations	3	2004-2005

Action Items	Measures And Approach	Potential Management Agent	Funding Options	Priority Level	Phasing and Timetable
Biological Resources					
Improve Fishing	Develop a fish stocking program	PA Fish and Boat Commission, Local Sportsmens Clubs,Truout unlimited, Casselman River Watershed Association	Local Sportsmens Clubs, Trout unlimited, USFWS	1	2000-2005
Improve fish habitat	Provide instream structures	PA Fish and Boat Commission, Local Sportsmens Clubs, Truout unlimited, Casselman River Watershed Association	Local Sportsmens, TU, USFWS, PADEP	1	2000-2005
Improve terrestrial habitat	Plant buffer zones, create overgrown and brushy areas, plant native fruits and berries for game/ nongame food supply	PA Game Commission, Local Sportsmens Clubs	Private foundations, USFWS	2	2002-2003
Protect wetlands, natural areas, wild areas, and other fragile areas	Identify and protect wetlands and other significant areas	District, Somerset County Conservancy, Casselman River Watershed Association	Pa DCNR, PA DEP, Grownig Greener	2	2002-2003
Keep fishing unrestricted (year round access)	Keep special regulations off of the Casselman	PA Fish and Boat Commission, Local Sportsmens Clubs	PA Fish and Boat Commission, Local Sportsmens Clubs	3	2003-2005
Recreational Resources					
Allegheny Highlands Trail	Complete construction, and develop spur trails (Turkeyfoot Trail) and repair structures (Pinkerton Tunnel0	Somerset Rails to Trails, Somerset County Conservancy, Somerset County Parks and Recreation Board, & Somerset County Planning Commission	PA DCNR, PA Rails to Trails, Private Foundations	1	2000-2005
Tourist information & education centers	Construct tourist information centers at trailheads	Somerset Rails to Trails, Somerset County Conservancy, Somerset County Parks and Recreation Board	PA DCNR, PA Rails to Trails, Private Foundations	1	2000-2002
Travel links for tourists	Provide travel for tourists between communities, using trails, railroads,roads and the Casselman River	Somerset Rails to Trails, Somerset County Conservancy, Somerset County Parks and Recreation Board	PA DCNR, PA Rails to Trails, Private Foundations	1	2000-2002
River Access	Develop boat launches and river access along roads, and parking for the trail	PA Fish and Boat Commission, Local Sportsmens Clubs Somerset Rails to Trails, Somerset County Conservancy, Somerset County Parks and Recreation Board	PA Fish and Boat Commission, PA DCNR, PA Rails to Trails, Private Foundations	1	2000-2002
Comfort areas	Provide restrooms, fire rings, camp grounds near the trail	Local Sportsmens Clubs Somerset Rails to Trails, PA DCNR, PA Rails to Trails, Private Foundations, Somerset County Parks and Recreation Board	PA DCNR, PA Rails to Trails, Private Foundations	2	2003-2005
Cultural, Historical and Archaeological Resources					
Fort Hill and Gnagey sites	Study old Indian sites with modern equipment	Local Historical Organizations PA DCNR, PA Rails to Trails, Private Foundations	PA DCNR, PA Rails to Trails, Private Foundations	1	2003-2004
Preserve, acquire and protect historical structures & sites	Develop a plan to preserve old covered bridges and structures	Local Historical Organizations	PA DCNR, PA Rails to Trails, Private Foundations	1	2003-2004

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Elklick Township Meeting

Name	Org.	Fish.	Hunt.	Boat.	Hike.	Bike	Bird Watch.	Other
William Short	Elklick Super.	X	X		X			
Dale Jeffrey	Farmer	X	X	X	X	X	X	
Dave Brant	Consult.		X					X
Lester McNutt	Chair-man	X	X	X	X	X	X	X

Big Spring property to state forest or conservancy
- expand trail from Meyersdale on to Grantsville
- industrial park listing at Maple Mt. Furniture Manufacturing and Piney Run Elklick and Sals. Gave sewage agreement but not water.
- Sals. Sewage plant less than ten years old
- Springs could be hooked up to a package plant
- ID treatment facilities (AMD) chemical and passive
- MT. Davis Bog with end. Plants, ID Flora and Fauna, improve facilities and infrastructure
- Coal run passive treatment system
- Gas well sites on map
- Mark Turkeyfoot trail

Confluence Public Meeting

Name	Occupation	Hunt	Fish	Bike	Boat	Bird	Hike	Other
Jim Johns								
Tom Stanks								
Dod Stanks								
Phyllis Clevenger								
Jean Murray								
Clifford Bryner	Retired	X	X					
Rose Svonavec	Jury Commissioner			X	X		X	
William Critchfield	Retired	X	X		X	X		X
Dianne Lytle	Postmaster			X	X			
Ronald Lytle Jr.	Self-employed	X			X		X	
Johnny Tressla								
Roger Phillippi	Retired	X	X					
Vincent S. Hinzy	Sunrise Medical							
Harry Hinzy								
Clinton Younkin	Surveyor	X	X		X			
Jim Stephens	Energy Consultant	X	X	X	X		X	
Jason Stephens								
Robert Ward								
Stephen King								
Bob Bastian								
Lawrance Jarvis	Retired	X	X	X				
Bob Ruppel	Self-employed	X	X	X	X		X	
Warren D. Conn	Self-employed	X	X	X	X			
Matthew Garland	Machinist	X	X	X	X	X	X	
Wayne Garland	Machinist		X			X		
John Wedd								
Gary Gonzales	Unemployed	X	X	X	X		X	X
Timothy R. Stark	Mason	X	X	X	X		X	

Comments by Lawrence Jarvis:
Problems: Would like to see the borough of Ursine receives funds to provide a sewerage treatment system. They are just 2 miles upstream from Confluence on the Laurel Hill Creek. This has to contribute to the quality of the middle Youghiogheny River water. Confluence needs financial help to upgrade their sewerage treatment and collection system. More parking area will be needed for hiking and biking trail – signage also needed.

Solutions: Confluence Municipal Authority has presently had a sewerage correction action study made by Kimball Engineers of Ebensburg and will be executed as funds are made available. Our present minimum sewer rate is $22.00 per month. Our median income is the lowest in Somerset County at $14,000. The county median income is $21,000. Unused WMRR right of way in Confluence near Yough. River could be turned over to Borough for this purpose.

Notes from the meeting:

Problems

1) Thomas mines into White's Creek on 523
2) Wastewater treatment (Ursine, Harnedsville, etc.)
3) Gas well at Draketown

Fishing and Boating

Access and parking at Harnedsville and Fort Hill

Rockwood Meeting :

Problems:

AMD 1). Wilson Creek.

2). Buffalo Creek

3). Several along trail

4). Clay Mines-McClintack Run

New – Dumamos – Remaining on Wolf Farm

-Ferg Bros – Limestone at Caves

Duamus coal is starting new project (remining) concern with blasting.

Natural acidic water- 5.5 rain/stream lack of buffering

Look at well head protection augers (how large?)

DEP- Remine PA Program

Delineate sites to be mined

State- digitizing AML sites

Wastewater: 1). Rwd: Plant expands two years ago but should be able to separate storm water

From influent. East End pump should be upgraded.

2). Garrett: WWTP needs to separate runoff from influent

3). Summit Township: Needs to build a plant

4). Black Needs sewer

Coxes Creek residents should be hooked up

Somerset Boro –Ben Vin. Is filling out a comment form.

List of industrial discharges from Somerset and industries

Prison-Problems with wastewater Treatment

New Centerville – public water and sewage

Seminar with SAC Check with small flows

Two tanks sand filter in 1 and septic in other and UV Light $10-13 thousand

Port-a-Jon or composting toilets along trail

Agricultural runoff – Identify Large operations

Encourage money to buy buffer strips by waterways 50 ft. easement stream bank fencing.
Railroads-Check if they have any emergency plans for derailments
"Project Grass"
Spraying-are they regulated?
PennDot Electric companies-spraying

Naturally Acidic- Identifying
-Headwaters of Wilson creek
-Townline Run
-Weimer Run

Timbering causing runoff problems
-Timber harvesters actions packet
-Permits only for stream crossings
-Provide education and distribute information

Recreational
--Access areas – conservancy could purchase
- below parting area
- handicap fishing access @ Coxes creek at old bridge
- boat launch areas along river and at trail heads
- Pinkerton tunnel- funding needed to go through
- Leave E&S ponds in @ new mine to prevent flooding

Historical/cultural
Contact Rwd Historical Society
-Clark Brought
-George Roberts

Turkey foot trail- Old Indian path

Monitor static water levels of drinking water.
Link water supplies in southern end of county (place water line along trail) to aid in drought
Cross country skiing on trail.
Groomer Hidden valley for the write off.
Ice Skating rink at the power plant.

Name	Org.	Fish	Hunt	Boat	Hike	Bike	Bird Watch	Other
Lester McNut	SCC/PFSC	X	X	X				X
Dave Brant	Consultant		X					X
Dave Mankamyer	Sommer Dist							
Ryan Steele	Rockwood	X			X	X		
David Steele	SCD	X			X	X		
B. Jean Atchison					X	X		
Meg Moses	S.P&R Board			X	X	X	X	
Dale Jeffrey	Y.R.W	X	X	X	X	X	X	
Barry Atchison			X	X		X		
Rich Stoner	SSCSL	X	X			X		

Comments
Dave Mankamyer:
Problem:

I. a. AMD
b. Need to identify areas forthcoming
II River Access For future use
III Visitor center needed at Rt. 281 Yough River

Solution:

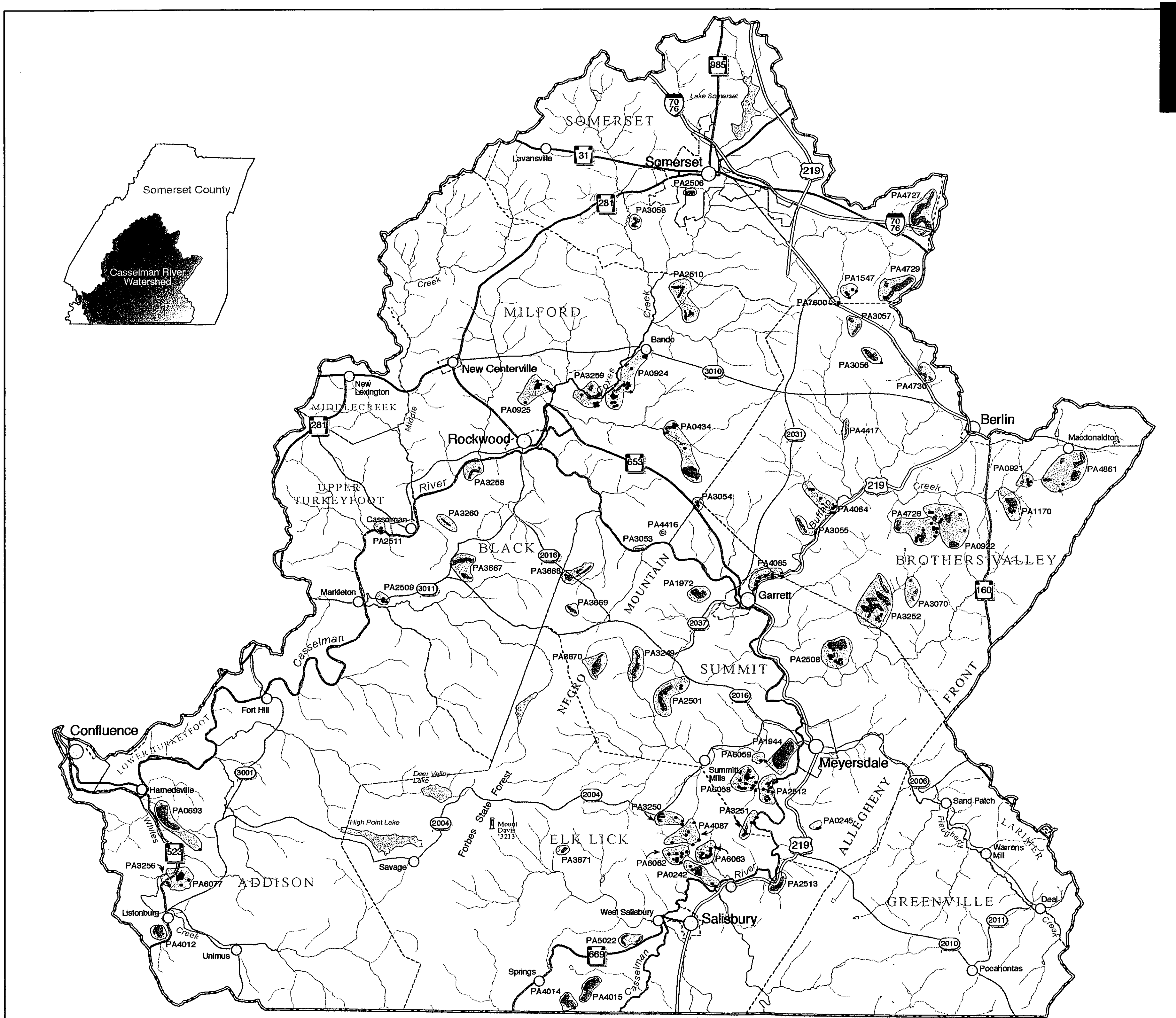
I. a. AMD cleanup project
   b. Remaining under DEP reclamation program
II. Obtain Access Areas

Build Visitor center and man with RSVP program

Somerset County Parks and Recreation Board

1. To provide access for non-powered boats(i.e. canoes, kayaks, rafts) near existing parking areas at Garrett, Rockwood, and Hanedsville.
2. To provide picnic tables, benches, and fire rings at scenic bridge areas.
3. To allow for the maintainence of ditches and culverts to handle water runoff.
4. To provide dry hydrants at strategic areas such as Harnedsville to assist local fire departments.
5. To encourage private camping areas for car and bicyclists who park and use the trail, setting sanitary and environmental quality guidelines for such areas(i.e. fire rings, potable water, port-a-jons, parking, trash disposal).
6. To assist in the repair of the Pinkerton Tunnel.

Abandoned Mine Land Map
Casselman River Watershed



LEGEND

- Abandoned Mine Discharge
- PA 2741 — Problem Area and ID
- Refuse Pile
- Watershed Boundary
- River or Stream
- Municipal Boundary
- Town or Place Name

SOURCE: PA Bureau of Abandoned Mining and Reclamation

North

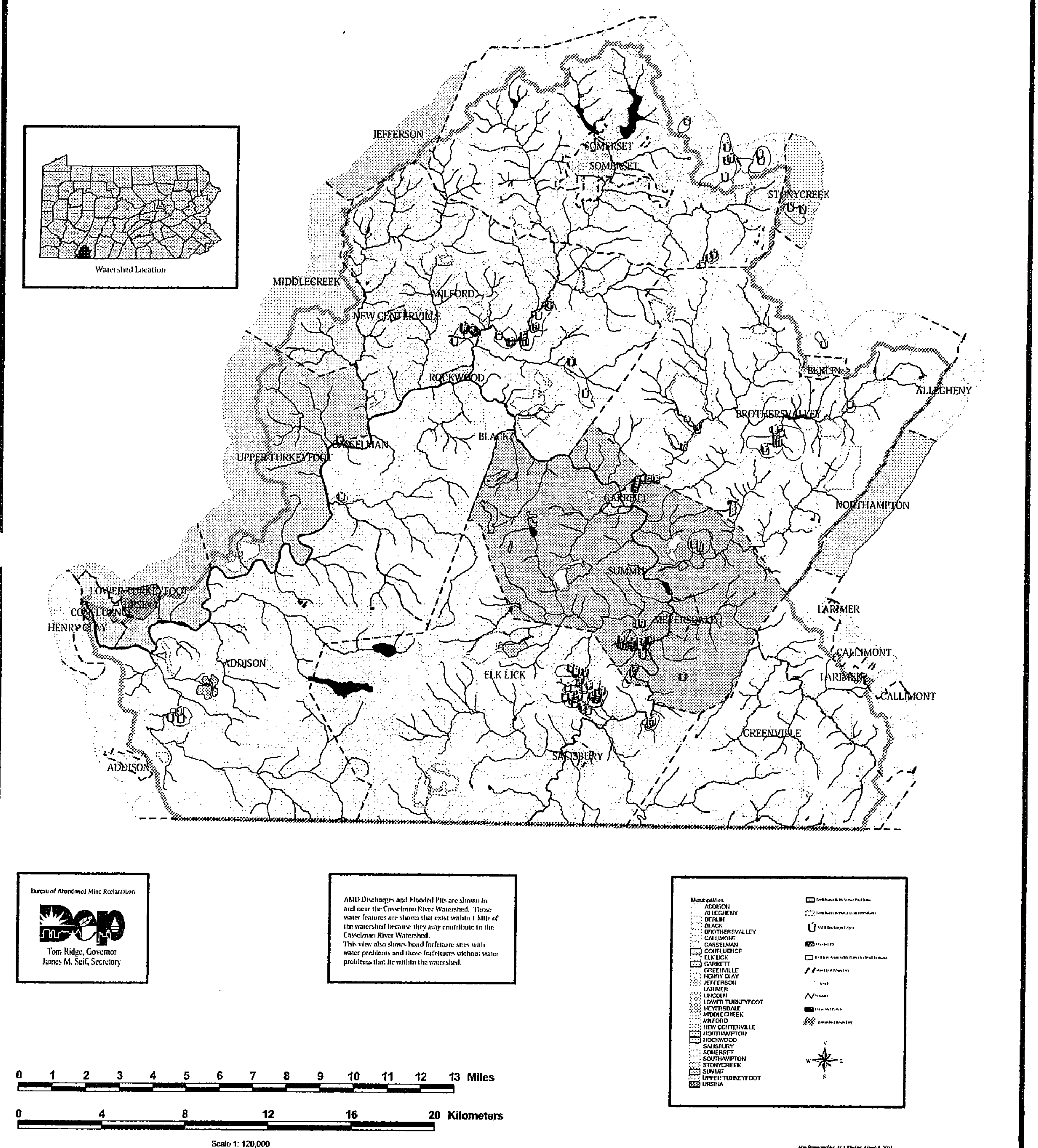
1:12000

0 — 6.5 Kilometers
0 — 4 Miles

Mapping & GIS Compiled By:

LandVision
Planning and Mapping Services

The Casselman River Watershed



Casselman Watershed

PA0242 ***Problem Area Name:*** *COAL RUN SOUTH*

Feature Number	Description	County Name	Municipal Name
01	AMD Discharge Area	SOMERSET	ELK LICK T
02	AMD Discharge Area	SOMERSET	ELK LICK T
03	AMD Discharge Area	SOMERSET	ELK LICK T
04	Spoil Pile	SOMERSET	ELK LICK T
05	Vertical Mine Shaft	SOMERSET	ELK LICK T
06	Vertical Mine Shaft	SOMERSET	ELK LICK T

PA0245 ***Problem Area Name:*** *MEYERSDALE HIGH SCHOOL*

Feature Number	Description	County Name	Municipal Name
01	Open Shaft/Mine Entry	SOMERSET	SUMMIT T
02	AMD Discharge Area	SOMERSET	SUMMIT T

PA0434 ***Problem Area Name:*** *BLACKFIELD*

Feature Number	Description	County Name	Municipal Name
01	Vertical Mine Shaft	SOMERSET	BLACK T
02	Subsidence Prone Area	SOMERSET	BLACK T
03	AMD Discharge Area	SOMERSET	BLACK T
04	Open Shaft/Mine Entry	SOMERSET	BLACK T
05	Open Shaft/Mine Entry	SOMERSET	BLACK T
06	AMD Discharge Area	SOMERSET	BLACK T
07	AMD Discharge Area	SOMERSET	BLACK T
08	Refuse Pile	SOMERSET	BLACK T
09	Refuse Pile	SOMERSET	BLACK T
10	Open Shaft/Mine Entry	SOMERSET	BLACK T
11	Open Shaft/Mine Entry	SOMERSET	BLACK T

PA0775 ***Problem Area Name:*** *LISTIE SOUTH*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	SOMERSET T
02	Dry Strip Mine	SOMERSET	SOMERSET T
03	Dry Strip Mine	SOMERSET	SOMERSET T
04	Dry Strip Mine	SOMERSET	SOMERSET T
05	Dry Strip Mine	SOMERSET	SOMERSET T
06	Dry Strip Mine	SOMERSET	SOMERSET T
07	Dry Strip Mine	SOMERSET	SOMERSET T
08	AMD Discharge Area	SOMERSET	SOMERSET T
09	AMD Discharge Area	SOMERSET	SOMERSET T
10	Open Shaft/Mine Entry	SOMERSET	SOMERSET T
12	Open Shaft/Mine Entry	SOMERSET	SOMERSET T
13	AMD Discharge Area	SOMERSET	SOMERSET T
14	AMD Discharge Area	SOMERSET	SOMERSET T
15	Dry Strip Mine	SOMERSET	SOMERSET T
16	Dry Strip Mine	SOMERSET	SOMERSET T
17	Dry Strip Mine	SOMERSET	SOMERSET T
18	Dry Strip Mine	SOMERSET	SOMERSET T
19	Dry Strip Mine	SOMERSET	SOMERSET T
20	Dry Strip Mine	SOMERSET	SOMERSET T
21	Dry Strip Mine	SOMERSET	SOMERSET T
22	Dry Strip Mine	SOMERSET	SOMERSET T

PA0921 ***Problem Area Name:*** *SHAFT*

Feature Number	Description	County Name	Municipal Name
01	Vertical Mine Shaft	SOMERSET	BROTHERSVALLEY T
02	Mine Entry	SOMERSET	BROTHERSVALLEY T
03	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T
04	Abandoned Structure	SOMERSET	BROTHERSVALLEY T
05	Refuse Pile	SOMERSET	BROTHERSVALLEY T

PA0922 ***Problem Area Name:*** *GOODTOWN*

Feature Number	Description	County Name	Municipal Name
01	Vertical Mine Shaft	SOMERSET	BROTHERSVALLEY T
02	Subsidence Prone Area	SOMERSET	BROTHERSVALLEY T
03	Dry Strip Mine	SOMERSET	BROTHERSVALLEY T
04	Dry Strip Mine	SOMERSET	BROTHERSVALLEY T
05	Refuse Pile	SOMERSET	BROTHERSVALLEY T
06	Open Shaft/Mine Entry	SOMERSET	BROTHERSVALLEY T
07	Open Shaft/Mine Entry	SOMERSET	BROTHERSVALLEY T
08	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T
09	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T
10	Open Shaft/Mine Entry	SOMERSET	BROTHERSVALLEY T

PA0924 *Problem Area Name:* *COXES CREEK*

Feature Number	*Description*	*County Name*	*Municipal Name*
01	Dry Strip Mine	SOMERSET	BLACK T
02	Mine Entry	SOMERSET	BLACK T
03	Open Shaft/Mine Entry	SOMERSET	BLACK T
04	Mine Entry	SOMERSET	BLACK T
05	Refuse Pile	SOMERSET	BLACK T
06	AMD Discharge Area	SOMERSET	BLACK T
07	AMD Discharge Area	SOMERSET	BLACK T
08	Open Shaft/Mine Entry	SOMERSET	BLACK T
09	Open Shaft/Mine Entry	SOMERSET	BLACK T
10	AMD Discharge Area	SOMERSET	BLACK T
11	Open Shaft/Mine Entry	SOMERSET	BLACK T
12	Open Shaft/Mine Entry	SOMERSET	BLACK T
13	AMD Discharge Area	SOMERSET	BLACK T
14	Open Shaft/Mine Entry	SOMERSET	BLACK T
15	AMD Discharge Area	SOMERSET	BLACK T
16	Open Shaft/Mine Entry	SOMERSET	BLACK T
17	AMD Discharge Area	SOMERSET	BLACK T
18	AMD Discharge Area	SOMERSET	BLACK T
19	AMD Discharge Area	SOMERSET	BLACK T
20	Subsidence Prone Area	SOMERSET	BLACK T
21	Refuse Pile	SOMERSET	BLACK T
22	AMD Discharge Area	SOMERSET	BLACK T
23	Vertical Mine Shaft	SOMERSET	BLACK T

PA0925 *Problem Area Name:* *ROCKWOOD NORTH*

Feature Number	Description	County Name	Municipal Name
01	AMD Discharge Area	SOMERSET	MILFORD T
02	AMD Discharge Area	SOMERSET	MILFORD T
03	AMD Discharge Area	SOMERSET	MILFORD T
04	AMD Discharge Area	SOMERSET	MILFORD T
05	Open Shaft/Mine Entry	SOMERSET	MILFORD T
06	AMD Discharge Area	SOMERSET	MILFORD T
07	Open Shaft/Mine Entry	SOMERSET	MILFORD T
08	Open Shaft/Mine Entry	SOMERSET	MILFORD T
09	AMD Discharge Area	SOMERSET	MILFORD T
10	AMD Discharge Area	SOMERSET	MILFORD T
11	AMD Discharge Area	SOMERSET	MILFORD T
12	AMD Discharge Area	SOMERSET	MILFORD T

PA1547 *Problem Area Name:* *COVER HILL NORTH*

Feature Number	Description	County Name	Municipal Name
01	AMD Discharge Area	SOMERSET	SOMERSET T
02	Open Shaft/Mine Entry	SOMERSET	SOMERSET T
03	AMD Discharge Area	SOMERSET	SOMERSET T
04	Open Shaft/Mine Entry	SOMERSET	SOMERSET T
05	Abandoned Structure	SOMERSET	SOMERSET T

PA2501 *Problem Area Name:* *BIGBY CREEK*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	SUMMIT T
02	Erosion-Prone Area	SOMERSET	SUMMIT T
03	AMD Discharge Area	SOMERSET	SUMMIT T
04	Spoil Pile	SOMERSET	SUMMIT T
05	Flooded Strip Mine	SOMERSET	SUMMIT T
06	Open Shaft/Mine Entry	SOMERSET	SUMMIT T

PA2506 ***Problem Area Name:*** *SOMERSET HIGH SCHOOL*

Feature Number	Description	County Name	Municipal Name
01	Subsidence Prone Area	SOMERSET	SOMERSET B

PA2508 ***Problem Area Name:*** *BLUE LICK*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	SUMMIT T
02	Spoil Pile	SOMERSET	SUMMIT T
03	Erosion-Prone Area	SOMERSET	SUMMIT T
04	Erosion-Prone Area	SOMERSET	SUMMIT T
05	Erosion-Prone Area	SOMERSET	SUMMIT T
06	Erosion-Prone Area	SOMERSET	SUMMIT T
07	Open Shaft/Mine Entry	SOMERSET	SUMMIT T
08	AMD Discharge Area	SOMERSET	SUMMIT T
09	Open Shaft/Mine Entry	SOMERSET	SUMMIT T
10	AMD Discharge Area	SOMERSET	SUMMIT T
11	Dry Strip Mine	SOMERSET	SUMMIT T
12	Dry Strip Mine	SOMERSET	SUMMIT T

PA2509 ***Problem Area Name:*** *MARKLETON*

Feature Number	Description	County Name	Municipal Name
01	Open Shaft/Mine Entry	SOMERSET	BLACK T
02	Abandoned Structure	SOMERSET	BLACK T
03	AMD Discharge Area	SOMERSET	BLACK T

PA2510 ***Problem Area Name:*** *MURDOCK EAST*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	BLACK T
02	Flooded Strip Mine	SOMERSET	BLACK T
03	Flooded Strip Mine	SOMERSET	BLACK T
04	Flooded Strip Mine	SOMERSET	BLACK T
05	Flooded Strip Mine	SOMERSET	BLACK T
06	Dry Strip Mine	SOMERSET	BLACK T

PA2511 *Problem Area Name:* *CASSELMAN*

Feature Number	Description	County Name	Municipal Name
01	AMD Discharge Area	SOMERSET	UPPER TURKEYFOOT T
02	Open Shaft/Mine Entry	SOMERSET	UPPER TURKEYFOOT T

PA2512 *Problem Area Name:* *SHAW MINES*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	SUMMIT T
02	Refuse Pile	SOMERSET	SUMMIT T
03	Abandoned Structure	SOMERSET	SUMMIT T
04	AMD Discharge Area	SOMERSET	SUMMIT T
05	AMD Discharge Area	SOMERSET	SUMMIT T
06	AMD Discharge Area	SOMERSET	SUMMIT T
07	Refuse Pile	SOMERSET	SUMMIT T
08	AMD Discharge Area	SOMERSET	SUMMIT T
09	AMD Discharge Area	SOMERSET	SUMMIT T
10	AMD Discharge Area	SOMERSET	SUMMIT T

PA2513 *Problem Area Name:* *BOYNTON*

Feature Number	Description	County Name	Municipal Name
01	Land Slide Area	SOMERSET	ELK LICK T
02	AMD Discharge Area	SOMERSET	ELK LICK T
03	Dry Strip Mine	SOMERSET	ELK LICK T
04	AMD Discharge Area	SOMERSET	ELK LICK T

PA3053 *Problem Area Name:* *NEGRO MOUNTAIN WEST*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	BLACK T

PA3054 *Problem Area Name:* *NEGRO MOUNTAIN NORTH*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	SUMMIT T

PA3055 ***Problem Area Name:*** *ALTHOUSE*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	BROTHERSVALLEY T
02	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T

PA3056 ***Problem Area Name:*** *COVER HILL*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	BROTHERSVALLEY T
02	Erosion-Prone Area	SOMERSET	BROTHERSVALLEY T

PA3057 ***Problem Area Name:*** *COVER HILL NORTH*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	BROTHERSVALLEY T
02	Dry Strip Mine	SOMERSET	BROTHERSVALLEY T

PA3058 ***Problem Area Name:*** *WEST BRANCH*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	MILFORD T

PA3070 ***Problem Area Name:*** *HAYS MILL*

Feature Number	Description	County Name	Municipal Name
01	Spoil Pile	SOMERSET	BROTHERSVALLEY T
02	Dry Strip Mine	SOMERSET	BROTHERSVALLEY T
03	Dry Strip Mine	SOMERSET	BROTHERSVALLEY T

PA3167 ***Problem Area Name:*** *MIZPAH CHURCH WEST*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	SOMERSET T
02	Dry Strip Mine	SOMERSET	SOMERSET T
03	Spoil Pile	SOMERSET	SOMERSET T
04	Dry Strip Mine	SOMERSET	SOMERSET T
05	Dry Strip Mine	SOMERSET	SOMERSET T
06	Flooded Strip Mine	SOMERSET	SOMERSET T
07	Open Shaft/Mine Entry	SOMERSET	SOMERSET T
08	Open Shaft/Mine Entry	SOMERSET	SOMERSET T
09	Spoil Pile	SOMERSET	SOMERSET T
10	Spoil Pile	SOMERSET	SOMERSET T
11	Open Shaft/Mine Entry	SOMERSET	SOMERSET T
12	AMD Discharge Area	SOMERSET	SOMERSET T
13	AMD Discharge Area	SOMERSET	SOMERSET T
14	Dry Strip Mine	SOMERSET	SOMERSET T
15	Dry Strip Mine	SOMERSET	SOMERSET T
16	Spoil Pile	SOMERSET	SOMERSET T

PA3175 ***Problem Area Name:*** *GREIGER*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	SOMERSET T
02	AMD Discharge Area	SOMERSET	SOMERSET T

PA3249 ***Problem Area Name:*** *CRANBERRY RUN*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	SUMMIT T
02	Spoil Pile	SOMERSET	SUMMIT T

PA3250 ***Problem Area Name:*** *SAINT PAUL NORTHEAST*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	ELK LICK T
02	Spoil Pile	SOMERSET	ELK LICK T
03	AMD Discharge Area	SOMERSET	ELK LICK T
04	AMD Discharge Area	SOMERSET	ELK LICK T
05	AMD Discharge Area	SOMERSET	ELK LICK T

PA3251 ***Problem Area Name:*** *SHAW MINES SOUTH*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	SUMMIT T
02	Open Shaft/Mine Entry	SOMERSET	SUMMIT T
03	AMD Discharge Area	SOMERSET	SUMMIT T
04	AMD Discharge Area		

PA3252 ***Problem Area Name:*** *ST. PAUL'S CEMETARY*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	BROTHERSVALLEY T
02	Spoil Pile	SOMERSET	BROTHERSVALLEY T
03	Dry Strip Mine	SOMERSET	BROTHERSVALLEY T
04	Spoil Pile	SOMERSET	BROTHERSVALLEY T
05	Spoil Pile	SOMERSET	BROTHERSVALLEY T
06	Spoil Pile	SOMERSET	BROTHERSVALLEY T
07	Dry Strip Mine	SOMERSET	BROTHERSVALLEY T
08	Spoil Pile	SOMERSET	BROTHERSVALLEY T
09	Dry Strip Mine	SOMERSET	BROTHERSVALLEY T
10	Refuse Pile	SOMERSET	BROTHERSVALLEY T
11	Abandoned Structure	SOMERSET	BROTHERSVALLEY T
12	Abandoned Structure	SOMERSET	BROTHERSVALLEY T
13	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T
14	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T
15	Spoil Pile	SOMERSET	BROTHERSVALLEY T

PA3256 ***Problem Area Name:*** *LISTONBURG NORTH*

Feature Number	Description	County Name	Municipal Name
01	AMD Discharge Area	SOMERSET	ADDISON T
02	Open Shaft/Mine Entry	SOMERSET	ADDISON T

PA3258 ***Problem Area Name:*** *ROCKWOOD STATION WEST*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	BLACK T
02	Spoil Pile	SOMERSET	BLACK T

PA3259 ***Problem Area Name:*** *COXES CREEK EAST*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	MILFORD T
02	Spoil Pile	SOMERSET	MILFORD T
03	Dry Strip Mine	SOMERSET	MILFORD T
04	AMD Discharge Area	SOMERSET	MILFORD T
05	Open Shaft/Mine Entry	SOMERSET	MILFORD T
06	AMD Discharge Area	SOMERSET	MILFORD T
07	Open Shaft/Mine Entry	SOMERSET	MILFORD T
08	AMD Discharge Area	SOMERSET	MILFORD T

PA3260 ***Problem Area Name:*** *LAUREL CHURCH*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	BLACK T

PA3667 ***Problem Area Name:*** *ROCKWOOD RESERVOIR WEST*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	BLACK T
02	Spoil Pile	SOMERSET	BLACK T
03	Dry Strip Mine	SOMERSET	BLACK T

PA3668 ***Problem Area Name:*** *SHAFER RUN*

Feature Number	*Description*	*County Name*	*Municipal Name*
01	Flooded Strip Mine	SOMERSET	SUMMIT T
02	Dry Strip Mine	SOMERSET	SUMMIT T
03	Flooded Strip Mine	SOMERSET	SUMMIT T
04	Spoil Pile	SOMERSET	SUMMIT T

PA3669 ***Problem Area Name:*** *SHAFER RUN SOUTH*

Feature Number	*Description*	*County Name*	*Municipal Name*
01	Spoil Pile	SOMERSET	SUMMIT T
02	Dry Strip Mine	SOMERSET	SUMMIT T

PA3670 ***Problem Area Name:*** *LAUREL FALLS NORTH*

Feature Number	*Description*	*County Name*	*Municipal Name*
01	Dry Strip Mine	SOMERSET	SUMMIT T
02	Spoil Pile	SOMERSET	SUMMIT T
03	Dry Strip Mine	SOMERSET	SUMMIT T
04	Abandoned Structure	SOMERSET	SUMMIT T
05	Flooded Strip Mine	SOMERSET	SUMMIT T
06	Dry Strip Mine	SOMERSET	SUMMIT T
07	Flooded Strip Mine	SOMERSET	SUMMIT T
08	Dry Strip Mine	SOMERSET	SUMMIT T

PA3671 ***Problem Area Name:*** *MOUNT DAVIS EAST*

Feature Number	*Description*	*County Name*	*Municipal Name*
01	Dry Strip Mine	SOMERSET	ELK LICK T
02	Spoil Pile	SOMERSET	ELK LICK T

PA4012 ***Problem Area Name:*** *ADDISON EAST*

Feature Number	*Description*	*County Name*	*Municipal Name*
01	Dry Strip Mine	SOMERSET	ADDISON T
02	Spoil Pile	SOMERSET	ADDISON T

PA4014 ***Problem Area Name:*** *VILLAGE OF SPRINGS*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	ELK LICK T
02	Dry Strip Mine	SOMERSET	ELK LICK T
03	Spoil Pile	SOMERSET	ELK LICK T
04	Spoil Pile	SOMERSET	ELK LICK T

PA4015 ***Problem Area Name:*** *FLAG RUN*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	ELK LICK T
02	Dry Strip Mine	SOMERSET	ELK LICK T
03	Dry Strip Mine	SOMERSET	ELK LICK T
04	Spoil Pile	SOMERSET	ELK LICK T
05	Dry Strip Mine	SOMERSET	ELK LICK T

PA4084 ***Problem Area Name:*** *SHOBER NORTHWEST*

Feature Number	Description	County Name	Municipal Name
01	Open Shaft/Mine Entry	SOMERSET	BROTHERSVALLEY T
02	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T
03	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T
04	Open Shaft/Mine Entry	SOMERSET	BROTHERSVALLEY T
05	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T
06	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T
07	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T

PA4085 ***Problem Area Name:*** *GARRETT NORTH*

Feature Number	Description	County Name	Municipal Name
01	AMD Discharge Area	SOMERSET	SUMMIT T
02	AMD Discharge Area	SOMERSET	SUMMIT T
03	AMD Discharge Area	SOMERSET	SUMMIT T
04	AMD Discharge Area	SOMERSET	SUMMIT T
05	AMD Discharge Area	SOMERSET	SUMMIT T
06	Open Shaft/Mine Entry	SOMERSET	SUMMIT T
07	AMD Discharge Area	SOMERSET	SUMMIT T
08	Open Shaft/Mine Entry	SOMERSET	BROTHERSVALLEY T
09	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T

PA4087 ***Problem Area Name:*** *COAL RUN NORTHWEST*

Feature Number	Description	County Name	Municipal Name
01	AMD Discharge Area	SOMERSET	ELK LICK T
02	AMD Discharge Area	SOMERSET	ELK LICK T
03	AMD Discharge Area	SOMERSET	ELK LICK T
04	AMD Discharge Area	SOMERSET	ELK LICK T
05	AMD Discharge Area	SOMERSET	ELK LICK T
06	AMD Discharge Area	SOMERSET	ELK LICK T

PA4416 ***Problem Area Name:*** *NEGRO MOUNTAIN*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	BLACK T

PA4417 ***Problem Area Name:*** *BEACHDALE HOLLOW*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	BROTHERSVALLEY T

PA4726 ***Problem Area Name:*** *GOODTOWN SOUTH*

Feature Number	Description	County Name	Municipal Name
01	Open Shaft/Mine Entry	SOMERSET	BROTHERSVALLEY T
02	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T
03	Open Shaft/Mine Entry	SOMERSET	BROTHERSVALLEY T
04	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T
05	Open Shaft/Mine Entry	SOMERSET	BROTHERSVALLEY T
06	Open Shaft/Mine Entry	SOMERSET	BROTHERSVALLEY T
07	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T
08	Refuse Pile	SOMERSET	BROTHERSVALLEY T
09	Open Shaft/Mine Entry	SOMERSET	BROTHERSVALLEY T
10	Open Shaft/Mine Entry	SOMERSET	BROTHERSVALLEY T
11	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T
12	Abandoned Structure	SOMERSET	BROTHERSVALLEY T
13	AMD Discharge Area	SOMERSET	BROTHERSVALLEY T
14	Spoil Pile	SOMERSET	BROTHERSVALLEY T
15	Dry Strip Mine	SOMERSET	BROTHERSVALLEY T

PA4727 ***Problem Area Name:*** *KIMBERLY RUN EAST*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	STONYCREEK T
02	Dry Strip Mine	SOMERSET	STONYCREEK T
03	Dry Strip Mine	SOMERSET	STONYCREEK T
04	Spoil Pile	SOMERSET	STONYCREEK T
05	Dry Strip Mine	SOMERSET	STONYCREEK T

PA4728 ***Problem Area Name:*** *BROTHERTON NORTHEAST*

Feature Number	*Description*	*County Name*	*Municipal Name*
01	Dry Strip Mine	SOMERSET	STONYCREEK T
02	AMD Discharge Area	SOMERSET	STONYCREEK T
03	Open Shaft/Mine Entry	SOMERSET	STONYCREEK T
04	Dry Strip Mine	SOMERSET	STONYCREEK T
05	Dry Strip Mine	SOMERSET	STONYCREEK T
06	Spoil Pile	SOMERSET	STONYCREEK T
07	AMD Discharge Area	SOMERSET	STONYCREEK T

PA4729 ***Problem Area Name:*** *BROTHERTON WEST*

Feature Number	*Description*	*County Name*	*Municipal Name*
01	Dry Strip Mine	SOMERSET	SOMERSET T
02	Dry Strip Mine	SOMERSET	SOMERSET T
03	Spoil Pile	SOMERSET	SOMERSET T
04	Dry Strip Mine	SOMERSET	SOMERSET T
05	Spoil Pile	SOMERSET	SOMERSET T
06	Dry Strip Mine	SOMERSET	SOMERSET T

PA4730 ***Problem Area Name:*** *MILLERS RUN*

Feature Number	*Description*	*County Name*	*Municipal Name*
01	Dry Strip Mine	SOMERSET	SOMERSET T
02	Dry Strip Mine	SOMERSET	SOMERSET T

PA4731 ***Problem Area Name:*** *SANDY HOLLOW WEST*

Feature Number	*Description*	*County Name*	*Municipal Name*
01	Dry Strip Mine		

PA4841 ***Problem Area Name:*** *CHECKED.WELLS CREEK*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	SOMERSET T
02	Flooded Strip Mine	SOMERSET	SOMERSET T
03	Spoil Pile	SOMERSET	SOMERSET T
04	Dry Strip Mine	SOMERSET	SOMERSET T
05	Dry Strip Mine	SOMERSET	SOMERSET T
06	Spoil Pile	SOMERSET	SOMERSET T
07	Dry Strip Mine	SOMERSET	SOMERSET T
08	Spoil Pile	SOMERSET	SOMERSET T

PA4859 ***Problem Area Name:*** *BERLIN NORTH*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	SOMERSET T
02	AMD Discharge Area	SOMERSET	SOMERSET T

PA4861 ***Problem Area Name:*** *MACDONALDTON*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	BROTHERSVALLEY T
02	Dry Strip Mine	SOMERSET	BROTHERSVALLEY T
03	Vertical Mine Shaft	SOMERSET	BROTHERSVALLEY T
04	Vertical Mine Shaft	SOMERSET	BROTHERSVALLEY T
05	Spoil Pile	SOMERSET	BROTHERSVALLEY T
06	Spoil Pile	SOMERSET	BROTHERSVALLEY T
07	Spoil Pile	SOMERSET	BROTHERSVALLEY T

PA5022 ***Problem Area Name:*** *SYLVAN LANE*

Feature Number	Description	County Name	Municipal Name
01	Dry Strip Mine	SOMERSET	ELK LICK T
02	Dry Strip Mine	SOMERSET	ELK LICK T

PA6058 *Problem Area Name:* *SHAW MINES NORTHWEST*

Feature Number	*Description*	*County Name*	*Municipal Name*
01	Dry Strip Mine	SOMERSET	SUMMIT T
02	Dry Strip Mine	SOMERSET	SUMMIT T
03	Abandoned Structure	SOMERSET	SUMMIT T
04	Refuse Pile	SOMERSET	SUMMIT T
05	AMD Discharge Area	SOMERSET	SUMMIT T
06	AMD Discharge Area	SOMERSET	SUMMIT T
07	AMD Discharge Area	SOMERSET	SUMMIT T
08	Dry Strip Mine	SOMERSET	SUMMIT T
09	AMD Discharge Area	SOMERSET	SUMMIT T
10	AMD Discharge Area	SOMERSET	SUMMIT T
11	AMD Discharge Area	SOMERSET	SUMMIT T
12	AMD Discharge Area	SOMERSET	SUMMIT T
13	AMD Discharge Area	SOMERSET	SUMMIT T

PA6059 *Problem Area Name:* *WEST MEYERSDALE SOUTH*

Feature Number	*Description*	*County Name*	*Municipal Name*
01	AMD Discharge Area	SOMERSET	SUMMIT T
02	AMD Discharge Area	SOMERSET	SUMMIT T

PA6062 *Problem Area Name:* *COAL RUN WEST*

Feature Number	*Description*	*County Name*	*Municipal Name*
01	Open Shaft/Mine Entry	SOMERSET	ELK LICK T
02	AMD Discharge Area	SOMERSET	ELK LICK T
03	Refuse Pile	SOMERSET	ELK LICK T
04	AMD Discharge Area	SOMERSET	ELK LICK T
05	AMD Discharge Area	SOMERSET	ELK LICK T
06	Open Shaft/Mine Entry	SOMERSET	ELK LICK T
07	AMD Discharge Area	SOMERSET	ELK LICK T
08	AMD Discharge Area	SOMERSET	ELK LICK T
09	AMD Discharge Area	SOMERSET	ELK LICK T

PA6063 ***Problem Area Name:*** *COAL RUN EAST*

Feature Number	*Description*	*County Name*	*Municipal Name*
01	Dry Strip Mine	SOMERSET	ELK LICK T
02	Spoil Pile	SOMERSET	ELK LICK T
03	AMD Discharge Area	SOMERSET	ELK LICK T
04	AMD Discharge Area	SOMERSET	ELK LICK T
05	AMD Discharge Area	SOMERSET	ELK LICK T
06	AMD Discharge Area	SOMERSET	ELK LICK T
07	AMD Discharge Area	SOMERSET	ELK LICK T
08	AMD Discharge Area	SOMERSET	ELK LICK T
09	AMD Discharge Area	SOMERSET	ELK LICK T

PA6077 ***Problem Area Name:*** *BEACHLY SOUTH*

Feature Number	*Description*	*County Name*	*Municipal Name*
01	Mine Entry	SOMERSET	ADDISON T
02	Mine Entry	SOMERSET	ADDISON T
03	AMD Discharge Area	SOMERSET	ADDISON T
04	Abandoned Structure	SOMERSET	ADDISON T
05	Abandoned Structure	SOMERSET	ADDISON T
06	Abandoned Structure	SOMERSET	ADDISON T
07	AMD Discharge Area	SOMERSET	ADDISON T
08	Abandoned Structure	SOMERSET	ADDISON T
09	Mine Entry	SOMERSET	ADDISON T
10	Mine Entry	SOMERSET	ADDISON T
11	Abandoned Structure	SOMERSET	ADDISON T
12	AMD Discharge Area	SOMERSET	ADDISON T

PA7600 ***Problem Area Name:*** *WELL COVER HILL*

Feature Number	*Description*	*County Name*	*Municipal Name*
01	Mine Entry	SOMERSET	SOMERSET T
02	AMD Discharge Area	SOMERSET	SOMERSET T

PA8506 ***Problem Area Name:*** *BERLIN BROTHERSVALLEY SCHOOL*

Feature Number	Description	County Name	Municipal Name
01	Subsidence Prone Area	SOMERSET	BERLIN B

303(d) listed stream segments

Stream Name	Contaminant	Cause	Miles of Impairment	Priority
Casselman River	AMD	Metals	26	High
Whites Creek	AMD	Metals	2	High
Coxes Creek	AMD	Suspended Solids	1	High
East Branch of Coxes Creek	AMD	Metals	2	High
Buffalo Creek	AMD	Metals	7.5	High

Active Mining Permits in the Casselman River Watershed

Permit #	Permittee	Township	Quad / #
679111	KING COAL	ADDISON	CONFLUENCE 15
5679113	SOBERDASH	BLACK	MURDOCK 5
5679116	BITUMINOUS COALS	ADDISON	CONFLUENCE 5
8956002	PAUL F. BECKER	BROTHERSVALLEY	BERLIN 26
8956003	DELTA MINING	BROTHERSVALLEY	BERLIN 52
56663069	ACTION MINING	ELKLICK / SUMMIT	MEYERSDALE 11
56663094	CRONER INC.	BROTHERSVALLEY	WITTENBERG 1
56663117	LAURA D. COAL, INC.	BROTHERSVALLEY	MURDOCK 13
56663125	HILLTOP MINING	BROTHERSVALLEY / SUMMIT	MURDOCK 14
56673133	SOBERDASH COAL	BLACK	MURDOCK 48
56713039	PBS COALS	SOMERSET / BROTHERSVALLEY	BERLIN 17
56723082	CRONER INC.	BROTHERSVALLEY / SOMERSET	MURDOCK 15
56723092	FETTEROLF	BLACK	MURDOCK 2
56733106	J. LLOYD McCLINTOCK	MILFORD	ROCKWOOD 9
56733132	COAL JUNCTION COAL	MILFORD	ROCKWOOD 10
56733134	SOBERDASH	BLACK	MURDOCK 3
56753024	PBS COAL	BROTHERSVALLEY	MURDOCK 16
56753026	SUN COAL	ELKLICK	GRANTSVILLE 7
56753029	DELTA MINING	SOMERSET	BERLIN 18
56753090	CRONER INC.	BROTHERSVALLEY / SUMMIT	WITTENBERG 2
56753121	AMERICAN MINING	BLACK	MURDOCK 4
56753129	SVONAVEC	MILFORD	ROCKWOOD 11
56763022	DELTA MINING	ELKLICK	MARKLETON 8
56763114	SVONAVEC	MILFORD	ROCKWOOD 12
56763115	SVONAVEC	MILFORD	ROCKWOOD 13
6773023	DELTA MINING	SUMMIT	MEYERSDALE 21
56773028	PBS COALS	SOMERSET / STONYCREEK	BERLIN 28
56773084	D & E CONST.	SUMMIT	MEYERSDALE 22
56783046	H & H COAL	BROTHERSVALLEY / BLACK	MURDOCK 17
56783111	ISERS RUN COAL CO.	ADDISON	MARKLETON 2
56793032	ACTION MINING	BROTHERSVALLEY / SUMMIT	MEYERSDALE 23
56793045	H & H COAL	SOMERSET	MURDOCK 31
56793053	DELTA	BROTHERSVALLEY	BERLIN 7
56793076	ACTION MINING	BLACK	MARKLETON 4
56793091	HARDROCK	BROTHERSVALLEY	MURDOCK 18
56800108	SOBERDASH COAL	MILFORD	ROCKWOOD 32
56800110	FINZEL COAL	ADDISON	CONFLUENCE 6
56800111	COAL JUNCTION COAL	MILFORD	ROCKWOOD 14
56800128	SVONAVEC	MILFORD	MURDOCK 27
56800137	WALTER & BETTY SHAFER	ADDISON	ACCIDENT 2
56803014	DELTA MINING	SUMMIT	MARKLETON 11
56803015	ACTION MINING	ELKLICK	MEYERSDALE 12
56803020	ACTION MINING	SUMMIT	MEYERSDALE 24
56803063	SUN COAL	ELKLICK	MARKLETON 9
56803074	TRIPLE G COAL	SUMMIT	MEYERSDALE 25
56803083	C & C COAL	BROTHERSVALLEY	WITTENBERG 5
56803093	CRONER INC.	BROTHERSVALLEY	BERLIN 8
56803113	SUN COAL CO.	ELKLICK	MEYERSDALE 33
56803128	PENN POCAHONTAS	BROTHERSVALLEY	MURDOCK 19
56803131	SVONAVEC	MILFORD	ROCKWOOD 16

Permit #	Permittee	Township	Quad / #
56810115	METCO MINING	LOWER TURKEYFOOT	KINGWOOD 1
56813002	FOGLE	BROTHERSVALLEY	BERLIN 9
56813012	DELTA	ELKLICK	GRANTSVILLE 5
56813027	ACTION MINING	BROTHERSVALLEY	WITTENBERG 6
56813060	ACTION MINING	SUMMIT	WITTENBERG 12
56813062	ACTION MINING	BROTHERSVALLEY	BERLIN 10
56813068	C.E. BEENER COAL	SOMERSET	MURDOCK 32
56813081	AMERICAN MINING	BLACK	MURDOCK 6
56813088	SUN COAL	ELKLICK	MEYERSDALE 14
56813101	J. LLOYD McCLINTOCK	MILFORD	ROCKWOOD 17
56813104	FINZEL	BROTHERSVALLEY	MURDOCK 20
56813116	COAL JUNCTION COAL	MILFORD	ROCKWOOD 24
56820116	SUN COAL	ELKLICK	GRANTSVILLE 11
56820125	GLESSNER MINES	SUMMIT	MEYERSDALE 35
56820131	SOBERDASH COAL	BLACK	ROCKWOOD 23
56820140	GILBERT LOCHRIE	BLACK	ROCKWOOD 1
56823007	DELTA MINING	SUMMIT	MEYERSDALE 26
56823008	CRONER INC.	BROTHERSVALLEY	MURDOCK 21
56823017	METCO MINING	MILFORD	ROCKWOOD 18
56823030	SVONAVEC	ADDISON	CONFLUENCE 7
56823033	CRONER INC.	BROTHERSVALLEY	BERLIN 11
56823040	DELTA MINING	ELKLICK	MARKLETON 10
56823051	AMERICAN MINING	SUMMIT	MEYERSDALE 27
56823059	ACTION MINING	SUMMIT	WITTENBERG 13
56823066	ACTION MINING	ELKLICK	MEYERSDALE 16
56823108	C & O COAL	BROTHERSVALLEY	MURDOCK 23
56823123	CRONER	BROTHERSVALLEY	BERLIN 12
56830102	BEACHY & BEACHY	ELKLICK	GRANTSVILLE 6
56830110	TRIPLE G COALS	SUMMIT	MEYERSDALE 36
56830111	J. LLOYD McCLINTOCK	MILFORD	ROCKWOOD 19
56830112	WOODROW SANNER	SUMMIT	MEYERSDALE 28
56830114	HILLTOP MINING	SUMMIT	MEYERSDALE 29
56833009	FETTEROLF MINING	BLACK	MURDOCK 7
56840105	SVONAVEC	MILFORD	ROCKWOOD 20
56840106	ACTION MINING	BLACK	MURDOCK 8
56840109	WOODROW SANNER	SUMMIT	MEYERSDALE 30
56840112	AMERICAN DEV.	BLACK	MURDOCK 9
56841612	SVONAVEC, INC.	BLACK	ROCKWOOD 45
56850101	SVONAVEC	ADDISON	CONFLUENCE 8
56850103	ACTION MINING	ADDISON	CONFLUENCE 11
56850108	SVONAVEC	SOMERSET	MURDOCK 33
56850109	CRONER	BROTHERSVALLEY	BERLIN 13
56850110	J. LLOYD McCLINTOCK	MILFORD	ROCKWOOD 21
56850111	CRONER, INC.	BROTHERSVALLEY	BERLIN 40
56850113	COMMONWEALTH COAL	BROTHERSVALLEY	MEYERSDALE 4
56860101	CRONER INC.	BROTHERSVALLEY	BERLIN 15
56860104	ACTION MINING	BROTHERSVALLEY / SUMMIT	WITTENBERG 9
56860105	CRONER INC.	BROTHERSVALLEY	MEYERSDALE 5
56860108	SUN COAL CO.	ELKLICK	MEYERSDALE 34
56870101	HILLTOP MINING	BROTHERSVALLEY	MURDOCK 25

Permit #	Permittee	Township	Quad / #
56870103	CRONER INC.	SOMERSET / BROTHERSVALLEY	BERLIN 19
56870107	ACTION MINING	BROTHERSVALLEY / SUMMIT	MEYERSDALE 31
56880102	BEACHDALE FUELS	BROTHERSVALLEY	WITTENBERG 15
56880103	FUTURE INDUSTRIES	SUMMIT	MEYERSDALE 32
56880108	ACTION MINING	ADDISON	CONFLUENCE 12
56880109	CRONER INC.	BROTHERSVALLEY	WITTENBERG 11
56880110	SVONAVEC	BLACK	ROCKWOOD 4
56880111	ACTION MINING INC.	ELKLICK / MARYLAND	AVILTON 8
56890101	CRONER, INC.	BROTHERSVALLEY	BERLIN 1
56890102	SVONAVEC	LOWER TURKEYFOOT	CONFLUENCE 21
56890106	FIEG BROTHERS	BROTHERSVALLEY	BERLIN 45
56890111	DUPPSTADT	ELKLICK	AVILTON 5
56890112	PAUL F. BECKER	BLACK	MURDOCK 35
56890114	WOODROW SANNER	MILFORD	ROCKWOOD 33
56890115	FUTURE INDUSTRIES, INC.	BROTHERSVALLEY	BERLIN 50
56900103	REAM-KRETCHMAN ASSOCIATES	BROTHERSVALLEY	MURDOCK 53
56900106	SCURFIELD COAL, INC.	BROTHERSVALLEY	BERLIN 48
56900107	METCO MINING & MINERALS, INC.	BROTHERSVALLEY	BERLIN 49
56900108	SVONAVEC, INC.	MILFORD	ROCKWOOD 35
56900111	HOFFMAN MINING, INC.	BROTHERSVALLEY	MURDOCK 56
56900112	FUTURE INDUSTRIES	SUMMIT	MARKLETON 17
56900113	FIEG BROS.	BROTHERSVALLEY	BERLIN 47
56900114	BEECHDALE MINING, INC.	BROTHERSVALLEY	MURDOCK 54
56910101	PAUL F. BECKER	SOMERSET / STONYCREEK	BERLIN 51
56910102	LINDA CAROL COAL	MILFORD	ROCKWOOD 37
56910104	HARDROCK COAL	ELKLICK	MEYERSDALE 44
56910105	SVONAVEC, INC.	MILFORD	ROCKWOOD 39
56920101	FUTURE INDUSTRIES, INC.	SUMMIT	MURDOCK 58
56920103	SVONAVEC INC.	ADDISON	CONFLUENCE 23
56920104	METCO MINING & MINERALS, INC.	MILFORD	ROCKWOOD 38
56920110	SENATE COAL MINES, INC.	BLACK	MURDOCK 59
56920113	FUTURE INDUSTRIES	ELKLICK / SUMMIT	MEYERSDALE 47
56920115	SVONAVEC, INC.	MILFORD	ROCKWOOD 40
56930101	FIEG BROTHERS	BROTHERSVALLEY	BERLIN 54
56930104	FUTURE INDUSTRIES, INC.	BROTHERSVALLEY	BERLIN 55
56930106	FUTURE INDUSTRIES, INC.	BLACK	ROCKWOOD 43
56930107	FUTURE INDUSTRIES, INC.	BROTHERSVALLEY	BERLIN 56
56930110	FUTURE IND.	BLACK	ROCKWOOD 42
56930111	REDSTONE MINING, INC.	BROTHERSVALLEY / SUMMIT	MEYERSDALE 48
56930112	FUTURE INDUSTRIES, INC.	BLACK	ROCKWOOD 44
56930113	CRONER, INC.	BROTHERSVALLEY	MURDOCK 60
56930114	FIEG BROTHERS	BROTHERSVALLEY	BERLIN 57
56940104	ZUBEC, INC.	BROTHERSVALLEY	MURDOCK 55
56940105	ACTION MINING, INC.	ELKLICK / SUMMIT	MEYERSDALE 49
56940106	FIEG BROTHERS	BROTHERSVALLEY	BERLIN 58
56950101	ACTION MINING, INC.	BROTHERSVALLEY	MURDOCK 62
56950107	AMERIKOHL MINING, INC.	BLACK	MURDOCK 61
56950108	FIEG BROTHERS	BROTHERSVALLEY	BERLIN 59
56950110	HARDROCK COAL CO.	ELKLICK	GRANTSVILLE 12
56960105	L.K. MINING, INC.	MILFORD	ROCKWOOD 46

Permit #	Permittee	Township	Quad / #
56960106	DUNAMIS RESOURCES, INC.	LINCOLN	BAKERSVILLE 3
56960108	PBS COALS	BROTHERSVALLEY	BERLIN 60
56960110	PBS COALS INC.	BROTHERSVALLEY	WITTENBERG 17
56970301	FIEG BROTHERS	SUMMIT / BLACK	MURDOCK 63
56980107	DUNAMIS RESOURCES, INC.	MILFORD	ROCKWOOD 47
56980109	MOUNTAINEER MINING CORPORATION	BROTHERSVALLEY	BERLIN 61
3366BSM73	SANNER	ELKLICK	GRANTSVILLE 8
3366BSM81	PENN POCAHONTAS	BROTHERSVALLEY	BERLIN 3
3366BSM85	CRONER INC.	BROTHERSVALLEY	MURDOCK 43
3369BSM32	GENERAL REFRACTORIES	ADDISON	MARKLETON 1
40(A)76SM11	SUN COAL	ELKLICK	MARKLETON 16
40(A)76SM2	SHADE MINING	BLACK	MURDOCK 39
40(A)76SM5	GLESSNER MINES	ADDISON	CONFLUENCE 16
40(A)76SM7	STAR COAL	BROTHERSVALLEY	BERLIN 43
40(A)77SM1	CHARLES BRANT	BLACK	MURDOCK 40
40(A)77SM10	SUN COAL	ELKLICK	MEYERSDALE 40
40(A)77SM13	BITUMINOUS COAL	ADDISON	CONFLUENCE 20
40(A)77SM15	SUMMIT COAL	ELKLICK	GRANTSVILLE 10
40(A)77SM16	SUMMIT MINING	ELKLICK	MEYERSDALE 39
40(A)77SM7	PENN POCAHONTAS	SOMERSET / BROTHERSVALLEY	BERLIN 44
40(A)77SM9	SVONAVEC	BLACK	ROCKWOOD 27
40(A)78BC7	RIVER HILL	ELKLICK	MEYERSDALE 41
4070BSM3	WALTER F. SHAFER	ADDISON	CONFLUENCE 13
4071BSM7	STAR COAL	BROTHERSVALLEY	BERLIN 42
4072BSM2	M.F. FETTEROLF	ELKLICK	AVILTON 1
4072SM11	M.F. FETTEROLF	SUMMIT	MEYERSDALE 17
4072SM18	SVONAVEC	MILFORD	ROCKWOOD 5
4072SM19	JAMES GLESSNER	BLACK	MARKLETON 13
4072SM22	M.F. FETTEROLF	SOMERSET	MURDOCK 28
4073SM1	M.F. FETTEROLF	ELKLICK / SUMMIT	MEYERSDALE 6
4073SM5	SOBERDASH COAL	BLACK	ROCKWOOD 25
4073SM6	OTTO BRICK & TILE	ELKLICK	GRANTSVILLE 9
4074SM1	RIVER HILL COAL	ELKLICK	AVILTON 4
4074SM11	C. EDWARD BEENER	MILFORD	ROCKWOOD 28
4074SM12	NEW ENTERPRISE STONE & LIME	JEFFERSON	BAKERSVILLE 1
4074SM13	M.F. FETTEROLF	MILFORD	ROCKWOOD 7
4074SM14	FINZEL & YOMMER	ADDISON	CONFLUENCE 1
4074SM15	RIVER HILL COAL	ELKLICK	GRANTSVILLE 2
4074SM18	BETTER MINING	BLACK	MARKLETON 3
4074SM2	FETTEROLF COAL	ELKLICK	MEYERSDALE 38
4074SM23	SCURFIELD	BROTHERSVALLEY	BERLIN 4
4074SM27	METCO MINING	MILFORD	MURDOCK 26
4074SM28	BURNHAM COAL	SUMMIT	MEYERSDALE 18
4074SM4	BBL ENTERPRISES	SOMERSET / MILFORD	MURDOCK 41
4074SM6	SVONAVEC	MILFORD	ROCKWOOD 6
4074SM8(A-1)	KEYSTONE LIME CO.	ADDISON	GRANTSVILLE 1
4075SM11	SUN COAL CO.	ELKLICK	MARKLETON 5
4075SM12	PENN POCAHONTAS	SUMMIT	MURDOCK 36
4075SM13 (SOAP #560)	STAR COAL	BLACK	MURDOCK 38
4075SM17	BETTER MINING	BLACK	ROCKWOOD 26

Permit #	Permittee	Township	Quad / #
4075SM20	YELLOW RUN COAL	MILFORD	ROCKWOOD 2[illegible]
4075SM3	C & O COAL	BROTHERSVALLEY	MURDOCK 10
4075SM7	MARSOLINO	JEFFERSON	BAKERSVILLE 2
4076SM2	KING COAL	ADDISON	CONFLUENCE 2
4076SM3	KING COAL	ADDISON	CONFLUENCE 1
4076SM4	KING COAL	ADDISON	CONFLUENCE 1[illegible]
4076SM5	KING COAL	ADDISON	CONFLUENCE 3
4076SM6	SCURFIELD	SOMERSET / BROTHERSVALLEY	BERLIN 21
4076SM7	BETTER MINING	UPPER TURKEYFOOT	MARKLETON 1[illegible]
4076SM8	BBL ENTERPRISES	SOMERSET	MURDOCK 45
4077SM11	WILLS CONSTRUCTION	LOWER TURKEYFOOT	CONFLUENCE 1[illegible]
4077SM8	WILLS CONSTRUCTION	UPPER TURKEYFOOT	CONFLUENCE 1
4078BC5	GLESSNER MINES	MILFORD	ROCKWOOD 31
4078BC7	CRONER, INC.	SOMERSET	MURDOCK 47
4078SM4	ONYX MINING	MILFORD	ROCKWOOD 3[illegible]
40A76SM1	RODAMER CONCRETE	ELKLICK	GRANTSVILLE 3
40A76SM6	PENN POCAHONTAS	BROTHERSVALLEY / BLACK	MURDOCK 11
40A76SM8	TOM MORAN	ELKLICK / GREENVILLE	AVILTON 2
40A76SM9	KEYSTONE LIME	ELKLICK	MARKLETON 7
40A77SM11	BITUMINOUS COAL	ADDISON	CONFLUENCE 4
40A77SM12	PBS COAL	BROTHERSVALLEY / BLACK	MURDOCK 12
40A77SM14	CRONER INC.	BROTHERSVALLEY	BERLIN 5
40A77SM2	SUMMIT COAL	ELKLICK	MEYERSDALE 9
40A77SM5	ROBERT F. HAY	SUMMIT	MEYERSDALE [illegible]
40A78SM2	M & M MINING	ELKLICK	MEYERSDALE [illegible]
40A78SM5	SUN COAL	SUMMIT	MEYERSDALE 20
NO #, JUST OBA	ACTION MINING	SUMMIT	MEYERSDALE 4[illegible]
PA #8856010	COMMONWEALTH COALS, INC.	BROTHERSVALLEY	MURDOCK 1
PA #8956008	SOBERDASH	BLACK / SUMMIT	MURDOCK 49
PA 5691003	PA-1 BECKER	ELKLICK	AVILTON 7
PA 8856004	DELTA MINING	ELKLICK	AVILTON 6
PA5691005	FUTURE INDUSTRIES	BLACK	MARKLETON 1[illegible]
PA8956001	LINDA CAROL COAL	MILFORD	ROCKWOOD 41
PA9156005	FUTURE INDUSTRIES	BLACK	ROCKWOOD 3
SOAP #081	TRIPLE G COAL CO.	SUMMIT	MEYERSDALE [illegible]
SOAP #249	Mt. SAVAGE REFRACTORIES REC.	ADDISON	MARKLETON 19
SOAP #256	SUN COAL CO.	LOWER TURKEYFOOT	CONFLUENCE [illegible]
SOAP #321	ROGER OHLER	BROTHERSVALLEY	MURDOCK 57
SOAP #541	PAUL F. BECKER	SOMERSET	BERLIN 46
SOAP #560	PAUL F. BECKER	BLACK	MURDOCK 52

EPA Permitted Sites in the Casselman River Watershed

RTK NET MASTER AREA REPORT

search used- Zip Code: ALL
City: SPRINGS
State: PA
Year: ALL

Mailing as well as facility addresses were searched.
Database(s) FINDS were not searched.

This search was taken from RTK NET's (the Right-To-Know Network)'s copies of various EPA databases. RTK NET is run by OMB Watch and Unison Institute at 1742 Connecticut Ave., NW, Washington DC, 20009 - Phone: 202-234-8494
The search was done on 03/14/2000.

If you don't see the words *END OF REPORT* at the end of this search, then this Web search didn't complete -- back up and try it again.

PCS DATA

PCS (Permit Compliance System) is EPA's database of water pollution permits. The first line of each record below shows the PCS legal facility name, system-generated city & state, and NPDES ID.

KEYSTONE LIME CO INC SPRINGS PA PA0044512
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
RIVER HILL COAL CO INC/W. OF S SPRINGS PA PA0045306
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
RODAMER CONCRETE PRODUCTS SPRINGS PA PA0044504
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
RODAMER CONCRETE PRODUCTS SPRINGS PA PA0118311
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0

RCRIS DATA

RCRIS (RCRA Information System) data shows hazardous waste permits for generators, receivers, and transporters of hazardous waste. The first line of each record below shows the handler (facility) name, city, and state.

KEYSTONE LIME COMPANY INC SPRINGS PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

Total numbers of records found from each database-
# of TRI facilities found : 0
# of RCRIS handlers found : 1
# of NPRI submissions found: 0
# of BRS facilities found : 0
# of PCS permits found : 4
# of ERNS reports found : 0
# of ARIP reports found : 0
# of DOCKET cases found : 0
# of CERCLA sites found : 0
# of RODS sites found : 0
# of CUS submissions found : 0
# of NPL sites found : 0
# of SETS PRPs found : 0

END OF REPORT

RTK NET MASTER AREA REPORT

search used- Zip Code: ALL
City: SALISBURY
State: PA
Year: ALL

Mailing as well as facility addresses were searched.
Database(s) FINDS were not searched.

This search was taken from RTK NET's (the Right-To-Know Network)'s copies of various EPA databases. RTK NET is run by OMB Watch and Unison Institute at 1742 Connecticut Ave., NW, Washington DC, 20009 - Phone: 202-234-8494
The search was done on 03/14/2000.

If you don't see the words *END OF REPORT* at the end of this search, then this Web search didn't complete -- back up and try it again.

PCS DATA

PCS (Permit Compliance System) is EPA's database of water pollution permits. The first line of each record below shows the PCS legal facility name, system-generated city & state, and NPDES ID.

```
DELTA MINING, INC.                  SALISBURY              PA   PA0120600
  Mail City & State: GRANTSVILLE                   MD
  Major facility: N    Facility Type: INDUSTRIAL
  Number of quarter years in non-compliance (out of 13 possible): 0
RIVER HILL COAL CO INC W. SALI      SALISBURY              PA   PA0045349
  Major facility: N    Facility Type: INDUSTRIAL
  Number of quarter years in non-compliance (out of 13 possible): 0
SALISBURY BORO                      SOMERSET COUNTY        PA   PA0021628
  Major facility: N    Facility Type: MUNICIPAL
  Number of quarter years in non-compliance (out of 13 possible): 0
SUN COAL CO                         SALISBURY              PA   PA0124915
  Major facility: N    Facility Type: INDUSTRIAL
  Number of quarter years in non-compliance (out of 13 possible): 0
SUN COAL CO                         SALISBURY              PA   PA0607029
  Major facility: N    Facility Type: INDUSTRIAL
  Number of quarter years in non-compliance (out of 13 possible): 0
SUN COAL COMPANY                    SALISBURY              PA   PA0117901
  Major facility: N    Facility Type: INDUSTRIAL
  Number of quarter years in non-compliance (out of 13 possible): 0
SUN COAL COMPANY                    SALISBURY              PA   PA0125032
  Major facility: N    Facility Type: INDUSTRIAL
  Number of quarter years in non-compliance (out of 13 possible): 0
SUN COAL COMPANY                    SALISBURY              PA   PA0125202
  Major facility: N    Facility Type: INDUSTRIAL
  Number of quarter years in non-compliance (out of 13 possible): 0
```

ERNS DATA

ERNS (Emergency Response Notification System) data are records of phone calls reporting toxic releases and spills to the National Response Center. Data is currently available for 1987-1997.
The first line of each record below shows the name of the discharging organization (if any could be identified) plus the city, state and reporting year of the spill.

```
MUSCHLITZ EXCAVATING                SALISBURY                        PA  1994
  Discharger located in: NAZARETH                        PA
  1st chemical: NATURAL GAS                 Lbs released: 0
No discharger listed                SALSBURY                         PA  1997
```

```
Discharger located in: SALISBURY                          PA
1st chemical: OILS,MISC:MOTOR                 Lbs released: 45



Total numbers of records found from each database-
  # of TRI facilities found  : 0
  # of RCRIS handlers found  : 0
  # of NPRI submissions found: 0
  # of BRS facilities found  : 0
  # of PCS permits found     : 8
  # of ERNS reports found    : 2
  # of ARIP reports found    : 0
  # of DOCKET cases found    : 0
  # of CERCLA sites found    : 0
  # of RODS sites found      : 0
  # of CUS submissions found : 0
  # of NPL sites found       : 0
  # of SETS PRPs found       : 0


*END OF REPORT*
```

RTK NET MASTER AREA REPORT

search used- Zip Code: ALL
City: BOYNTON
State: PA
Year: ALL

Mailing as well as facility addresses were searched.
Database(s) FINDS were not searched.

This search was taken from RTK NET's (the Right-To-Know Network)'s copies of various EPA databases. RTK NET is run by OMB Watch and Unison Institute at 1742 Connecticut Ave., NW, Washington DC, 20009 - Phone: 202-234-8494
The search was done on 03/14/2000.

If you don't see the words *END OF REPORT* at the end of this search, then this Web search didn't complete -- back up and try it again.

PCS DATA

PCS (Permit Compliance System) is EPA's database of water pollution permits. The first line of each record below shows the PCS legal facility name, system-generated city & state, and NPDES ID.

EDWARD MILLER EXCAVATING BOYNTON PA PA0079341
Mail City & State: GRANTSVILLE MD
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0

RCRIS DATA

RCRIS (RCRA Information System) data shows hazardous waste permits for generators, receivers, and transporters of hazardous waste. The first line of each record below shows the handler (facility) name, city, and state.

PITTSBURGH NIPPLE WORKS BOYNTON PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

Total numbers of records found from each database-

# of TRI facilities found	: 0
# of RCRIS handlers found	: 1
# of NPRI submissions found	: 0
# of BRS facilities found	: 0
# of PCS permits found	: 1
# of ERNS reports found	: 0
# of ARIP reports found	: 0
# of DOCKET cases found	: 0
# of CERCLA sites found	: 0
# of RODS sites found	: 0
# of CUS submissions found	: 0
# of NPL sites found	: 0
# of SETS PRPs found	: 0

END OF REPORT

RTK NET MASTER AREA REPORT

search used- Zip Code: ALL
City: MEYERSDALE
State: PA
Year: ALL

Mailing as well as facility addresses were searched.
Database(s) FINDS were not searched.

This search was taken from RTK NET's (the Right-To-Know Network)'s copies of various EPA databases. RTK NET is run by OMB Watch and Unison Institute at 1742 Connecticut Ave., NW, Washington DC, 20009 - Phone: 202-234-8494
The search was done on 03/14/2000.

If you don't see the words *END OF REPORT* at the end of this search, then this Web search didn't complete -- back up and try it again.

PCS DATA

PCS (Permit Compliance System) is EPA's database of water pollution permits. The first line of each record below shows the PCS legal facility name, system-generated city & state, and NPDES ID.

ACTION MINING CO SUMMIT TWP PA PA0606014
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
ACTION MINING INC ELK LICK TWP PA PA0608611
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
ACTION MINING INC. GRANTSVILLE MD MD0052701
Mail City & State: MEYERSDALE PA
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
ACTION MINING, INC. GRANTSVILLE MD MD0064157
Mail City & State: MEYERSDALE PA
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
BEENER, KERRY MEYERSDALE BORO PA PA0216101
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
BILL'S LUMBER/STAIRS, WILLIAM LARIMER PA PAR226107
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
CAMP ALBRYOCA MEYERSDALE BORO PA PA0035483
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
GILBERT DEVELOPMENT CO INC ELK LICK TWP PA PA0098043
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
MEYERSDALE BORO SUMMIT TWP PA PA0024481
Major facility: N Facility Type: MUNICIPAL
Number of quarter years in non-compliance (out of 13 possible): 0
MEYERSDALE-SUMMIT PARK RECREAT MEYERSDALE BORO PA PA0041238
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
PA DISTRICT BRETHREN CHURCH MEYERSDALE BORO PA PA0094099
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SCHROCK, DARLENE MEYERSDALE BORO PA PAG046119
Major facility: N Facility Type: OTHER
Number of quarter years in non-compliance (out of 13 possible): 0
T L MORAN INC BITTINGER MD MD0055301
Mail City & State: MEYERSDALE PA
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
TRIPLE G. COAL COMPANY, INC. MEYERSDALE BORO PA PA0124991

Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0

CERCLIS DATA

The CERCLA List of sites is a list of potential and actual sites that might have to be cleaned up under Superfund. All currently known sites are in this database, including NPL sites. The first line of each record below shows the site name, city, state, and EPA ID.

DELTA COAL SALES INC MEYERSDALE PA PAD085523850
NPL Status: NOT ON NPL
Discovery Date: 08/01/1980
This is a "No Further Remedial Action Planned" site

ERNS DATA

ERNS (Emergency Response Notification System) data are records of phone calls reporting toxic releases and spills to the National Response Center. Data is currently available for 1987-1997. The first line of each record below shows the name of the discharging organization (if any could be identified) plus the city, state and reporting year of the spill.

EARNEST MILLER MEYERSDALE PA 1994
Discharger located in: UNKNOWN
1st chemical: NATURAL GAS Lbs released: 0

RCRIS DATA

RCRIS (RCRA Information System) data shows hazardous waste permits for generators, receivers, and transporters of hazardous waste. The first line of each record below shows the handler (facility) name, city, and state.

CSX TRANSP MEYERSDALE PA
Mail City & State: JACKSONVILLE FL
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

DELTA COAL SALES INC MEYERSDALE PA
Generator Status : None
Treatment, Storage & Disposal Status: None
Number of permits : 2 Number of recorded violations to date: 2

INTERNATIONAL TRAILERS INC MEYERSDALE PA
Generator Status : Conditionally Exempt SQG
Treatment, Storage & Disposal Status: None

LEPLEY TRUCKING COMPANY MEYESDALE PA
Mail City & State: MEYERSDALE PA
Generator Status : None
Treatment, Storage & Disposal Status: None
This handler is a hazardous waste transporter.

MEYERSDALE BOROUGH OF	MEYERSDALE	PA

Generator Status : None
Treatment, Storage & Disposal Status: None

MOLDED COMPOSITES INC	MEYERSDALE	PA

Mail City & State: GREENSBURG PA
Generator Status : None
Treatment, Storage & Disposal Status: None

SUNOCO SERVICE STATION-MEYERSDALE	MEYERSDALE	PA

Generator Status : None
Treatment, Storage & Disposal Status: None

SUNOCO SERVICE STATION-MEYERSDALE	MEYERSDALE	PA

Generator Status : None
Treatment, Storage & Disposal Status: None

Total numbers of records found from each database-
# of TRI facilities found : 0
# of RCRIS handlers found : 8
# of NPRI submissions found: 0
# of BRS facilities found : 0
# of PCS permits found : 14
# of ERNS reports found : 1
# of ARIP reports found : 0
# of DOCKET cases found : 0
# of CERCLA sites found : 1
# of RODS sites found : 0
# of CUS submissions found : 0
# of NPL sites found : 0
# of SETS PRPs found : 0

END OF REPORT

```
                     RTK NET MASTER AREA REPORT
          search used- Zip Code:        ALL
                       City:            BERLIN
                       State:           PA
                       Year:            ALL

   Mailing as well as facility addresses were searched.
   Database(s) FINDS were not searched.

   This search was taken from RTK NET's (the Right-To-Know Network)'s copies
   of various EPA databases. RTK NET is run by OMB Watch and Unison Institute
   at 1742 Connecticut Ave., NW, Washington DC, 20009 - Phone: 202-234-8494
   The search was done on 03/14/2000.

   If you don't see the words *END OF REPORT* at the end of this search,
   then this Web search didn't complete -- back up and try it again.


                                 TRI DATA
   TRI (Toxic Release Inventory) data shows releases and transfers
   of toxic chemicals from manufacturers only.  Data exists for the
   years 1987 - 1996.  The first line of each record below shows the
   TRI facility name, city, state, and reporting year.

 SNYDER OF BERLIN               BERLIN                     PA   1987
   TRI ID: 15530SNYDRPOBOX
   Lbs Released: 0   Lbs Transferred: 20,760
 SNYDER OF BERLIN               BERLIN                     PA   1988
   TRI ID: 15530SNYDRPOBOX
   Lbs Released: 0   Lbs Transferred: 20,760



                                 PCS DATA
   PCS (Permit Compliance System) is EPA's database of water pollution
   permits.  The first line of each record below shows the PCS legal
   facility name, system-generated city & state, and NPDES ID.

 ALLEGHENY MOUNTAIN COAL, INC.  BERLIN BORO           PA   PA0125083
   Major facility: N   Facility Type: INDUSTRIAL
   Number of quarter years in non-compliance (out of 13 possible): 0
 BERLIN BORO                    BERLIN BORO           PA   PA0021822
   Major facility: N   Facility Type: MUNICIPAL
   Number of quarter years in non-compliance (out of 13 possible): 13
 C & O COAL COMPANY             BERLIN BORO           PA   PA0124559
   Major facility: N   Facility Type: INDUSTRIAL
   Number of quarter years in non-compliance (out of 13 possible): 0
 CRONER INC                     BERLIN BORO           PA   PA0124656
   Major facility: N   Facility Type: INDUSTRIAL
   Number of quarter years in non-compliance (out of 13 possible): 0
 CRONER, INC.                   SOMERSET TWP AUTH     PA   PA0109754
   Major facility: N   Facility Type: INDUSTRIAL
   Number of quarter years in non-compliance (out of 13 possible): 0
 CRONER, INC.                   SOMERSET COUNTY       PA   PA0120910
   Major facility: N   Facility Type: INDUSTRIAL
   Number of quarter years in non-compliance (out of 13 possible): 0
 D & E CONSTRUCTION COMPANY     BERLIN BORO           PA   PA0608394
   Major facility: N   Facility Type: INDUSTRIAL
   Number of quarter years in non-compliance (out of 13 possible): 0
 D AND E CONSTRUCTION CO        BERLIN BORO           PA   PA0608513
   Major facility: N   Facility Type: INDUSTRIAL
   Number of quarter years in non-compliance (out of 13 possible): 0
 F AND B COAL COMPANY           GARRETT BORO          PA   PA0608602
   Major facility: N   Facility Type: INDUSTRIAL
   Number of quarter years in non-compliance (out of 13 possible): 0
```

FOGLE MINING, INC. BERLIN BORO PA PA0125075
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
HILLTOP MINING CO BERLIN BORO PA PA0605816
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
KREPELKA, JOSEPH BERLIN BORO PA PA0094021
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
LUNG, GEORGE & ROBERTA STONYCREEK TWP PA PA0217051
Major facility: N Facility Type: OTHER
Number of quarter years in non-compliance (out of 13 possible): 0
PENN POCAHONTAS COAL COMPANY BERLIN BORO PA PA0608092
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SCURFIELD COAL CO SOMERSET COUNTY PA PA0608521
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SCURFIELD COAL, INC. BERLIN BORO PA PA0110507
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SCURFIELD COAL, INC. BERLIN BORO PA PA0598861
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SUMMIT MINES, INC. FRIEDENS PA PA0120626
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0

ERNS DATA

ERNS (Emergency Response Notification System) data are records of phone calls reporting toxic releases and spills to the National Response Center. Data is currently available for 1987-1997. The first line of each record below shows the name of the discharging organization (if any could be identified) plus the city, state and reporting year of the spill.

VANYO SUPPLY BERLIN PA 1990
1st chemical: OILS,MISC:TRANSFORMER Lbs released: 0
VANYO SUPPLY INC. BERLIN PA 1990
1st chemical: BENZENE Lbs released: 0
VANYO SUPPLIES INC. BERLIN PA 1991
1st chemical: OIL: DIESEL Lbs released: 0

RCRIS DATA

RCRIS (RCRA Information System) data shows hazardous waste permits for generators, receivers, and transporters of hazardous waste. The first line of each record below shows the handler (facility) name, city, and state.

JERRYS QUALITY PLATING BERLIN PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
Number of permits : 0 Number of recorded violations to date: 1
LAFFERTY CHEVROLET INC BERLIN PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
SNYDER OF BERLIN BERLIN PA
Generator Status : Small Quantity Generator (SQG)

Treatment, Storage & Disposal Status: None

TETCO MLV MP 1210.87 LN#2 BERLIN PA

Mail City & State: HOUSTON TX

Generator Status : Small Quantity Generator (SQG)

Treatment, Storage & Disposal Status: None

VANYO INC BERLIN PA

Generator Status : Small Quantity Generator (SQG)

Treatment, Storage & Disposal Status: None

Total numbers of records found from each database-

- # of TRI facilities found : 2
- # of RCRIS handlers found : 5
- # of NPRI submissions found: 0
- # of BRS facilities found : 0
- # of PCS permits found : 18
- # of ERNS reports found : 3
- # of ARIP reports found : 0
- # of DOCKET cases found : 0
- # of CERCLA sites found : 0
- # of RODS sites found : 0
- # of CUS submissions found : 0
- # of NPL sites found : 0
- # of SETS PRPs found : 0

END OF REPORT

```
                    RTK NET MASTER AREA REPORT
          search used- Zip Code:        ALL
                       City:            GARRETT
                       State:           PA
                       Year:            ALL
```

Mailing as well as facility addresses were searched.
Database(s) FINDS were not searched.

This search was taken from RTK NET's (the Right-To-Know Network)'s copies of various EPA databases. RTK NET is run by OMB Watch and Unison Institute at 1742 Connecticut Ave., NW, Washington DC, 20009 - Phone: 202-234-8494
The search was done on 03/14/2000.

If you don't see the words *END OF REPORT* at the end of this search, then this Web search didn't complete -- back up and try it again.

PCS DATA

PCS (Permit Compliance System) is EPA's database of water pollution permits. The first line of each record below shows the PCS legal facility name, system-generated city & state, and NPDES ID.

```
BURNHAM COAL CO-GARRETT OPERAT  SUMMIT TWP          PA   PA0042200
  Major facility: N   Facility Type: INDUSTRIAL
  Number of quarter years in non-compliance (out of 13 possible): 0
GARRETT BORO COUNCIL            GARRETT BORO        PA   PA0098132
  Major facility: N   Facility Type: MUNICIPAL
  Number of quarter years in non-compliance (out of 13 possible): 0
GARRETT BORO MUN AUTH STP       GARRETT BORO        PA   PA0039489
  Major facility: N   Facility Type: MUNICIPAL
  Number of quarter years in non-compliance (out of 13 possible): 0
PEMBROKE COAL CO                SOMERSET COUNTY     PA   PA0007323
  Major facility: N   Facility Type: INDUSTRIAL
  Number of quarter years in non-compliance (out of 13 possible): 0
PENN POCAHONTAS COAL CO         GARRETT BORO        PA   PA0617105
  Major facility: N   Facility Type: INDUSTRIAL
  Number of quarter years in non-compliance (out of 13 possible): 0
PENN POCAHONTAS COAL COMPANY    GARRETT M A         PA   PA0110027
  Major facility: N   Facility Type: INDUSTRIAL
  Number of quarter years in non-compliance (out of 13 possible): 0
PENN POCHONTAS COAL CO BLUE LI  MEYERSDALE BORO     PA   PA0124796
  Major facility: N   Facility Type: INDUSTRIAL
  Number of quarter years in non-compliance (out of 13 possible): 0

Total numbers of records found from each database-
  # of TRI facilities found  : 0
  # of RCRIS handlers found  : 0
  # of NPRI submissions found: 0
  # of BRS facilities found  : 0
  # of PCS permits found     : 7
  # of ERNS reports found    : 0
  # of ARIP reports found    : 0
  # of DOCKET cases found    : 0
  # of CERCLA sites found    : 0
  # of RODS sites found      : 0
  # of CUS submissions found : 0
  # of NPL sites found       : 0
  # of SETS PRPs found       : 0
```

END OF REPORT

RTK NET MASTER AREA REPORT

search used- Zip Code: ALL
City: ROCKWOOD
State: PA
Year: ALL

Mailing as well as facility addresses were searched.
Database(s) FINDS were not searched.

This search was taken from RTK NET's (the Right-To-Know Network)'s copies of various EPA databases. RTK NET is run by OMB Watch and Unison Institute at 1742 Connecticut Ave., NW, Washington DC, 20009 - Phone: 202-234-8494
The search was done on 03/14/2000.

If you don't see the words *END OF REPORT* at the end of this search, then this Web search didn't complete -- back up and try it again.

TRI DATA

TRI (Toxic Release Inventory) data shows releases and transfers of toxic chemicals from manufacturers only. Data exists for the years 1987 - 1996. The first line of each record below shows the TRI facility name, city, state, and reporting year.

ROCKWOOD MFG CO. ROCKWOOD PA 1996
TRI ID: 15557RCKWD300MA Waste Generated (lbs): 68,110
Lbs Released: 250 Lbs Transferred: 34,360

PCS DATA

PCS (Permit Compliance System) is EPA's database of water pollution permits. The first line of each record below shows the PCS legal facility name, system-generated city & state, and NPDES ID.

AMERICAN MINING COMPANY-WEIMER SOMERSET COUNTY PA PA0120880
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0

C. EDWARD BEENER COAL COMPANY ROCKWOOD BORO PA PA0109461
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0

J. LLOYD MCCLINTOCK - MCCLINTO ROCKWOOD BORO PA PA0089893
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0

LAUREL RIDGE STATE PARK ROCKWOOD PA PA0032981
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0

MILLER, JAMES R. NEW CENTERVILLE PA PA0215961
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0

ROCKWOOD BORO ROCKWOOD PA PA0024490
Major facility: N Facility Type: MUNICIPAL
Number of quarter years in non-compliance (out of 13 possible): 0

ROCKWOOD REAL ESTATE MIDDLECREEK TWP PA PA0205087
Major facility: N Facility Type: OTHER
Number of quarter years in non-compliance (out of 13 possible): 0

SANNER BROTHERS COAL CO GRANTSVILLE MD MD0050601
Mail City & State: ROCKWOOD PA
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0

SANNER BROTHERS COAL COMPANY FAIRHOPE PA PA0120146
Major facility: N Facility Type: INDUSTRIAL

```
  Number of quarter years in non-compliance (out of 13 possible): 0
SANNER BROTHERS COAL COMPANY      SOMERSET COUNTY        PA    PA0120171
  Major facility: N   Facility Type: INDUSTRIAL
  Number of quarter years in non-compliance (out of 13 possible): 0
SANNER ENERGIES INC               SOMERSET COUNTY        PA    PA0606324
  Major facility: N   Facility Type: INDUSTRIAL
  Number of quarter years in non-compliance (out of 13 possible): 0
TRICE, ROBERT & BETTY             ROCKWOOD BORO          PA    PA0094307
  Major facility: N   Facility Type: INDUSTRIAL
  Number of quarter years in non-compliance (out of 13 possible): 0
```

BRS DATA

BRS (RCRA Biennial Reporting System) data shows generation and shipment of RCRA and other waste. The 1989 through 1995 data years are available through this program. The first line of each record below shows the BRS facility name, city, state, and reporting year.

```
ROCKWOOD MANUF. CO.INC.                  ROCKWOOD                   PA   1989
  Tons generated: 6   Tons shipped: 4
  Tons managed  : 2   Tons received: 0   EPA ID: PAD004337804
```

ERNS DATA

ERNS (Emergency Response Notification System) data are records of phone calls reporting toxic releases and spills to the National Response Center. Data is currently available for 1987-1997. The first line of each record below shows the name of the discharging organization (if any could be identified) plus the city, state and reporting year of the spill.

```
CASTLEMAN ENTERPRISES                                                 PA  1987
  Discharger located in: ROCKWOOD                         PA
  1st chemical: BRINE SILT                          Lbs released:
ROCKWOOD AREA SCHOOL                                                  PA  1987
  Discharger located in: ROCKWOOD                         PA
  1st chemical: UNKNOWN MATERIAL                    Lbs released:
CSX TRANSPORTATION                ROCKWOOD                            PA  1990
  Discharger located in: JACKSONVILLE                     FL
  1st chemical: OIL, MISC: MOTOR                    Lbs released: 75,000
CSX TRANSPORTATION                ROCKWOOD                            PA  1990
  Discharger located in: JACKSONVILLE                     FL
  1st chemical: MOTOR OIL                           Lbs released: 75,000
THREE TEES INC.                   CUMBERLAND                          MD  1997
  Discharger located in: ROCKWOOD                         PA
  1st chemical: GASOLINE: AUTOMOTIVE (UNLEADED)     Lbs released: 325
CSX TRANSPORTATION                ROCKWOOD                            PA  1997
  Discharger located in: JACKSONVILLE                     FL
  1st chemical: MIXTURE OF WATER AND MOTOR OIL      Lbs released: 150
```

RCRIS DATA

RCRIS (RCRA Information System) data shows hazardous waste permits for generators, receivers, and transporters of hazardous waste. The first line of each record below shows the handler (facility) name, city, and state.

CSX TRANSP (ROCKWOOD) ROCKWOOD PA
Mail City & State: JACKSONVILLE FL
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

NEW LEXINGTON FIRE EQUIP ROCKWOOD PA
Generator Status : Conditionally Exempt SQG
Treatment, Storage & Disposal Status: None

ROCKWOOD MANUFACTURING CO INC ROCKWOOD PA
Generator Status : Large Quantity Generator (LQG)
Treatment, Storage & Disposal Status: None

TETCO M & R 1874 MP1202.85 LN 2 ROCKWOOD PA
Mail City & State: HOUSTON TX
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

TETCO M & R 1890 MP1201.80LN 2 ROCKWOOD PA
Mail City & State: HOUSTON TX
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

TETCO M&R 051 MP1200.34 LN 2 ROCKWOOD PA
Mail City & State: HOUSTON TX
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

TETCO M&R 1925 MP 1198.88 LN 2 ROCKWOOD PA
Mail City & State: HOUSTON TX
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

TEXAS EASTERN GAS ROCKWOOD ROCKWOOD PA
Mail City & State: HOUSTON TX
Generator Status : Large Quantity Generator (LQG)
Treatment, Storage & Disposal Status: None

Total numbers of records found from each database-
# of TRI facilities found : 1
# of RCRIS handlers found : 8
# of NPRI submissions found: 0
# of BRS facilities found : 1
# of PCS permits found : 12
# of ERNS reports found : 6
# of ARIP reports found : 0
# of DOCKET cases found : 0
# of CERCLA sites found : 0
# of RODS sites found : 0
# of CUS submissions found : 0
# of NPL sites found : 0
# of SETS PRPs found : 0

END OF REPORT

RTK NET MASTER AREA REPORT

search used- Zip Code: ALL
City: SOMERSET
State: PA
Year: ALL

Mailing as well as facility addresses were searched.
Database(s) FINDS were not searched.

This search was taken from RTK NET's (the Right-To-Know Network)'s copies of various EPA databases. RTK NET is run by OMB Watch and Unison Institute at 1742 Connecticut Ave., NW, Washington DC, 20009 - Phone: 202-234-8494
The search was done on 03/14/2000.

If you don't see the words *END OF REPORT* at the end of this search, then this Web search didn't complete -- back up and try it again.

TRI DATA

TRI (Toxic Release Inventory) data shows releases and transfers of toxic chemicals from manufacturers only. Data exists for the years 1987 - 1996. The first line of each record below shows the TRI facility name, city, state, and reporting year.

BORDEN INC. SOMERSET PA 1987
TRI ID: 15501BRDNN1019N
Lbs Released: 499 Lbs Transferred: 247,200

CARBOSE CORP. SOMERSET PA 1987
TRI ID: 15501CRBSC100MA
Lbs Released: 0 Lbs Transferred: 0

DEVILBISS HEALTH CARE INC. SOMERSET PA 1987
TRI ID: 15501DVLBSPOBOX
Lbs Released: 22,319 Lbs Transferred: 571

GILMOUR MFG. CO. SOMERSET PA 1987
TRI ID: 15501GLMRMDRUMA
Lbs Released: 14,250 Lbs Transferred: 0

THE COLEMAN CO. INC. SOMERSET PA 1987
TRI ID: 15501THCLMRD2PO
Lbs Released: 73,750 Lbs Transferred: 0

CARBOSE CORP. SOMERSET PA 1988
TRI ID: 15501CRBSC100MA
Lbs Released: 0 Lbs Transferred: 0

COLEMAN CO. INC. SOMERSET PA 1988
TRI ID: 15501THCLMRD2PO
Lbs Released: 109,250 Lbs Transferred: 0

GILMOUR MFG. CO. SOMERSET PA 1988
TRI ID: 15501GLMRMDRUMA
Lbs Released: 10,750 Lbs Transferred: 0

SODIAAL N.A. SOMERSET PA 1988
TRI ID: 15501BRDNN1019N
Lbs Released: 250 Lbs Transferred: 247,200

CARBOSE CORP. SOMERSET PA 1989
TRI ID: 15501CRBSC100MA
Lbs Released: 0 Lbs Transferred: 0

DEVILBISS HEALTH CARE INC. SOMERSET PA 1989
TRI ID: 15501DVLBSPOBOX
Lbs Released: 8,300 Lbs Transferred: 0

FLEETWOOD FOLDING TRAILERS SOMERSET PA 1989
TRI ID: 15501THCLMRD2PO
Lbs Released: 99,400 Lbs Transferred: 0

GILMOUR MFG. CO. SOMERSET PA 1989
TRI ID: 15501GLMRMDRUMA
Lbs Released: 18,100 Lbs Transferred: 0

CARBOSE CORP. SOMERSET PA 1990
TRI ID: 15501CRBSC100MA
Lbs Released: 0 Lbs Transferred: 0

FLEETWOOD FOLDING TRAILERS SOMERSET PA 1990
TRI ID: 15501THCLMRD2PO
Lbs Released: 98,613 Lbs Transferred: 0
GILMOUR MFG. CO. SOMERSET PA 1990
TRI ID: 15501GLMRMDRUMA
Lbs Released: 11,800 Lbs Transferred: 250
FLEETWOOD FOLDING TRAILERS SOMERSET PA 1991
TRI ID: 15501THCLMRD2PO Waste Generated (lbs): 137,500
Lbs Released: 138,850 Lbs Transferred: 0
GILMOUR MFG. CO. SOMERSET PA 1991
TRI ID: 15501GLMRMDRUMA Waste Generated (lbs): 28,185
Lbs Released: 26,235 Lbs Transferred: 250
MULTI-SERVICE EQUIPMENT CORP. SOMERSET PA 1991
TRI ID: 15501MLTSRRTE60 Waste Generated (lbs): 1,287
Lbs Released: 1,287 Lbs Transferred: 0
PENN CARBOSE INC. SOMERSET PA 1991
TRI ID: 15501CRBSC100MA Waste Generated (lbs): 1,544
Lbs Released: 707 Lbs Transferred: 1,544
FLEETWOOD FOLDING TRAILERS SOMERSET PA 1992
TRI ID: 15501THCLMRD2PO Waste Generated (lbs): 167,600
Lbs Released: 165,150 Lbs Transferred: 0
GILMOUR MFG. CO. SOMERSET PA 1992
TRI ID: 15501GLMRMDRUMA Waste Generated (lbs): 2,200
Lbs Released: 250 Lbs Transferred: 250
MULTI-SERVICE EQUIPMENT CORP. SOMERSET PA 1992
TRI ID: 15501MLTSRRTE60 Waste Generated (lbs): 1,645
Lbs Released: 1,645 Lbs Transferred: 0
PENN CARBOSE INC. SOMERSET PA 1992
TRI ID: 15501CRBSC100MA Waste Generated (lbs): 500
Lbs Released: 255 Lbs Transferred: 250
SODIAAL N.A. SOMERSET PA 1992
TRI ID: 15501BRDNN1019N Waste Generated (lbs): 0
Lbs Released: 0 Lbs Transferred: 60,000
FLEETWOOD FOLDING TRAILERS SOMERSET PA 1993
TRI ID: 15501THCLMRD2PO Waste Generated (lbs): 240,000
Lbs Released: 240,000 Lbs Transferred: 0
PENN CARBOSE INC. SOMERSET PA 1993
TRI ID: 15501CRBSC100MA Waste Generated (lbs): 500
Lbs Released: 255 Lbs Transferred: 250
SODIAAL N.A. SOMERSET PA 1993
TRI ID: 15501BRDNN1019N Waste Generated (lbs): 0
Lbs Released: 0 Lbs Transferred: 80,000
FLEETWOOD FOLDING TRAILERS SOMERSET PA 1994
TRI ID: 15501THCLMRD2PO Waste Generated (lbs): 126,500
Lbs Released: 131,100 Lbs Transferred: 0
GILMOUR MFG. CO. SOMERSET PA 1994
TRI ID: 15501GLMRMDRUMA Waste Generated (lbs): 11,288
Lbs Released: 11,288 Lbs Transferred: 0
PENN CARBOSE INC. SOMERSET PA 1994
TRI ID: 15501CRBSC100MA Waste Generated (lbs): 500
Lbs Released: 255 Lbs Transferred: 250
FLEETWOOD FOLDING TRAILERS SOMERSET PA 1995
TRI ID: 15501THCLMRD2PO Waste Generated (lbs): 96,900
Lbs Released: 96,900 Lbs Transferred: 0
PENN CARBOSE INC. SOMERSET PA 1995
TRI ID: 15501CRBSC100MA Waste Generated (lbs): 500
Lbs Released: 255 Lbs Transferred: 250
FLEETWOOD FOLDING TRAILERS SOMERSET PA 1996
TRI ID: 15501THCLMRD2PO Waste Generated (lbs): 146,130
Lbs Released: 136,230 Lbs Transferred: 0
PENN CARBOSE INC. SOMERSET PA 1996
TRI ID: 15501CRBSC100MA Waste Generated (lbs): 500
Lbs Released: 255 Lbs Transferred: 250
FLEETWOOD FOLDING TRAILERS SOMERSET PA 1997
TRI ID: 15501THCLMRD2PO Waste Generated (lbs): 184,550
Lbs Released: 184,550 Lbs Transferred: 0

PENN CARBOSE INC. SOMERSET PA 1997
TRI ID: 15501CRBSC100MA Waste Generated (lbs): 0
Lbs Released: 0 Lbs Transferred: 0

PCS DATA

PCS (Permit Compliance System) is EPA's database of water pollution permits. The first line of each record below shows the PCS legal facility name, system-generated city & state, and NPDES ID.

APPALACHIAN FUELS, INC. STONYCREEK TWP PA PA0111341
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
BAKERSVILLE QUARRY OF SOMERSET SOMERSET COUNTY PA PA0035394
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
BEATRICE FOODS CO SOMERSET SOMERSET TWP PA PA0004146
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
BEECHDALE MINING, INC. SOMERSET BORO PA PA0599000
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
BISHOP, JOHN SOMERSET TWP PA PA0094846
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
BISHOP, JOHN C./STP #1 SOMERSET TWP PA PA0094838
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
BITUMINOUS COALS ADDISON #1 MI ADDISON PA PA0089214
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
BITUMINOUS COALS, INC. ADDISON PA PA0118184
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
BLUE LICK COAL CO INC SOMERSET TWP PA PA0124630
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
BRANT COAL CO., INC. SOMERSET COUNTY PA PA0615854
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
BRANT COAL COMPANY, INC. SOMERSET TWP AUTH PA PA0099902
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
BRANT COAL COMPANY, INC. SOMERSET COUNTY PA PA0125831
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
BRAWL MINING INC. GRANTSVILLE MD MD0055638
Mail City & State: SOMERSET PA
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
BYERS MOBILE HOME COURT SOMERSET TWP AUTH PA PA0110108
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
C & P COAL CO., INC. SOMERSET COUNTY PA PA0607096
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
COMMONWEALTH COALS,INC WESTERNPORT MD MD0059099
Mail City & State: SOMERSET PA
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
COMMONWEALTH STONE INC. JENNER TWP PA PA0607720
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
COXES CREEK WATER TREATMENT PL SOMERSET TWP PA PA0216763
Major facility: N Facility Type: INDUSTRIAL

Number of quarter years in non-compliance (out of 13 possible): 0
DEVILBISS CO-MEDICAL PRODUCTS SOMERSET TWP PA PA0034711
Major facility: Y Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 21 possible): 13
DIAMOND T COAL CO-STONYCREEK SOMERSET COUNTY PA PA0006696
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
DICE, ROBERT SOMERSET TWP PA PA0204781
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
ENERGY CENTER, INC. BLACK LICK PA PA0205630
Major facility: N Facility Type: OTHER
Number of quarter years in non-compliance (out of 13 possible): 0
FETTEROLF MINING BARRELLVILLE MD MD0056260
Mail City & State: SOMERSET PA
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
FETTEROLF MINING INC BARRELLVILLE MD MD0056006
Mail City & State: SOMERSET PA
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
FETTEROLF MINING SALES CO-ADAM FRIEDENS PA PA0111023
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
FETTEROLF MINING, INC. BARRELLVILLE MD MD0057444
Mail City & State: SOMERSET PA
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
FETTEROLF MINING, INC. CORRIGANVILLE MD MD0057479
Mail City & State: SOMERSET PA
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
FETTEROLF MINING, INC. CENTRAL CITY BORO PA PA0110621
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
FETTEROLF MINING, INC. CENTRAL CITY BORO PA PA0124494
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
FLEETWOOD FOLDING TRAILERS INC SOMERSET BORO PA PAR806106
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
GIBBS CORPORATION SOMERSET TWP PA PA0110299
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 13
GILMOUR MANUFACTURING CO SOMERSET BORO PA PAR236115
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
GREEN GARDEN INC. SOMERSET TWP AUTH PA PA0097381
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
HOFFMAN, BRIAN LINCOLN TWP PA PA0203912
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
HOFFMAN, DEAN F. LINCOLN TWP PA PA0203904
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
HORVATH, JOHN SOMERSET TWP PA PA0110949
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
ISERS RUN COAL COMPANY, INC. MARKLETON PA PA0069043
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
LAUREL HILL STATE PARK SOMERSET TWP PA PA0032247
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
LEER, RICK LINCOLN TWP PA PA0204005

Major facility: N   Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0

LOHR, A DUANE	SOMERSET TWP AUTH	PA	PA0217328
Major facility: N Facility Type: OTHER			
Number of quarter years in non-compliance (out of 13 possible): 0			
LUTHER P MILLER INC	CONFLUENCE BORO	PA	PA0216011
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
MAYFAIR CREAMERY-SOMERSET PLNT	SOMERSET TWP	PA	PA0204170
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
MET CO MINING AND MINERALS INC	SOMERSET TWP	PA	PA0608319
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
MET-CO.MINING & MINERAL,INC	SOMERSET COUNTY	PA	PA0040291
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
MET-CO.MINING & MINERALS,INC	SOMERSET COUNTY	PA	PA0039497
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
METCO MINING AND MINERAL INC	QUEMAHONING TWP	PA	PA0607916
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
MOSHOLDER, BARRY	SOMERSET TWP	PA	PA0217069
Major facility: N Facility Type: OTHER			
Number of quarter years in non-compliance (out of 13 possible): 0			
NEW ENTERPRISE STONE & LIME CO	SOMERSET TWP	PA	PA0121134
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
NEW ENTERPRISE STONE & LIME CO	SOMERSET COUNTY	PA	PA0125199
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
OSSELBURN, WILLIAM	LINCOLN TWP	PA	PA0215970
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
ROOF GARDEN COURT	SOMERSET TWP	PA	PA0095851
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
SCURFIELD COAL, INC.- CARVER M	SOMERSET COUNTY	PA	PA0125211
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
SOLAR FUEL COMPANY	STOYSTOWN BORO	PA	PA0079081
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
SOLAR FUEL COMPANY	STOYSTOWN BORO	PA	PA0110787
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
SOLAR FUEL COMPANY	SOMERSET COUNTY	PA	PA0120561
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
SOLAR FUEL COMPANY - MINE NO.	RALPHTON	PA	PA0110779
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
SOLAR FUEL COMPANY, NO. 12	SOMERSET COUNTY	PA	PA0111325
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
SOLAR FUEL COMPANY, NO. 7 MINE	HOOVERSVILLE	PA	PA0110914
Major facility: N Facility Type: INDUSTRIAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
SOMERSET BORO	SOMERSET TWP	PA	PA0021768
Major facility: Y Facility Type: MUNICIPAL			
Number of quarter years in non-compliance (out of 21 possible): 11			
SOMERSET BORO	SOMERSET TWP	PA	PAL021768
Major facility: N Facility Type: MUNICIPAL			
Number of quarter years in non-compliance (out of 13 possible): 0			
SOMERSET BORO MUN AUTH	JEFFERSON TWP	PA	PA0035254

Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SOMERSET FOUNDRY & MACHINE CO SOMERSET TWP PA PAR206132
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SOMERSET HEALTH SERVICES, INC. SOMERSET TWP AUTH PA PA0094676
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SOMERSET TWP MUN AUTH SOMERSET TWP PA PA0096636
Major facility: N Facility Type: MUNICIPAL
Number of quarter years in non-compliance (out of 13 possible): 0
SOMERSET TWP MUN AUTH SOMERSET TWP AUTH PA PA0111589
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SOMERSET TWP MUN AUTH SOMERSET TWP AUTH PA PA0205681
Major facility: N Facility Type: MUNICIPAL
Number of quarter years in non-compliance (out of 13 possible): 0
SOMERSET TWP MUN AUTH - WELLS SOMERSET TWP AUTH PA PA0041441
Major facility: N Facility Type: MUNICIPAL
Number of quarter years in non-compliance (out of 13 possible): 0
SPECHT PLASTICS INC SOMERSET SOMERSET BORO PA PA0005193
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SPRINGDALE MOBILE HOME PARK SOMERSET COUNTY PA PA0110868
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SUN COAL COMPANY SALISBURY PA PA0125202
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SUNNY ACRES ASSOCIATES L.P. SOMERSET TWP PA PA0033456
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SVONAVEC INC MILFORD #9 SUFACE SOMERSET TWP AUTH PA PA0124893
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SVONAVEC INC MILFORD NO 8 MINE SOMERSET BORO PA PA0124583
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SVONAVEC, INC. NEW CENTERVILLE PA PA0598879
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SVONAVEC, INC.- LANGLEY MINE SOMERSET COUNTY PA PA0119296
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
SVONAVEL FORT HILL MINE SOMERSET BORO PA PA0606618
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
WAHL, JON SOMERSET TWP PA PAG046112
Major facility: N Facility Type: OTHER
Number of quarter years in non-compliance (out of 13 possible): 0
WALKER EXCAVATING INC SOMERSET TWP PA PA0607312
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
WEIMER, CRAIG BOSWELL BORO PA PA0093904
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
WILL'S CONSTRUCTION SOMERSET BORO PA PA0119903
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0

BRS DATA

BRS (RCRA Biennial Reporting System) data shows generation and shipment of RCRA and other waste. The 1989 through 1995 data years are available through this program. The first line of each record below shows the BRS facility name, city, state, and reporting year.

AGWAY INC. SOMERSET PA 1991
Tons generated: 7 Tons shipped: 7
Tons managed : 0 Tons received: 0 EPA ID: PAD030128102

PA DEPT OF TRANS MAINT DIST 9-7 BUCKSTOWN PA 1991
Mail City & State: SOMERSET PA
Tons generated: 10 Tons shipped: 9
Tons managed : 0 Tons received: 0 EPA ID: PAD982673782

CERCLIS DATA

The CERCLA List of sites is a list of potential and actual sites that might have to be cleaned up under Superfund. All currently known sites are in this database, including NPL sites. The first line of each record below shows the site name, city, state, and EPA ID.

BRIGGS SOMERSET PA PAD980539118
NPL Status: NOT ON NPL
Discovery Date: 06/01/1981
This is a "No Further Remedial Action Planned" site

DEVILBLISS CO HEALTH CARE DIV SOMERSET PA PAD990752537
NPL Status: NOT ON NPL
Discovery Date: 10/31/1989
This is a "No Further Remedial Action Planned" site

GIBBS ELECTRONICS SOMERSET PA PAD004337556
NPL Status: NOT ON NPL
Discovery Date: 10/01/1980
This is a "No Further Remedial Action Planned" site

UPTEGRAFF TRANSFORMER CO SOMERSET PA PAD981037104
NPL Status: NOT ON NPL
Discovery Date: 03/29/1985
This is a "No Further Remedial Action Planned" site

ERNS DATA

ERNS (Emergency Response Notification System) data are records of phone calls reporting toxic releases and spills to the National Response Center. Data is currently available for 1987-1997. The first line of each record below shows the name of the discharging organization (if any could be identified) plus the city, state and reporting year of the spill.

DAMSON OIL CORP. SOMERSET PA 1987
Discharger located in: YATESVORO PA
1st chemical: GAS WELL BRINE Lbs released: 0

RYDER TRUCK RENTAL BEDFORD PA 1989
Discharger located in: SOMERSET PA
1st chemical: DIESEL FUEL Lbs released: 210

YELLOW FREIGHT SYSTEM SOMERSET PA 1990
Discharger located in: OVERLAND PARK KS
1st chemical: PROPYLENE OXIDE Lbs released: 732

LACEY EXPRESS SOMERSET PA 1993
Discharger located in: UNKNOWN
1st chemical: NITRIC ACID Lbs released: 25

NKNOWN SOMERSET PA 1993
Discharger located in: UNKNOWN
1st chemical: ETHYLENE GLYCOL Lbs released: 0

3 TREES INCORPORATEDD DUNCANSVILLE PA 1994
Discharger located in: SOMERSET PA
1st chemical: GASOLINE Lbs released: 122

BERKEBILE OIL COMPANY PORT ELIZABETH NJ 1997

Discharger located in: SOMERSET PA
1st chemical: DIESEL FUEL CONDITIONER & ADDITI Lbs released: 0

RYDER LOGISTICS SOMERSET PA 1997
Discharger located in: OWINGS MILLS MD
1st chemical: OILS,DIESEL Lbs released: 420

RCRIS DATA

RCRIS (RCRA Information System) data shows hazardous waste permits for generators, receivers, and transporters of hazardous waste. The first line of each record below shows the handler (facility) name, city, and state.

AGWAY ENERGY PRODUCTS SOMERSET PA
Mail City & State: SYRACUSE NY
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

ANDERSON EQUIPMENT CO SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

ATLANTIC SVC STA SOMERSET PA
Mail City & State: PHILADELPHIA PA
Generator Status : None
Treatment, Storage & Disposal Status: None

BECKWITH MACHINERY CO SOMERSET PA
Mail City & State: PITTSBURGH PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

BECKWITH MACHINERY CO - SOMERSET SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

BENDER SHOE CO SOMERSET PA
Generator Status : None
Treatment, Storage & Disposal Status: None

BERKEBILE OIL CO INC THE SOMERSET PA
Generator Status : Large Quantity Generator (LQG)
Treatment, Storage & Disposal Status: None

BETTY BRITE DRY CLEANERS SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

BURKHARTS ZIEBART CENTER-SOMERSET SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

CARBOSE CORP SOMERSET PA
Generator Status : Conditionally Exempt SQG
Treatment, Storage & Disposal Status: None

CASSELMAN ENTERPRISES INC SOMERSET PA
Generator Status : Large Quantity Generator (LQG)
Treatment, Storage & Disposal Status: None

COBER, FRANK E & SONS INC SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

COLUMBIA GAS OF PENNSYLVANIA SOMERSET PA
Mail City & State: COLUMBUS OH
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

DEVILBISS CO - HEALTH CARE DIV SOMERSET PA
Generator Status : Conditionally Exempt SQG
Treatment, Storage & Disposal Status: None
Number of permits : 4 Number of recorded violations to date: 0

EIGHTY FOUR MINING SOMERSET SOMERSET PA
Mail City & State: EIGHTY FOUR PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

EMERT GRINDING INC SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
Number of permits : 1 Number of recorded violations to date: 0

FLEETWOOD FOLDING TRAILERS INC SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
Number of permits : 1 Number of recorded violations to date: 0

FRIEDLINE, W W GARAGE SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

GEHMAN ENTERPRISES BOSWELL PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

GENERAL TELEPHONE CO OF PENNSYLVANIA SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

GIBBS CORP SOMERSET PA
Generator Status : None
Treatment, Storage & Disposal Status: None
Number of permits : 5 Number of recorded violations to date: 2

GILMOUR MANUFACTURING COMPANY SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

GRAHAMS TRUCK SVC SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

GREEN GARDEN INC SOMERSET PA
Generator Status : Conditionally Exempt SQG
Treatment, Storage & Disposal Status: None
Number of permits : 1 Number of recorded violations to date: 0

J E HERRING MOTOR CO SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

JIMS AUTO & TRUCK STOP INC SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

K&D AUTO ELEC SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

KOVAL TOOL & DIE INC SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

KWIK FILL S0071 292 SOMERSET PA
Mail City & State: WARREN PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

LEISS TOOL & DIE CO SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

LINCOLN SUPPLY & EQUIPMENT CO SOMERSET PA
Generator Status : None
Treatment, Storage & Disposal Status: None

LONG PRINTING SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

LYONS SWML LOGNG EQUIP SUP INC SOMERSET PA
Mail City & State: LITTLE VALLEY NY
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

MARDIS MOTORS SOMERSET PA
Generator Status : Small Quantity Generator (SQG)

Treatment, Storage & Disposal Status: None
MULHOLLEN AUTO ELECTRIC SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
MURDOCK ENTERPRISE INC SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
NEW ENTERPRISE STONE & LIME CO SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
NEW ENTERPRISE STONE-SOMERSET BLACKTOP SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
PA DEPT OF TRANS-SOMERSET SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
PA TURNPIKE COMM - SOMERSET MAINT FAC SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
PENNDOT MAINTENANCE DIST 9-7 BUCKSTOWN PA
Mail City & State: SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
PENSKE TRUCK LEASING CO L P SOMERSET PA
Mail City & State: PITTSBURGH PA
Generator Status : None
Treatment, Storage & Disposal Status: None
REVCO DRUGS DISTRIBUTION CTR SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
RITCO INC SOMERSET PA
Generator Status : None
Treatment, Storage & Disposal Status: None
This handler is a hazardous waste transporter.
ROSS KENNY CHEV OLDS CAD INC SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
SAYLOR MOTOR CO SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
SHANNON, TOM OLDS SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
SHERWIN WILLIAMS CO I1092 SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
SHERWIN-WILLIAMS CO THE SOMERSET PA
Generator Status : None
Treatment, Storage & Disposal Status: None
SOMERSET AUTO PARTS SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
SOMERSET CERAMICS DIV OF KODICOR INC SOMERSET PA
Generator Status : None
Treatment, Storage & Disposal Status: None
SOMERSET CNTY VO TECH SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
SOMERSET COMMUNITY HOSPITAL SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
SOMERSET DRY CLEANERS SOMERSET PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
SOMERSET FERTILIZER PLT - AGWAY INC SOMERSET PA
Generator Status : None

Treatment, Storage & Disposal Status: None

SOMERSET STATE HOSPITAL — SOMERSET — PA
Generator Status : None
Treatment, Storage & Disposal Status: None

SOMERSET TWP MUN AUTH — SOMERSET — PA
Generator Status : None
Treatment, Storage & Disposal Status: None

SOMERSET WELDING & STEEL — SOMERSET — PA
Generator Status : Conditionally Exempt SQG
Treatment, Storage & Disposal Status: None

SOMERSET WELDING & STEEL — SOMERSET — PA
Mail City & State: BOSWELL PA
Generator Status : Conditionally Exempt SQG
Treatment, Storage & Disposal Status: None

SOMERSET WELDING & STEEL INC — SOMERSET — PA
Mail City & State: BOSWELL PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
Number of permits : 0   Number of recorded violations to date: 1

SOMERSET-BEDFORD CTY MNTL HLTH — SOMERSET — PA
Generator Status : None
Treatment, Storage & Disposal Status: None

STAHL OIL COMPANY INC — SOMERSET — PA
Generator Status : Conditionally Exempt SQG
Treatment, Storage & Disposal Status: None
This handler is a hazardous waste transporter.

SUNOCO SERVICE STATION-SOMERSET — SOMERSET — PA
Generator Status : None
Treatment, Storage & Disposal Status: None

SUPER CITY MANUFACTURING CO — SOMERSET — PA
Generator Status : None
Treatment, Storage & Disposal Status: None

SUPERCITY MFG INC — SOMERSET — PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

TETCO M&R 579 MP 1205.84 LN 2 — SOMERSET — PA
Mail City & State: HOUSTON TX
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

WEIMERS BLACKSMITH & WELDING — SOMERSET — PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

WHITEFORD NATIONAL LEASE — SOMERSET — PA
Mail City & State: SOUTHBEND IN
Generator Status : None
Treatment, Storage & Disposal Status: None

Total numbers of records found from each database-
# of TRI facilities found : 37
# of RCRIS handlers found : 68
# of NPRI submissions found: 0
# of BRS facilities found : 2
# of PCS permits found : 80
# of ERNS reports found : 8
# of ARIP reports found : 0
# of DOCKET cases found : 0
# of CERCLA sites found : 4
# of RODS sites found : 0
# of CUS submissions found : 0
# of NPL sites found : 0
# of SETS PRPs found : 0

END OF REPORT

```
                    RTK NET MASTER AREA REPORT
          search used- Zip Code:        ALL
                       City:            MARKLETON
                       State:           PA
                       Year:            ALL

   Mailing as well as facility addresses were searched.
   Database(s) FINDS were not searched.

   This search was taken from RTK NET's (the Right-To-Know Network)'s copies
   of various EPA databases. RTK NET is run by OMB Watch and Unison Institute
   at 1742 Connecticut Ave., NW, Washington DC, 20009 - Phone: 202-234-8494
   The search was done on 03/14/2000.

   If you don't see the words *END OF REPORT* at the end of this search,
   then this Web search didn't complete -- back up and try it again.


                              PCS DATA
   PCS (Permit Compliance System) is EPA's database of water pollution
   permits.  The first line of each record below shows the PCS legal
   facility name, system-generated city & state, and NPDES ID.

 ISERS RUN COAL COMPANY, INC.   MARKLETON            PA    PA0069043
   Major facility: N   Facility Type: INDUSTRIAL
   Number of quarter years in non-compliance (out of 13 possible): 0
 KING & BUNGARD LUMBER CO INC   MARKLETON            PA    PAR226111
   Major facility: N   Facility Type: INDUSTRIAL
   Number of quarter years in non-compliance (out of 13 possible): 0



 Total numbers of records found from each database-
   # of TRI facilities found   : 0
   # of RCRIS handlers found   : 0
   # of NPRI submissions found: 0
   # of BRS facilities found   : 0
   # of PCS permits found      : 2
   # of ERNS reports found     : 0
   # of ARIP reports found     : 0
   # of DOCKET cases found     : 0
   # of CERCLA sites found     : 0
   # of RODS sites found       : 0
   # of CUS submissions found : 0
   # of NPL sites found        : 0
   # of SETS PRPs found        : 0

 *END OF REPORT*
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RTK NET MASTER AREA REPORT

search used- Zip Code: ALL
City: FORT HILL
State: PA
Year: ALL

Mailing as well as facility addresses were searched.
Database(s) FINDS were not searched.

This search was taken from RTK NET's (the Right-To-Know Network)'s copies of various EPA databases. RTK NET is run by OMB Watch and Unison Institute at 1742 Connecticut Ave., NW, Washington DC, 20009 - Phone: 202-234-8494
The search was done on 03/14/2000.

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PCS DATA

PCS (Permit Compliance System) is EPA's database of water pollution permits. The first line of each record below shows the PCS legal facility name, system-generated city & state, and NPDES ID.

DEER VALLEY YMCA CAMP FORT HILL PA PA0031291
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0

GENERAL REFRACTORIES CO FORT HILL PA PA0605824
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0

Total numbers of records found from each database-
# of TRI facilities found : 0
# of RCRIS handlers found : 0
# of NPRI submissions found: 0
# of BRS facilities found : 0
# of PCS permits found : 2
# of ERNS reports found : 0
# of ARIP reports found : 0
# of DOCKET cases found : 0
# of CERCLA sites found : 0
# of RODS sites found : 0
# of CUS submissions found : 0
# of NPL sites found : 0
# of SETS PRPs found : 0

END OF REPORT

RTK NET MASTER AREA REPORT

search used- Zip Code: ALL
City: LISTONBURG
State: PA
Year: ALL

Mailing as well as facility addresses were searched.
Database(s) FINDS were not searched.

This search was taken from RTK NET's (the Right-To-Know Network)'s copies of various EPA databases. RTK NET is run by OMB Watch and Unison Institute at 1742 Connecticut Ave., NW, Washington DC, 20009 - Phone: 202-234-8494
The search was done on 03/14/2000.

If you don't see the words *END OF REPORT* at the end of this search, then this Web search didn't complete -- back up and try it again.

PCS DATA

PCS (Permit Compliance System) is EPA's database of water pollution permits. The first line of each record below shows the PCS legal facility name, system-generated city & state, and NPDES ID.

WALTER F. & BETTY SHAFER   LISTONBURG   PA   PA0125008
Major facility: N   Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0

Total numbers of records found from each database-

# of TRI facilities found	: 0
# of RCRIS handlers found	: 0
# of NPRI submissions found	: 0
# of BRS facilities found	: 0
# of PCS permits found	: 1
# of ERNS reports found	: 0
# of ARIP reports found	: 0
# of DOCKET cases found	: 0
# of CERCLA sites found	: 0
# of RODS sites found	: 0
# of CUS submissions found	: 0
# of NPL sites found	: 0
# of SETS PRPs found	: 0

END OF REPORT

RTK NET MASTER AREA REPORT

search used- Zip Code: ALL
City: ADDISON
State: PA
Year: ALL

Mailing as well as facility addresses were searched.
Database(s) FINDS were not searched.

This search was taken from RTK NET's (the Right-To-Know Network)'s copies of various EPA databases. RTK NET is run by OMB Watch and Unison Institute at 1742 Connecticut Ave., NW, Washington DC, 20009 - Phone: 202-234-8494
The search was done on 03/14/2000.

If you don't see the words *END OF REPORT* at the end of this search, then this Web search didn't complete -- back up and try it again.

PCS DATA

PCS (Permit Compliance System) is EPA's database of water pollution permits. The first line of each record below shows the PCS legal facility name, system-generated city & state, and NPDES ID.

BITUMINOUS COALS ADDISON #1 MI ADDISON PA PA0089214
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
BITUMINOUS COALS, INC. ADDISON PA PA0118184
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
GENERAL REFRACTORIES CO - FORT ADDISON PA PA0004669
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
JUTOPE REALTY INC ADDISON PA PA0203726
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
KING COAL COMPANY - KING NO.4 ADDISON PA PA0069400
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
KING COAL COMPANY - MINE 5 ADDISON PA PA0089338
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
KING COAL COMPANY - MINE 6 ADDISON PA PA0089346
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
KING COAL COMPANY-KING NO.3 MI ADDISON PA PA0069370
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0
US ARMY CORPS OF ENGINEERS ADDISON PA PA0094544
Major facility: N Facility Type: FEDERAL
Number of quarter years in non-compliance (out of 13 possible): 0

BRS DATA

BRS (RCRA Biennial Reporting System) data shows generation and shipment of RCRA and other waste. The 1989 through 1995 data years are available through this program. The first line of each record below shows the BRS facility name, city, state, and reporting year.

WHETSELL LUMBER CO ADDISON PA 1993
Tons generated: 92 Tons shipped: 92
Tons managed : 0 Tons received: 0 EPA ID: PAD987390010

RCRIS DATA

RCRIS (RCRA Information System) data shows hazardous waste permits for generators, receivers, and transporters of hazardous waste. The first line of each record below shows the handler (facility) name, city, and state.

WHETSELL LUMBER COMPANY ASSISON PA
Mail City & State: ADDISON PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None
Number of permits : 1 Number of recorded violations to date: 0

Total numbers of records found from each database-
\# of TRI facilities found : 0
\# of RCRIS handlers found : 1
\# of NPRI submissions found: 0
\# of BRS facilities found : 1
\# of PCS permits found : 9
\# of ERNS reports found : 0
\# of ARIP reports found : 0
\# of DOCKET cases found : 0
\# of CERCLA sites found : 0
\# of RODS sites found : 0
\# of CUS submissions found : 0
\# of NPL sites found : 0
\# of SETS PRPs found : 0

END OF REPORT

RTK NET MASTER AREA REPORT

search used- Zip Code: ALL
City: CONFLUENCE
State: PA
Year: ALL

Mailing as well as facility addresses were searched.
Database(s) FINDS were not searched.

This search was taken from RTK NET's (the Right-To-Know Network)'s copies of various EPA databases. RTK NET is run by OMB Watch and Unison Institute at 1742 Connecticut Ave., NW, Washington DC, 20009 - Phone: 202-234-8494
The search was done on 03/14/2000.

If you don't see the words *END OF REPORT* at the end of this search, then this Web search didn't complete -- back up and try it again.

PCS DATA

PCS (Permit Compliance System) is EPA's database of water pollution permits. The first line of each record below shows the PCS legal facility name, system-generated city & state, and NPDES ID.

CONFLUENCE BOROUGH MUNICIPAL A CONFLUENCE BORO PA PA0038164
Major facility: N Facility Type: MUNICIPAL
Number of quarter years in non-compliance (out of 13 possible): 2

TURKEYFOOT VALLEY AREA SCHOOL LOWER TURKEYFOOT PA PA0096423
Major facility: N Facility Type: INDUSTRIAL
Number of quarter years in non-compliance (out of 13 possible): 0

US ARMY CORPS OF ENGINEERS ADDISON PA PA0094544
Major facility: N Facility Type: FEDERAL
Number of quarter years in non-compliance (out of 13 possible): 0

US ARMY CORPS OF ENGINEERS-CEO CONFLUENCE BORO PA PA0025003
Major facility: N Facility Type: FEDERAL
Number of quarter years in non-compliance (out of 13 possible): 0

DOCKET DATA

DOCKET is a database of all court cases filed by the Dept. of Justice on behalf of EPA in civil court. It lists all cases since the beginning of EPA. A partial database of EPA Administrative Actions is also included. The first line of each record below shows the facility name, city, and state.

TURKEYFOOT VLY AREA SCHS CONFLUENCE PA
Case Name: TURKEYFOOT VALLEY AREA SCHOOL Case result: Source Agrees

ERNS DATA

ERNS (Emergency Response Notification System) data are records of phone calls reporting toxic releases and spills to the National Response Center. Data is currently available for 1987-1997. The first line of each record below shows the name of the discharging organization (if any could be identified) plus the city, state and reporting year of the spill.

No discharger listed CONFLUENCE PA 1987
1st chemical: CAUSTIC SODA Lbs released:

EWITT TRUCKING CONFLUENCE PA 1987
Discharger located in: ELLERBE NC

1st chemical: MOTOR OIL   Lbs released: 4,500
No discharger listed   CONFLUENCE   PA 1988
1st chemical: KEROSENE   Lbs released: 1,591

RCRIS DATA

RCRIS (RCRA Information System) data shows hazardous waste permits for generators, receivers, and transporters of hazardous waste. The first line of each record below shows the handler (facility) name, city, and state.

RIVERSIDE MOTOR SALES   CONFLUENCE   PA
Generator Status : Small Quantity Generator (SQG)
Treatment, Storage & Disposal Status: None

Total numbers of records found from each database-
# of TRI facilities found : 0
# of RCRIS handlers found : 1
# of NPRI submissions found: 0
# of BRS facilities found : 0
# of PCS permits found : 4
# of ERNS reports found : 3
# of ARIP reports found : 0
# of DOCKET cases found : 1
# of CERCLA sites found : 0
# of RODS sites found : 0
# of CUS submissions found : 0
# of NPL sites found : 0
# of SETS PRPs found : 0

END OF REPORT

The following pages provide information on potential funding sources for action plan items identified in this River Conservation Plan. This information is not all-inclusive, but it does identify many commonly used funding vehicles. Sources for further information and detail are also provided.

Contents of this section include:

On-Line Funding Source Information

A wealth of funding information is available from agency and organization websites. A partial listing of some valuable sites is provided in the table on the following page.

General Watershed Issues

- DEP Fact Sheet Potential Funding Sources for Watershed Groups
- DCNR Community Conservation Partnership Initiative
- EPA Environmental Finance Program Guidebook of Financial Tools, Section 2. C. Grants
- EPA Environmental Finance Program Stream Corridor Protection Funding Options – Pennsylvania
- NRCS Watershed and River Basin Planning and Installation

AMD and Other Water Quality Issues

- Potential Funding Sources for Mine Drainage Abatement from EPA's A Citizen '5 Handbook to Address Contaminated Coal Mine Drainage
- DEP Ten Percent Set-Aside Program for Acid Mine Drainage
- Funding excerpt from Working Draft of DEP's Pennsylvania's Nonpoint Source (NPS) Management Program 1998 Update
- NRCS Rural Abandoned Mine Program

Following this information is a summary of environmental protection regulatory authority.

ON-LINE FUNDING INFORMATION

Item	Agency/ Organization	Web Address
Guidebook of Financial Tools	EPA	http://www.epa.gov/efinpage/guidebk/guindex.htm
Environmental Finance Center – University of Maryland	EPA/ University of Maryland	http://www.mdsg.umd.edu/EFC/elinks.html
Potential Funding Sources for Watershed Groups	DEP	http://www.dep.state.pa.us/dep/deputate/watermgt/wc/Fact Sheets.htm#Watershed Support Fact Sheets
Wetland and Riparian Stewardship in Pennsylvania	DEP	http://www.dep.state.pa.us/dep/deputate/watermgt/wc/Subjects/nonpointsourcepollution.htm
Sources of Funding for Watershed Activities	DEP	http://www.dep.state.pa.us/dep/deputate/enved/watershed/Sources_Funding_Watershed.htm
Community Conservation Partnership Initiative	DCNR	http://www.dcnr.state.pa.us/grants.htm
United Environment Fund	United Environment Fund	http://www.uef.org
The Foundation Center	The Foundation Center	http://www.fdncenter.org
USDA Conservation Programs	NRCS	http://www.nrcs.usda.gov/NRCSProg.html

POTENTIAL FUNDING SOURCES FOR WATERSHED GROUPS

Many watershed groups have volunteers to work on numerous projects within their watershed boundaries. They try to resolve or remediate current problems by giving many hours of service, and they may help in the prevention of future water quality problems as well.

However, to perform these services, groups need money for the purchase of equipment and supplies. This funding is not always easy to find. The following is a list of potential funding sources and references for use by watershed groups. This is not all inclusive, and you may find other sources not currently on the list. Make sure you are aware of the administrative requirements for any grant you pursue. The Department of Environmental Protection does not endorse the use of any specific group from the list and is supplying names for informational purposes only.

SOURCE OF ASSISTANCE	CONTACT PHONE NUMBER	BRIEF DESCRIPTION OF PROGRAM	PLANNING	IMPLE-MENTA-TION	OTHER
DEP Nonpoint Source Management Program, Harrisburg, PA	717-787-5259	Grants for planning and nonpoint source pollution control projects.	X	X	X
DEP Stormwater Management Program, Harrisburg, PA	717-772-4048	Watershed planning for stormwater control (counties) and implementation of programs at local levels (municipalities).	X	X	
DEP Coastal Zone Management Program, Harrisburg, PA	717-787-5259	Grants for planning and construction in the Lake Erie and the Delaware Estuary Coastal Zones.	X	X	
NRCS, PL 83-566, The Watershed Protection and Flood Prevention Act, Harrisburg, PA	717-782-4429	Plan development for natural resource concerns within a watershed area; cost-sharing available to carry out plan.		X	
DCNR Rivers Conservation Program, Harrisburg, PA	717-787-2316	Conserve and enhance river resources by offering planning grants, technical assistance, implementation grants, development grants, and acquisition grants.	X	X	
Canaan Valley Institute, West Virginia	304-866-4739 800-922-3601	Promotes the development and growth of local associations committed to improving or maintaining the natural resources of their watersheds, in the Mid-Atlantic Highlands portions of PA, MD, VA and all of WV.	X	X	X
Great Lakes Protection Fund, Pennsylvania Office - Meadville, PA	312-201-0660	Occasional small planning grants and natural resource grants for regional efforts in the Great Lakes area. For information specific to Pennsylvania call 814-332-6816.	X	X	
EPA National Estuary Grant Program	202-260-6502	Supports the development of programs to protect coastal watersheds in estuaries of national significance, which includes the Delaware Estuary in Pennsylvania.	X		

SOURCE OF ASSISTANCE	CONTACT PHONE NUMBER	BRIEF DESCRIPTION OF PROGRAM	PLANNING	IMPLE-MENTA-TION	OTHER
Vira I. Heinz ndowment, ittsburgh, PA	814-669-4847 John Dawes	Provides funds to the Western Pennsylvania Watershed Protection Program to implement comprehensive ecosystem management programs in selected western Pennsylvania watersheds. In addition, small matching grants are provided to DCNR for the Coldwater Heritage Program.	X	X	X
Western Pennsylvania Watershed Protection Program sponsored by the Howard Heinz Endowments	814-669-4847 John Dawes, Grant Administrator	Provides funding to grassroots organizations and watershed associations for site specific watershed remediation in western Pennsylvania.	X	X	
The Leo Model Foundation, Inc., Philadelphia, PA	215-546-8058	Grants for habitat conservation, watershed conservation, and species preservation in the USA and other countries.	X	X	
The William Penn Foundation, Philadelphia, PA	215-988-1830	Grants to preserve natural areas, including environmental education and planning, within the Foundation's geographic area (primarily southeastern Pennsylvania).	X	X	X
Educational Mini-Projects Program, Harrisburg, PA	717-236-1006	Small grants for Pennsylvania-based, grassroots educational projects that address nonpoint source watershed concepts.			X
EPA Environmental Education Grants, Region III, Philadelphia, PA	215-566-5546	Grants awarded to small nonprofit groups for various projects in Region III.	X	X	
rrisburg oundation, Harrisburg, PA	717-236-5040	Grants awarded to groups for environmental projects. They also administer special foundation grants set up for specific environmental projects by specific donors. The Foundation serves Cumberland, Dauphin, Perry, Lebanon and Franklin Counties in southcentral Pennsylvania.	X	X	
Charles A. and Anne Morrow Lindburgh Foundation, Minneapolis, MN	612-338-1703	Grants awarded for the conservation of natural resources and water resource management.	X		X
Fish American Foundation, Alexandria, VA	703-548-6338	Grants awarded for: streambank stabilization materials, instream habitat improvements, contracted heavy equipment, and stream morphology work.		X	
Coldwater Heritage Partnership, Partnership between Department of Conservation and Natural Resources, PA Fish and Boat Commission and Trout Unlimited, Harrisburg, PA	717-787-2316	Grants for prioritizing watersheds in need of protection, for assessment of coldwater ecosystems and for the development of watershed conservation plans.	X	X	X
American Canoe Association, ringfield, VA	703-451-0141 Contact: David Jenkins	May provide funding for various watershed-related projects including starting groups and lobbying.	X		X

SOURCE OF ASSISTANCE	CONTACT PHONE NUMBER	BRIEF DESCRIPTION OF PROGRAM	PLANNING	IMPLE-MENTA-TION	OTHER
Dirt and Gravel Road Maintenance, Harrisburg, PA	State Conservation Commission at 717-787-8821 or local County Conservation District	This is available to local municipalities and state agencies who have jurisdiction over dirt and gravel roads. Groups may be able to work with their local municipality regarding projects dealing with best management practices for erosion and sedimentation control problems and fugitive dust in watersheds.	X	X	
National Park Service, Rivers, Trails and Conservation Assistance Program, Philadelphia, PA	215-597-1581 Joseph DiBello, Chief	The National Park Service works with communities to conserve land and river resources and provides funding for various projects dealing with the conservation of these resources including the development of trails and greenways.	X	X	

Further references:

1. A Guidebook of Financial Tools. In draft. Being produced by the EPA Environmental Financial Advisory Board and the Environmental Finance Center. Web address: http://www.epa.gov/efinpage/guidebk/guindex.htm
2. Catalog of Federal Domestic Assistance. U.S. General Services Administration. Web address: http://www.gsa.gov/fdac.htm
3. Wetland and Riparian Stewardship in PA - A Guide to Voluntary Options for Landowners, Local Governments and Organizations. The guide lists various technical and financial assistance programs available to reduce impacts from nonpoint source pollution. Contact the Alliance for the Chesapeake Bay at 717-236-8825.
4. 1997 Directory of Funding Sources for Grassroots River and Watershed Groups. This is a directory of foundations and others that fund watershed efforts. Available for $35 from River Network at 800-423-6747 or e-mail rivernet2@aol.com
5. Consideration of performance of a Community Environmental Project (CEP) instead of civil penalties in certain cases where the alleged violator has suggested a CEP. The Department of Environmental Protection will coordinate with local government and groups to identify appropriate projects. Contact local DEP regional office for more information.
6. For information about training regarding grant proposal writing and winning grants contact the Nonprofit Management Development Center at LaSalle University in Philadelphia. There is a cost associated with the training. 215-951-1701.
7. Your local library has information about grants including the Environmental Grant Making Foundations Book. Some libraries, including the Dauphin County Library in Harrisburg, have a computer database that can be searched by subject for funding sources pertaining to watersheds or streams.
8. The United Environment Fund fosters growth of environmental organizations throughout the United States by helping them develop a stronger, more diversified funding base. Web address: http://www.uef.org
9. The Foundation Center is an independent, nonprofit information clearinghouse that collects, organizes, analyzes and disseminates information about foundations, corporate giving, etc. They maintain five foundation libraries throughout the United States, and they have cooperating collections of information located in public libraries including libraries in Pennsylvania. Besides publications and supplementary materials, some libraries provide other services for grant seekers. For information about these cooperating collections call 1-800-424-9836. Foundation web address: http://www.fdncenter.org
10. Catalog of Federal Funding Sources for Watershed Protection. USEPA. 1997. Provides information on federal funding programs for watershed protection and local-level watershed projects. Call the National Center for Environmental Publications and Information at 513-489-8190 or 800-490-9198, ask for EPA Document 841-B-97-008.

This fact sheet and related environmental information are available electronically via Internet. Access the DEP website at http://www.dep.state.pa.us) choose Information by Subject/Water Management/Watershed Conservation/Watershed Support).

DCNR

Community Conservation Partnership Initiative

NOTE: This information was obtained from the DCNR website at www.dcnr.state.pa.us/grants.htm and it has been edited to fit the format of this River Conservation Plan.

DCNR Opens Application Period for Keystone Grants

Planning, Implementation and Technical Assistance Grants
Technical Assistance Program
Acquisition and Development Grants

The new Department of Conservation and Natural Resources (DCNR) establishes cabinet-level status for Pennsylvania's state parks and forests and also places conservation and recreation programs dealing with local recreation, heritage parks, rivers conservation, greenways, trails, and open spaces under a single agency. A key priority of this agency is to bring its programs into towns and cities across Pennsylvania and to provide leadership linking agency resources with local conservation efforts.

The Community Conservation Partnership initiative joins DCNR with communities, nonprofit groups and the private sector in conserving Pennsylvania's valuable natural and cultural heritage. DCNR partnership involve greenways, open spaces, community parks, rail trails, river corridors, natural areas, indoor and outdoor recreation and environmental education. Agency programs will be liked with efforts to conserve natural and historic resources, provide recreation, enhance tourism, and foster community development.

DCNR Partnership Opportunities

The new DCNR provides a single point of contact for communities and nonprofit conservation agencies seeking state assistance in support of local conservation initiatives. This assistance can take the form of grants, technical assistance, information exchange and training. These programs are described below:

Heritage Parks Grants promote public-private partnerships to preserve and enhance natural, cultural, historic and recreation resources to stimulate economic development through heritage tourism. Grants are available to municipalities, nonprofit organizations or federally designated commissions acting on behalf of the municipalities in a heritage park area. Grants are awarded for a variety of purposes including feasibility studies; development of management action plans for heritage park areas; specialized studies; implementation projects; and hiring of state heritage park managers. Grants require a 25-50 percent local match.

Community Grants are awarded to municipalities for recreation, park and conservation projects. These include the rehabilitation and development of parks and recreation facilities; acquisition of land for park and conservation purposes; and technical assistance for feasibility studies, trails studies, and site development planning. Grants require a 50 percent match except for some technical assistance grants and projects eligible as small community projects. The small community component provides 100 percent funding - $20,000 maximum - for material costs and professional design fees to municipalities with fewer than 5,000 residents so they may develop basic recreation projects.

Land Trust Grants provide 50 percent funding for acquisition and planning of open space and natural areas which face imminent loss. Lands must be open to public use and priority is given to habitat for threatened species. Eligible applicants are nonprofit land trusts and conservancies.

River Conservation Grants are available to municipalities, counties, municipal and intermunicipal authorities, and river support groups to conserve and enhance river resources. River support groups must be nonprofits which are designated to act on behalf of interested municipalities. Planning grants are available to identify significant natural and cultural resources, threats, concerns and special opportunities and to develop river conservation plans. Implementation grants are available to carry out projects or activities defined in an approved river conservation plan. Grants require a 50 percent match.

Rails-to-Trails Grants provide 50 percent funding for the planning, acquisition or development of rail-trail corridors. Eligible applicants include municipalities and nonprofit organizations established to preserve and protect available abandoned railroad corridors for use as trails or future rail service.

Special Projects

The Bureau plays a pivotal role in special projects like:

The Governor's Conference on Greenways and Trails
The State Recreation Planning Program
The June Rivers Month Sojourn

Community Conservation Partnership Initiative

Planning, Implementation and Technical Assistance Grants

Community Grant Program

Municipalities are the only eligible applicants. The Department provides grant funding at a level not to exceed 50 percent of eligible costs except when noted otherwise. A municipality may submit one grant application for one project type listed under this program per funding cycle. Project types include:

- Circuit Riders: Three-year grant program to hire a full-time recreation and/or park director to share services through an intergovernmental cooperative effort created by two or more municipalities. Available grant funding for the circuit rider's salary decreases from 100 percent the first year to 75 percent the second and 50 percent the third. No funding is provided in the fourth year.

- Comprehensive Recreation, Park and Open Space Plans: Grants to develop a comprehensive long-range planning document that provides strategies to address a municipality's recreation, park and open space needs.

- Feasibility Studies (Swimming Pool/Recreation Facilities): Grants to determine the feasibility of acquiring, developing or rehabilitating swimming pools, ice rinks, sports complexes, recreation centers, etc. DCNR usually requires the completion of these studies before a municipality is funded for development or rehabilitation of major facilities under the Keystone Acquisition and Development Grants.

- Greenways: Grants to explore establishing, developing and managing linear corridors of open space along streams, shorelines, wetlands, canals, ridge tops, etc. These corridors are studied to create recreational trails and bikeways, park connectors, and for environmental protection. DCNR has separate grant programs for river conservation and rail-trail planning.

- Master Site Plans: Grants to design the proposed development of a neighborhood, community, or regional park. Site control, either through ownership or a long-term lease, is required.

- County Natural Areas Inventories: Grants to inventory important natural areas, habitats for species of special concern, significant natural plant communities and areas important for open space, recreation and wildlife habitat. Inventories are done on a county or multi-county area.

- Peer-to-Peer Technical Assistance: Grants of up to 90 percent of eligible costs ($7,500 maximum) to study problem-specific issues dealing with the administration of park and recreation facilities and/or services. These are short-term projects conducted primarily by experienced park and recreation professionals who work closely with community leaders.

Rails-to-Trails Grant Program

Both municipalities and appropriate organizations are eligible applicants. The Department provides grant funding at a level not to exceed 50 percent of eligible costs. An eligible applicant may submit one application per funding cycle under this program.

- Rail-Trail Feasibility Studies: Grants to determine the feasibility of converting an available railroad rights-of-way to a trail. Site control, either through ownership or a long-term lease is not required in order to conduct the study.

  Rail-Trail Master Plans: Grants to develop a design detailing the proposed development of the trail. Site control, either through ownership or a long-term lease, is required.

- Rail-Trail Special Purpose Studies: Grants to develop a detailed study on a particular issue or structure (culverts, bridges, tunnels) that impacts the conversion of a rail corridor to a trail. Site control, either through ownership or a long-term lease, is required.

Rivers Conservation Grant Program

Both municipalities and appropriate organizations are eligible applicants. The Department provides grant funding at a level not to exceed 50 percent of eligible costs (maximum $50,000 grant). An applicant may submit **one** application per funding cycle under this program.

- Rivers Conservation Plans: Grants to study watersheds or rivers, including streams and creeks, to identify significant river resources, potential threats to these resources, and recommend restoration, maintenance or enhancement actions.

- Rivers Implementation Projects: Grants directed to resolution of specific issues for a river that is on the Pennsylvania Rivers Conservation Registry. Examples of eligible projects under the PITA program include: investigations into river access, water quality monitoring, and preparation of ordinances and zoning documents.

Note: A municipality or appropriate organization may submit one application per grant program (Community, Rivers, or Rails Program) and no more than two grant applications per funding cycle.

Community Conservation Partnership Initiative

Technical Assistance Program

The program helps local governments, land trusts, rails4o-trails and river conservation groups and others interested in recreation, parks, open space and conservation provide services to their constituents through various means. Other organizations, including municipal and civic associations, state agencies, schools, trusts, day care centers, camps, etc., take advantage of the services.

Consultations

Professional recreation and park advisors in the central and field offices provide assistance on numerous issues. Whether one-on-one over the phone, or in meetings with one or more officials in a community or organization, advisors bring a wealth of resources.

- Personnel - Hiring practices, job descriptions, salaries, the "Personal Referral Service"
- Management - Developing citizen boards, governmental and organizational cooperation, facility design, delivery system evaluation, feasibility studies
- Finance - Budgeting, untapped revenue sources
- Liability - Risk management information, techniques/sources
- Rails-to-Trails - Advise on the planning, acquisition and development of rail-trail corridors
- Rivers Conservation - Advise and assist in the development of river conservation plans

Workshops

The Bureau sponsors annual workshops series and also instructs at conferences sponsored by others.

- Swimming Pool Management - the Bureau sponsors a dozen or more sessions yearly, for public and private pool and beach operators, to train participants in the safe and cost-effective facility management and operation.
- Playground Design/Safety - the Bureau sponsors yearly sessions to train municipal, school, day care and other playground providers in facility safety-design, operation and maintenance.
- Instructional Participation at Other Conferences - the Bureau participates in numerous conferences and programs to explain its programs and assist other organizations.

  PA Recreation and Park Society
  PA Planning Association
  PA State Assoc. of Township Supervisors, etc.
  The Civil Engineers Society
  PA Municipal Secretaries Institute

Publications

The Bureau offers dozens of publications and hundreds of sample items requests for proposals, concession arrangements, intergovernmental agreements, surveys) to help local governments and other organizations understand how similar groups deal with these issues.

Budget and Salary Survey
Hiring Municipal Recreation and Park Personnel
Swimming Pool Management Manual
"Recreation Outreach" newsletter
"PA Rivers Newsletter"
"A Stream Stabilization and Management Guide for Landowners"
PA Scenic Rivers Program
PA Rivers Conservation Program

Community Conservation Partnership Initiative

Acquisition and Development Grants

Community Grant Program

Municipalities are the only eligible applicants. The Department provides grant funding at a level not to exceed 50 percent of eligible costs except for Small Communities/Small Projects type which is 100 percent funding for approved material costs and professional design fees. A Municipality may submit one application for one project type and no more than two applications per funding cycle. Projects include:

Acquisition - grants for the purchase of land for park, recreation and conservation purposes. Projects may include acquisition of land for new areas, inholdings or expansion of existing sites.

Park Rehabilitation and Development - grants for the rehabilitation of existing parks, indoor and outdoor recreation facilities and development of new park and recreation areas.

Small Communities/Small Projects - this is a special component for municipalities with a population of 5,000 or less. Grants are limited to a maximum of $20,000 and will provide up to 100 percent funding of only material costs and professional design fees. Grants are for the rehabilitation and development of basic outdoor park and recreation facilities and minor indoor recreation renovations. The labor and construction equipment must be provided by the municipality or donated.

Rails-to-Trails Grant Program

Both municipalities and appropriate organizations are eligible applicants. The Department provides grant funding at a level not to exceed 50 percent of the eligible costs. Applicants may submit one application per project type and no more than two grant applications in any funding cycle. Projects include:

Rails-to-Trails Acquisition - grants for the purchase of abandoned railroad rights-of-way for public recreational trail use and purchase of adjacent land for access or related support facilities.

Rails-to-Trails Rehabilitation and Development Projects - grants for the rehabilitation and development of abandoned rights-of-way and support facilities for public recreational trail use.

Rivers Conservation Grant Program

Both municipalities and appropriate organizations are eligible applicants. The Department provides grant funding at a level not to exceed 50 percent of the eligible costs. Rivers conservation acquisition and development grants are limited to a maximum of $50,000. Applicants may submit one application per project type and no more than two grant applications in any funding cycle. Projects include:

> Rivers Conservation Acquisition Projects - grants for the purchase of land for rivers conservation purposes.
>
> Rivers Conservation Development Projects - grants for the development of river conservation projects as recommended in the approved Rivers Conservation Plan.

United States Environmental protection Agency

Environmental Finance Program

A Guidebook of Financial Tools
Section 2.C.
Grants

NOTE: This information was obtained from the EPA website at www.epa.gov/efinpage/guidbk98/gbk2c.htm and it has been edited to remove material not relevant to this River Conservation Plan and to fit the format of this document.

2.C. GRANTS

Description: A grant is a sum of money awarded to an eligible entity without a demand for repayment. Typically, grants are awarded by the federal government to State or local governments, or by States to local governments, for the purpose of financing a particular activity or facility. The grant award represents a monetary transfer payment from one organization to another for a purpose deemed necessary or desirable by the awarding organization. Grants also can be made by or to the private sector, particularly non-profit organizations. Matching grants, for example, on a one-to-one basis, are now being used both the public and private sectors.

Advantages: The primary advantage of grants is that State and local governments and other eligible recipients do not have to use their own resources to pay the specific eligible costs that the grant monies cover. In cases where grant recipients do not have the needed resources, grants enable valuable work to move forward. In other cases, grants make it possible for recipients to pursue additional environmental and/or other activities or to forgo expenditures entirely. Grants can be highly equitable when they address affordability concerns, and may be the only way that some recipients, such as smaller communities, can proceed. Furthermore, grants can leverage additional resources through matching funds.

Limitations: Applying for grants can be costly, time-consuming, and problematical. It requires trained staff on the part of the grantee to determine grant opportunities and submit often detailed grant applications. These grant applications can often take months for the awarding organizations to process and award. Even then, due to the intense competition at both the State and the local levels for the limited pool of grant funds, State and local governments and other recipients may find it increasingly difficult to acquire funding for many projects.

Due to grant project eligibility limitations, only a percentage of the total project costs may be eligible for project assistance. Providing matching funds, often ranging from 5 to 50 percent, may be difficult. Even when grant funding is approved, the grantee may need to seek short-term debt instruments to cover cash shortages while awaiting the arrival of the funds.

Grant funds often have conditions that affect the scope, intent, nature or cost of the project or program in question. For example, USEPA Section 105 grants are negotiated grant agreements which obligate State air programs to use the funds to perform certain activities that may or may not coincide with the State's own priorities for its air program. Certain grant conditions, such as mandatory grant reviews and production of detailed reports, may increase the overall cost of the project. Most federal grants also require that grantees comply with other federal laws and regulations regarding a range of factors such as wage rates, anti-discrimination and environmental requirements. In recent years, grant funding has been increasingly unstable, making it difficult to plan ahead.

Summary: Grants remain the cheapest way for grant recipients to fund environmental work, and may be the only way to get a project moving, particularly those of smaller, disadvantaged entities. Federal grants are still the largest source of environmental grant monies compared to States, communities, and then non-profit sector. Grants clearly demonstrate the federal commitment specific environmental priorities. However, federal grants have many limitations. These grant monies tend to be unstable, slow-moving, highly competitive, and not readily expandable, compared to other financing tools such as bonds. Because of the large number of different federal grants and constantly changing requirements, grants are not summarized in a Comparison Matrix at the end of the section. Potential grant recipients should, and need to, consult the **Catalog of Federal Domestic Assistance** available from the U.S. General Services Administration. The catalog also can be accessed electronically on the World Wide Web at **http://aspe.os.dhhs.gov/cfda/index.htm**. The catalog has its own write-up in the Guidebook in **Section 5.B.: Electronic Services.**

LIST OF GRANTS
(In Alphabetical Order)

1. Agriculture: Forest Service -- Cooperative Forestry Assistance
2. Agriculture: Forest Service -- Economic Action Programs
3. Agriculture: Forest Service -- Landowner Assistance programs
4. Agriculture: Forest Service -- Urban and Community Forestry Program
5. Agriculture: NRCS -- Environmental Quality Incentives Program
6. Agriculture: Rural Business-Cooperative Service -- Business Enterprise Grants
7. Agriculture: Rural Business-Cooperative Service -- Economic Development Grants
8. Agriculture: Rural Utilities Service -- Distance Learning and Telemedicine Grants
9. Agriculture: Rural Utilities Service -- Water and Wastewater Disposal Systems Grants
10. Appalachian Regional Commission Supplemental Grants
11. Commerce: EDA -- Public Works and Infrastructure Development Grants
12. Commerce: EDA -- Special Economic Development & Adjustment Assistance Grants
13. Commerce: NOAA -- Coastal Services Center Cooperative Agreements
14. Commerce: NOAA -- Coastal Zone Management Administration Implementation Awards
15. Defense: Army Corps of Engineers -- Civil Works Projects
16. EPA: Environmental Education and Training Grants
17. EPA: Environmental Justice Grants to Small Community Groups
18. EPA: Environmental Monitoring for Public Access & Community Tracking Grants
19. EPA: Performance Partnership Grants
20. EPA: Program Grants
21. EPA: Section 319 Nonoint Source Pollution Control Grants
22. EPA: Superfund Technical Assistance Grants
23. EPA: Sustainable Development Challenge Grants
24. EPA: Underground Storage Tank Trust Fund Program Grants
25. EPA: Wetlands Protection Development Grants
26. Environmental Technology Initiative
27. FEMA: Flood Mitigation Assistance
28. FEMA: Hazard Mitigation Assistance
29. Foundation and Corporate Giving
30. HUD: CDBG -- Economic Development Initiative Grants
31. HUD: CDBG -- Entitlement Grants
32. HUD: CDBG -- Small Cities Program Nonentitlement Grants
33. HUD: CDBG -- States' Grants Program Nonentitlement Grants
34. Interior: Fish and Wildlife Service -- National Coastal Wetlands Conservation Grants

LIST OF GRANTS Continued

[Special Note: We received a writeup for an innovative new grant tool after this section was completed. Please see the write-up for the **EPA: Clear Air Partnership Fund in Appendix A** on page A-4.]

DEPARTMENT OF AGRICULTURE
FOREST SERVICE
COOPERATIVE FORESTRY ASSISTANCE

Description: Cooperative Forestry Assistance provides formula grants to State forestry agencies to assist in the advancement of forest resource management with respect to non-federal forests and other rural lands. Among the program's objectives are encouragement of the production of timber, control of insects and diseases affecting trees and forests, control of rural fifes, improvement and maintenance of fish and wildlife habitat, planning and conduct of urban and community forestry programs, and efficient utilization of wood and wood residues, including the recycling of wood fiber. State agencies can use the assistance to provide funds to owners of non-federal lands, rural communities, urban municipalities, nonprofit organizations, and State and local agencies for programs which help to achieve ecosystem health and sustainability by improving wildlife habitat, conserving forest land, reforestation, improving soil and water quality, preventing and suppressing damaging insects and diseases, wildfire protection, expanding economies of rural communities, and improving urban environments.

Actual Use: In Fiscal Year 1997, cooperative forestry grant obligations totaled $91,629,000, with individual grant amounts ranging from $25,000 to $6 million. Almost sixteen thousand landowners and 2.15 million acres were enrolled in forest stewardship programs. Approximately 1,800 rural and 8,000 urban communities were being assisted.

Potential Use: State forestry agencies can support a wide range of environmental protection and enhancement activities. Sound forestry practices can be essential to watershed protection and preservation of streams, lakes and wetlands. The Forest Service estimates that program grant obligation totals in each of Fiscal Years 1998 and 1999 will be about $104,000,000. The Service projects that more than 4,000,000 acres will be enrolled in forest stewardship programs by the end of the year 2000.

Advantages: This program provides State forestry agencies with resources they would not otherwise have to promote and support environmental protection and remediation.

Limitations: Some cooperative forestry assistance is restricted to owners of non-industrial private forest land.

Reference for Further Information: Contact U.S. Department of Agriculture, Forest Service, State and Private Forestry Division, Cooperative Forestry Staff, P.O. Box 96090, Washington, DC 20090-6090, Telephone: 202-205-1657, Fax: 202-205-1174, Intemet: **www.fs.fed.us/spf/**.

DEPARTMENT OF AGRICULTURE
FOREST SERVICE
ECONOMIC ACTION PROGRAMS

Description: The Economic Action Programs framework under Cooperative Forestry Assistance includes a set of programs aimed at helping communities to diversify and strengthen their local economies through a whole range of forest-based resources. It focuses on integrating economic development and environmental protection concerns in the context of sustainable community development goals. The three major program components are Rural Community Assistance, Forest Products Conservation and Recycling, and Market Development and Expansion Rural Community Assistance focuses on helping the whole community capitalize on available local human and natural resources to improve the quality of life and the social and economic situation. Communities are helped to organize, plan, and implement actions that are community-based, comprehensive, and partnership oriented. Forest Products Conservation and Recycling encourages and facilitates more efficient use of forest resources to enhance economic development and promote better stewardship of the forest resource. Emphasis is on stimulating public and private sector innovation. Opportunities include new uses for wood and other forest based resources through recycling and value-added secondary manufacturing, and alternative goods and services. Market Development and Expansion is meant to strengthen local and regional economies through the creation of domestic and international markets for forest resources.

Actual Use: The Michigan Forest Management Division emphasizes employment retention through sustainable economic activities in the forest products industry. The New Mexico Forestry Division has initiated a forest health/rural wealth partnership to assist forest-based communities to utilize forest products in ways that help improve the health of forest ecosystems.

Potential Use: State foresters can promote conservation and recycling of forest resources in conjunction with the production and marketing of environmentally friendly goods.

Advantages: Economic Action Programs focus on integrating economic development and environmental protection concerns. They can help organize diverse community interests for renewable resource based economic development and conservation.

Limitations: State forestry agencies must participate meaningfully in the program if it is to provide needed environmental assistance while promoting forest-based economic development

Reference for Further Information: U.S. Department of Agriculture, Forest Service, State and Private Forestry Division, Cooperative Forestry Staff, P.O. Box 96090, Washington, DC 20090-6090, Telephone: 202-205-1657, Fax: 202-205-1174, Internet: **www.fs.fed.us/spf/**.

DEPARTMENT OF AGRICULTURE
FOREST SERVICE
LANDOWNER ASSISTANCE PROGRAMS

Description: Cooperative Forestry Assistance includes technical and financial assistance to help private landowners create sustainable forest land management plans and implement their forest stewardship objectives. The Forest Stewardship Program (FSP) uses cooperative agreements with State forestry agencies to deliver professional natural resource management advice to non-industrial private forest (NIPF) land owners. It provides technical and planning guidance to landowners who agree to maintain the land under a detailed natural resource management plan for at least ten years. A completed Forest Stewardship plan is required of landowners seeking cost share assistance via the Stewardship Incentives Program (SIP). This program supports a wide range of forest management activities to

develop and implement Forest Stewardship plans. Eligible activities beyond plan development include reforestation and afforestation, forest and agroforest improvement, soil and water protection and improvement, riparian and wetland protection and improvement, fisheries habitat enhancement, wildlife habitat enhancement, forest recreation enhancement, and windbreak and hedgerow establishment, maintenance and renovation. Preference is given activities designed to attain multiple objectives, such as forest and agroforest improvements which enhance wildlife habitat or create recreation opportunities. Federal reimbursement of approved landowner expenses may be up to 75%, to a maximum of $10,000/year, in exchange for landowner agreement to maintain and protect SIP-funded practices for at least ten years. The Forest Legacy (FL) Program supports State acquisition of partial interests (e.g., conservation easements) in privately owned forest lands to restrict development of environmentally sensitive areas.

Actual Use: Landowner assistance programs have been a basic component of cooperative forestry and typically involve thousands of landowners and millions of acres.

Potential Use: These programs can improve environmental management of privately owned non-industrial forest land and can induce landowners to replant and maintain private forests.

Advantages: Federal funds help states provide otherwise unaffordable technical assistance and cost sharing to private land owners.

Limitations: Participation by private forest owners is voluntary and the limit on federal reimbursement reduces the attractiveness of the program while program accomplishment standards may promote emphasis on larger parcels within the pool of eligible lands.

Reference for Further Information: U.S. Department of Agriculture, Forest Service, State and Private Forestry Division, Cooperative Forestry Staff; P.O. Box 96090, Washington, DC 20090-6090, Telephone: 202-205-1389, Fax: 202-205-1271, Intemet: **www.fs.fed.us/spf/**.

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DEPARTMENT OF AGRICULTURE
FOREST SERVICE
URBAN AND COMMUNITY FORESTRY PROGRAM

Description: The Urban and Community Forestry Program is implemented through Forest Service Regional/Area Offices working with State Foresters and key cooperators such as Soil and Water Conservation Districts, state forestry associations, and city foresters/arborists. Each State Forester is required to establish a State Urban Forestry Advisory Council and a full-time Urban and Community Forestry coordinator position. The State advisory councils recommend program and funding priorities and assist the State foresters in preparing State Urban and Community Forestry Strategic Plans. Projects must include community volunteerism as a major element and must have the objective of solving some specific, described problem. States may use no more than twenty percent of their annual funding for purchasing, planting, or maintaining trees in communities. Direct funding grants for the purchase and planting of trees or for maintenance activities are on a 50/50 matching basis.

Actual Use: The Ohio Department of Natural Resources' Division of Forestry works with the Ohio Environmental Protection Agency and Attorney General's Office to use' air pollution fines for pass-through grants to communities for targeted tree planting projects.

Potential Use: State forestry agencies can support restoration of urban watersheds and help preserve forest lands threatened by residential and commercial growth, in coordination with related environmental projects.

Advantages: The program explicitly promotes ethnic and cultural diversity in urban and community forestry efforts.

Limitations: Grants to communities and nonprofit urban forestry organizations require a 50% match, potentially eliminating participation by low-income communities.

Reference for Further Information: U.S. Department of Agriculture, Forest Service, State and Private Forestry Division, Cooperative Forestry Staff; P.O. Box 96090, Washington, DC 20090, Telephone: 202-205-1389, Fax: 202-205-1271, Internet: **www.fs.fed.us/spf/**. Ohio Department of Natural Resources, Division of Forestry, 1855 Fountain Square Court, Columbus, Ohio 43224, Telephone: 614-265-6694, Intemet: www.hcs.ohio-state.edu/ODNR/Forestry.htm.

DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE (NRCS)

ENVIRONMENTAL QUALITY INCENTIVES PROGRAM

Description: The Environmental Quality Incentives Program (EQIP), authorized by the Federal Agricultural Improvement and Reform Act of 1996, is a single, voluntary conservation program, that replaces the Agricultural Conservation Program, Agricultural Water Quality Incentives Program, Great Plains Conservation Program and Colorado River Basin Salinity Control Program, It provides technical, financial, and educational assistance to farmers and ranchers through the NRCS. In line with maximizing the overall environmental benefits, the NRCS may designate a watershed, an area or a region of special environmental sensitivity as a priority area and give special consideration to applicants who have conservation plans that address the natural resource concern(s) for which the priority area was designated. Half of the program's assistance is targeted to livestock-related natural resource concerns and half to general conservation priorities. It includes cost-share assistance for up to 75% of the cost of conservation practices such as grassed waterways, filter strips, manure management facilities, capping abandoned wells, and wildlife habitat enhancement. Incentive payments can be made for up to three years to encourage livestock and agricultural producers to adopt land management practices such as nutrient, manure, irrigation water, wildlife, and integrated pest management Total cost-share and incentive payments are limited to $10,000 per person per year and $50,000 for the contract term of 5 to 10 years. Cost-sharing assistance may not be given to construct animal waste storage or treatment facilities serving large confined livestock operations.

Actual Use: In Fiscal Year 1997, EQUIP made $171,000,000 in grants and provided $5,066,644 in educational assistance. The NRCS estimates that EQUIP will make $156,000,000 and $174,000,000 in grant obligations in Fiscal Years 1998 and 1999, respectively.

Potential Use: This program is expected to have a static funding level through fiscal 2002. It can be used for a wide range of water quality protection measures.

Advantages: The effective consolidation of programs can make it easier to use for both the clients and the administering agency, but the cost-share limit may retard participation.

Limitations: if a federal income tax deduction is taken for agricultural soil and water conservation expenses, cost-sharing payments cannot be excluded from gross income. The program has a $200 million/year authorization but annual funding could be less.

Reference for Further Information: U.S. Department of Agriculture, Natural Resources Conservation Service, Conservation Operations Division, P0 Box 2890, Washington, D.C. 20013, Telephone: 202-720-1845; Fax: 202-720-1838; Internet: **www.nhq.nrcs.usda.gov/CCS/FB96OPA/ EQIPfinal.html**.

DEPARTMENT OF AGRICULTURE
FOREST SERVICE
ECONOMIC ACTION PROGRAMS

Description: The Economic Action Programs framework under Cooperative Forestry Assistance includes a set of programs aimed at helping communities to diversify and strengthen their local economies through a whole range of forest-based resources. It focuses on integrating economic development and environmental protection concerns in the context of sustainable community development goals. The three major program components are Rural Community Assistance, Forest Products Conservation and Recycling, and Market Development and Expansion. Rural Community Assistance focuses on helping the whole community capitalize on available local human and natural resources to improve the quality of life and the social and economic situation. Communities are helped to organize, plan, and implement actions that are community-based, comprehensive, and partnership oriented. Forest Products Conservation and Recycling encourages and facilitates more efficient use of forest resources to enhance economic development and promote better stewardship of the forest resource. Emphasis is on stimulating public and private sector innovation. Opportunities include new uses for wood and other forest based resources through recycling and value-added secondary manufacturing, and alternative goods and services. Market Development and Expansion is meant to strengthen local and regional economies through the creation of domestic and international markets for forest resources.

Actual Use: The Michigan Forest Management Division emphasizes employment retention through sustainable economic activities in the forest products industry. The New Mexico Forestry Division has initiated a forest health/rural wealth partnership to assist forest-based communities to utilize forest products in ways that help improve the health of forest ecosystems.

Potential Use: State foresters can promote conservation and recycling of forest resources in conjunction with the production and marketing of environmentally friendly goods.

Advantages: Economic Action Programs focus on integrating economic development and environmental protection concerns. They can help organize diverse community interests for renewable resource based economic development and conservation.

Limitations: State forestry agencies must participate meaningfully in the program if it is to provide needed environmental assistance while promoting forest-based economic development

Reference for Further Information: U.S. Department of Agriculture, Forest Service, State and Private Forestry Division, Cooperative Forestry Staff, P.O. Box 96090, Washington, DC 20090-6090, Telephone: 202-205-1657, Fax: 202-205-1174, Internet: **www.fs.fed.us/spf/**.

DEPARTMENT OF AGRICULTURE
FOREST SERVICE
LANDOWNER ASSISTANCE PROGRAMS

Description: Cooperative Forestry Assistance includes technical and financial assistance to help private landowners create sustainable forest land management plans and implement their forest stewardship objectives. The Forest Stewardship Program (FSP) uses cooperative agreements with State forestry agencies to deliver professional natural resource management advice to non-industrial private forest (NIPF) land owners. It provides technical and planning guidance to landowners who agree to maintain the land under a detailed natural resource management plan for at least ten years. A completed Forest Stewardship plan is required of landowners seeking cost share assistance via the Stewardship Incentives Program (SIP). This program supports a wide range of forest management activities to

FY 1997 ranged from $2,150 to $1,500,000 with an average of $170,402. Funding estimates in FY 1998 and 1999, were $104,305,000 and $55,994,000, respectively.

Potential Use: The types of physical infrastructure projects supported could include more water and wastewater treatment systems and could be extended to include solid waste facilities, recycling facilities, waste4o~nergy facilities, small business air pollution and waste audits, and recreation. Project resources might also be devoted to brownfields cleanup and redevelopment activities.

Advantages: Funding for the Appalachian Regional Commission has been quite stable over the years, and highly equitable given the economic need of the region as a whole. Project funding is specific and remains an opportunity.

Limitations: Grants are limited to counties in all or part of the States comprising Appalachia -- including Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia and West Virginia. The program generally only supplements other federal grants and 20 percent of eligible costs must come from sources other than the federal government. ARC supplemental grant assistance is limited to 50 percent of total project costs except in distressed counties where assistance is limited to 80 percent

Reference for Further Information: U.S. Environmental Protection Agency (EPA), Environmental Financial Advisory Board (EFAB) Advisory, Small Community Financing Strategies for Environmental Facilities, August 9, 1991 (this report contains a general description of the ARC supplemental grant program). Additional information on these grants and ARC programs can be found in the Catalog of Federal Domestic Assistance and at its World Wide Web site: **http://aspe.os.dhhs.gov/cfda/index.htm** - wherein there the assistance programs of all federal departments and agencies can be accessed via various organizational and topical formats.

DEPARTMENT OF DEFENSE
ARMY CORPS OF ENGINEERS
CIVIL WORKS PROJECTS

Description: The Army Corps of Engineers' Civil Works Directorate has numerous environmental responsibilities. Not only is the Corps the largest provider of water-based recreation facilities, it also administers a major environmental permitting program and operates hydropower facilities which provide 24 percent of the nation's electricity. Now among the Corps' responsibilities is management of the Formerly Used Sites Remedial Action Program (FUSRAP), which was transferred from the Department of Energy in 1997. Although major projects require congressional approval, the Corps' Continuing Authority projects, which must cost under $5 million, can take care of emergency repairs to streambanks and shorelines, small beach erosion control projects, Section 107 Small Navigation Projects, projects to mitigate shore damage at federal navigation projects, small flood control projects, and snagging and clearing for flood control. Some types of projects have federal cost limits of $500,000. Depending upon the type of project, cost sharing may be 50 percent federal, 80 percent federal, or potentially more complicated. For most assistance, preapplication consultation and coordination is essential and the application is simply a letter to the District Engineer, indicating clear intent to provide all required local participation.

Actual Use: The Corps spends about $500 million a year on environmental activities. The Continuing Authorities Program had $50 million for Fiscal Year 1998 and the President's budget requests $47 million for Fiscal Year 1999. Recent projects include work to prevent Judsonia, Arkansas', sewage lagoon levee from collapsing into the Little Red River and plans to combine structural flood control with creation of fish and wildlife habitats in New Jersey's Raritan River Basin.

Potential Use: State and local governments can work with the Corps' District Engineer to define environmentally sensitive project objectives and identify realistic sources of the non-federal share of costs.

Advantages: The Continuing Authorities Program eliminates the need for project-specific congressional authorizations for relatively small projects and the federal share of costs can make such projects affordable for state and local governments.

Limitations: Projects must be engineering feasible, economically justified, and complete within themselves.

Reference for Further Information: Contact U.S. Army Corps of Engineers, Directorate of Civil Works, 20 Massachusetts Avenue, NW, Washington, DC 20314-1000; Phone: 202-272-1975; Internet: **www.usace.army.mil/.**

ENVIRONMENTAL PROTECON AGENCY (EPA)
ENVIRONMENTAL EDUCATION AND TRAINING GRANTS

Description: The National Environmental Education Act authorizes project grants to establish environmental education and training programs. EPA's Office of Environmental Education runs an Environmental Education and Training Program (EETP), to train educational professionals in the development and delivery of environmental education programs, and Environmental Education Grants (EEG), to support projects to design, demonstrate, or disseminate practices, methods or techniques related to environmental education and training. EETP supports classroom training in environmental education and studies including environmental sciences and theory, educational methods and practices, environmental career or occupational education, and topical environmental issues and problems. It also supports development of environmental education programs and curricula, including those to meet the needs of diverse ethnic and cultural groups. EEGs support the design, demonstration, or dissemination of environmental curricula, including development of educational tools and materials. Projects must focus on improving environmental education teaching skills, or educating communities, the general public, teachers, or students about public health, or building State, local or tribal government capacity to develop environmental education programs.

Actual Use: In Fiscal Year 1997 EPA awarded a small grant to Haskell Indian Nations University to support extension of environmental education to under-served American Indian audiences through distance learning (See Section 2.C., Agriculture: RUS - Distance Learning and Telemedicine Loans and Grants). Large awards have been made to the University of Michigan and the North American Association for Environmental Education. In Fiscal Year 1997, grant obligations totaled $1.95 million. For Fiscal Years 1998 and 1999, grant obligations are estimated at $1.95 and $1.82 million, respectively.

Potential Use: Environmental Education Grants can be used to develop a grass-roots capability to understand and evaluate environmental conditions and measures proposed to address them.

Advantages: Grants make environmental education projects feasible in circumstances in which they are not otherwise possible. Environmental education prepares voters to deal rationally with critical issues which might be manipulated by vested interests.

Limitations: Funds cannot be used for acquisition of real property, including buildings, or the construction or substantial modification of any building. These grants require a 25% non-federal match and the training program grants are for five years subject to the availability of funds.

Reference for Further Information: U.S. EPA, Office of Communications, Education and Public Affairs, Environmental Education Division, Mail Code 1704, 401 M Street, SW, Washington, DC 20460, Telephone: 202-2604965, Fax: 202-2604095, Internet: **www.epa.gov/.**

ENVIRONMENTAL PROTECTION AGENCY (EPA)
ENVIRONMENTAL MONITORING FOR PUBLIC ACCESS

AND COMMUNITY TRACKING (IMPACT) GRANTS

Description: The EMPACT grants program is a pilot program designed to provide public access to clear, understandable, timely and accurate environmental monitoring data in at least 75 of the 86 larger metropolitan areas. The purpose is to assist the public in day-to-day decision-making about their health and the environment. The emphasis is on active partnerships between local and state government, research institutions, non-governmental organizations, the private sector, and the federal government in the use of advanced and innovative technologies to monitor environmental conditions and communicate clearly understandable, time-relevant and credible information to the lay public. Proposed partnerships must be established with formal agreements which outline the roles and responsibilities of individual partners. Each application must include provision for an Internet home page used for describing the program and for posting local environmental data. Grant or cooperative agreement awards range from $250,000 to $600,000 for a period of 12 to 24 months.

Actual Use: This is a new $3.5 million pilot program, for which full applications were due on May 15, 1998.

Potential Use: If the program is expanded, it could support provision of contemporaneous environmental information in a form readily understood by and useful to voters and taxpayers.

Advantages: Federal funding can facilitate the public understanding of environmental information that is essential for reasoned decision mating in both public and private policy arenas.

Limitations: While it may yield valuable experience, this pilot program is for the most populous metropolitan areas and there is no assurance that it will be expanded or continued.

Reference for Further Information: Contact Environmental Protection Agency, Office of Research and Development, National Center for Environmental Research and Quality Assurance, Environmental Engineering Research Division, Mail Stop 8722R, Washington, DC 20460, Telephone: 202-564-6824, Fax: 202-565-2446, E-mail: karn.barbara@epa.gov, Internet: **es.epa.gov/ ncerqa/rfa/empact.html.**

ENVIRONMENTAL PROTECTION AGENCY (EPA)
PERFORMANCE PARTNERSHIP GRANTS

Description: Performance Partnership Grants (PPGs) are multi-program grants made to State or Tribal agencies by EPA from funds allocated and otherwise available for categorical grant programs. They are voluntary and provide States and Tribes the option to combine funds from two or more categorical grants into one or more PPGs. PPGs are authorized by the 1996 Omnibus Consolidated Rescissions and Appropriations Act ~L 104-134). The authority covers the following sixteen program grants funded from EPA's State and Tribal Assistance Grants appropriation:

1. Air pollution control (CAA section 105);
2. Water pollution control (CWA section 106);
3. Nonpoint source management;
4. Water quality cooperative agreements (CWA section 104(b)(3));
5. Wetlands program development CWA section 014(b)(3));
6. Public water supervision (SDWA sections 1443(a) and 1451 (a)(3));
7. Underground water source protection (SDWA section 1443(1,));
8. Hazardous waste management (Solid Waste Disposal Act section 3011(a)):

9. Underground storage tank (Solid Waste Disposal Act section 2007(f)(2));
10. Radon assessment and mitigation (TSCA section 306);
11. Lead-based paint activities (TSCA section 404(g));
12. Toxics compliance and monitoring (TSCA section 28);
13. Pollution prevention incentives for States ~PA section 6605);
14. Pesticide cooperative enforcement (FIFRA section 23(a)(1));
15. Pesticides and program implementation ~IFRA section 23(a)(l))
16. Pesticide applicator certification & training/pesticide program (FIFRA section 23(a)(2)); and
17. General Assistance Grants to Indian Tribes (Indian Environmental General Assistance Act

Actual Use: States began to seek PPG authority and negotiate with EPA in FY 1997.

Potential Use: All fifty States and the Tribal agencies could negotiate and implement PPGS allowing them increased flexibility in implementing and funding environmental priorities. $169,900,000 in grants were obligated in Fiscal Year 1997.

Advantages: PPGs give States and Tribes more flexibility to address their highest environmental priorities, thus increasing equity and environmental incentives. They provide incentives to States and Tribes to improve environmental performance and links between program goals and outcomes. PPGs also cut administrative burdens/costs for recipients and EPA by reducing the numbers of grant applications, budgets, work plans and reports. EPA will build partnerships with States and Tribes via shared goals and division of responsibilities.

Limitations: No extra funds are available via use of PPGs. States and Tribes must first develop environmental indicators and performance measures to ensure progress is made to agreed on goals.

Reference for Further Information: U.S. EPA, Office of the Administrator, Office of Regional Operations and State/Local Relations, 401 M Street, SW, Washington, D.C. 20460, Mail Code: 1501.

ENVIRONMENTAL PROTECTION AGENCY (EPA) PROGRAM GRANTS

Description: Federal grants for various purposes including State and local program research, demonstrations, development, and implementation. The amount available, application criteria, and requirements differ from grant to grant, depending on Congressional authorization and internal EPA grant policies. Some grant programs are specifically authorized for a particular purpose, while other grant programs give significant discretion to the supervising EPA office.

Actual Use: The table on the following page provides a partial list of EPA grants, organized by the office that administers the grant. This list is provided only as an example; it is not necessarily comprehensive or current, since grants change from year to year according to Congressional authorization. Historically, EPA grants have funded both State and local programs in all environmental media. A number of grants are targeted to research and demonstration projects; other grants provide support for State and local program activities that coincide with federal environmental quality priorities.

Potential Use: State and local governments could use EPA grant funds to cover the costs of whatever program activities and/or capital purchases meet the applicable grant criteria.

Advantages: Federal grants provide State and local governments with the means of meeting national environmental quality goals. They may also provide funds otherwise unavailable to State or local programs, thus enhancing equity, environmental incentives, and financial leveraging considerations.

Limitations: Funds may be targeted to specific statutory goats. Programs must compete for limited funds and sign EPA grant agreements to perform activities. Each grant is very specific, thus limiting State and local flexibility.

Reference for Further Information: U.S. EPA grants can be accessed on the Agency's Web Page under: Grant Programs Administered by EPA at **http://www.epa.gov/ogd/grants.htm**. The respective EPA program offices will also have information on the grant programs that they oversee. In addition, the Catalog of Federal Domestic Assistance contains descriptions of all federal grant programs, including EPA's, and can be obtained at the Government Printing Office. EPA grant programs can also be accessed in the Catalog electronically through it Internet Website at **http://aspe.os.dhhs.gov/cfda/ideptaa.htm** - which is the section for Independent Agencies.

PARTIAL LISTIING OF EPA PROGRAM GRANTS BY OFFICE, 1995

Office of Water	Water Pollution Control State and Interstate Program Support Grants (Section 106) Water Quality Control Information System Grants State Public Water System Supervision Grants State Underground Water Source Protection Grants Water Pollution Control -- Lake Restoration Cooperative Agreements National Estuary Program Grants Nonpoint Source Planning Grants Nonpoint Source Set-Asides (under Title VI of the CWA) Wetlands Protection -- State Development Grants
Office of Research and Development	Solid Waste Disposal Research Grants Water Pollution Control - Research, Development and Demonstration Grants Toxic Substances Research Grants Safe Drinking Water Research and Demonstration Grants Environmental Protection -- Consolidated Research Grants Air Pollution Control Research Grants Pesticides Control Research Grants
Office of Administration	Environmental Protection Consolidated Grants -- Program Support
Office of Prevention, Pesticides, and Toxic Substances	Consolidated Pesticide Compliance Monitoring and Program Pollution Prevention Grants Program Cooperative Agreements Toxic Substances Compliance Monitoring Program Grants Asbestos Hazard Abatement (Schools) Assistance Toxic Release Inventory Data Quality Assurance Program
Office of Solid Waste and Emergency Response	Hazardous Waste Management State Program Support Superfund State Core Program Cooperative Agreements Hazardous Substance Response Trust Fund (Superfund) State Underground Storage Tank Trust Fund Program Solid Waste Management Assistance Grants Superfund Innovative Technology Evaluation Program

ENVIRONMENTAL PROTECTION AGENCY (EPA)
SECTION 319 NONPOINT SOURCE POLLUTION CONTROL GRANTS

Description: Section 319(h) of the Clean Water Act provides for formula grants to States and tribes to implement projects or programs that will help to reduce non-point sources of water pollution within identified priority watersheds. All project funding must implement EPA-approved nonpoint source management programs and include at least 40 percent nonfederal match.

Fundable projects include the design, demonstration, implementation, and evaluation of Best Management Practices (BMPs) for animal waste, nonpoint pollution reduction in priority watersheds, groundwater protection from nonpoint sources, public education programs on nonpoint source management (e.g., basin-wide landowner and homeowner education). Also covered now are lake projects previously funded under the Clean Water Act Section 314 Clean Lakes Program. Nonprofit organizations may submit applications to State lead agencies for funds in accordance with the State's work program.

Actual Use: State grants average $2 million and range from $268,651 to $5,310,372. Indian tribe grants average $50,000 and range from $45,000 to $55,000. In Fiscal Year 1997, grant obligations totaled $100 million. Grant obligation estimates for Fiscal Years 1998 and 1999 are $1 Os million and $200 million, respectively. Best management practices have been designed and implemented for stream, lake and estuary watersheds and for animal wastes and sediment, pesticide and fertilizer control. Several States have used Section 319 funds to support their Farm*A*Syst source water protection programs (see **Section 5.A., Cooperative Extension Systems**).

Potential Use: States can use funds to implement portions of nonpoint source management programs addressing critical priorities.

Advantages: Grant funds can make some otherwise unaffordable water quality activities feasible.

Limitations: States must provide a non-federal match of at least forty percent and meet maintenance of effort requirements. Only $100 million is available nationally and projects or programs must be conducted within the state's non-point source priority watersheds.

Reference for Further Information: U.S. EPA, Office of Wetlands, Oceans and Watersheds, Assessment and Watershed Protection Division, Nonpoint Source Control Branch, Mail Code: 4503F, 401 M Street, SW, Washington, DC 20460; Telephone: 202-260-7100, E-mail: ow.general~epa.gov, Internet: www.epa.govIowowINPSIguide.html. A description of this grant program can be found in the Catalog of Federal Domestic Assistance and at the Catalog's World Wide Web site, http:/laspe.os.dhhs.govlcfdalideptdoc.htrn.

ENVIRONMENTAL PROTECTION AGENCY (EPA)
SUPERFUND TECHNICAL ASSISTANCE GRANTS

Description: EPA's Office of Solid Waste and Emergency Response administers Superfund Technical Assistance Grants (TAG) for Citizen Groups at Priority Sites. The program provides project grants for incorporated community groups to hire technical advisors who can assist them in interpreting technical information concerning the assessment of potential hazards and the selection and design of appropriate remedies at sites eligible for cleanup under the Superfund program. Funds may be used at sites listed or proposed for listing on the National Priority List (NPL) where cleanup is underway to obtain technical assistance in interpreting information regarding the nature of the hazard, remedial investigation and feasibility study, record of decision, selection and construction of remedial action, operation and maintenance, or removal action.

Incorporated groups of individuals who may be affected by a release or threatened release at any Superfund facility are eligible. Affected individuals are homeowners, landowners and others who can demonstrate direct effects from the site, such as actual or potential health or economic injury. Competing groups are encouraged to consolidate and submit a single application. Only one grant is made per site, for a maximum of $50,000 unless waived for up to an additional $50,000. A twenty percent match, including in-kind contributions, is required unless waived or lowered due to financial burden The Superfund TAG Handbook provides detailed application instructions.

Actual Use: These grants help citizens acquire technical advisors to help them understand proposed clean-up remedies, better understand the technical problem at the site, and respond to EPA actions. Since the program began in March 1988, EPA has issued 196 awards totaling more than $72 million (including new awards, waivers and deviations). EPA superfund technical assistance grant obligations totaled $700,000 in Fiscal Year 1997 and are projected to be $1,000,000 and $500,000 in Fiscal Years 1998 and 1999, respectively.

Advantages: Technical assistance grants provide resources to help those directly affected by hazardous chemical waste sites to understand the situation and what is being done to correct it.

Limitations: Grants are limited to Superfund site communities and can be no more than $50,000-$ 100,000 for what is typically a six-year period. Funds cannot be used to develop new information or underwrite legal actions.

Reference for Further Information: U.S. EPA, Office of Solid Waste and Emergency Response, Office of Emergency and Remedial Response, Community Involvement and Outreach Center, Mail Code 5204G, 401 M Street, SW, Washington, DC 20460, Telephone: 703-603-8863; Fax: 703-603-9100; E-mail:superfund.info@epa.gov; Internet: **www.epa.gov/oerrpage/superfnd/web/tools/tag/ index.htm.**

ENVIRONMENTAL PROTECTION AGENCY (EPA) SUSTAINABLE DEVELOPMENT CRALLENGE GRANTS

Description: This EPA grant program is designed to encourage people, organizations, governments and businesses to work cooperatively to develop flexible, locally-oriented approaches that link place-based environmental management with sustainable development and revitalization. The program funds projects that improve the environment, build sustainable futures for communities, help local economies and encourage partnerships among community groups, businesses, government and others. It looks for projects yielding the greatest environmental and economic benefits, and leverage the most community investment and resources.

Actual Use: The Sustainable Development Grant Program solicits project proposals for grants of up to $250,000. Proposals are received from public entities, agencies, institutions and organizations (such as State and local governments, and federally recognized tribes and regional entities), and non- profit private agencies, institutions and organizations.

The Program obligated $5 million in grants in Fiscal Year 1997. Projects funded have ranged from better forest management practices in New Hampshire to a network of 26 community supported organic farms in the Mid-Atlantic region to a mid-city green projects building materials exchange in Louisiana to a smart wood certification program in Washington

Potential Use: The program could potentially fund the demonstration of a wide variety of environmentally and economically sustainable projects in all environmental media and program areas. These projects could help identify those practices which show priories of being truly sustainable and those which are not and should be avoided EPA estimates that the program will have grant obligations in Fiscal Years 1998 and 1999 of $5 million and $9.3 million, respectively.

Advantages: Funding authorities are broad and the program supports an unusually wide range of creative and innovative approaches, and provides support to segments of the private sector. Project support represents seed Funding and successful grantees leverage substantial additional public and private resources. Environmental incentives are very high and built into the program.

Limitations: The program requires a nonfederal match of 20 percent of a project's total budget and federal assistance may not exceed $250,000.

Reference for Further Information: U.S. EPA, Office of Air and Radiation, 401 M Street, SW, Washington, D.C. 20460, Telephone Number: 202-260-2441, Contact: Pamela Hurt.

ENVIRONMENTAL PROTECTION AGENCY (EPA) UNDERGROUND STORAGE TANK TRUST FUND PROGRAM GRANTS

Description: EPA's Office of Solid Waste and Emergency Response oversees two grant programs dealing with underground storage tanks. The State Underground Storage Tanks (UST) Program provides project grants to assist state governments in the development and implementation of underground storage tank programs, so as to build their capacity to operate their programs in lieu of the federal program. A high priority is to encourage owners and operators to upgrade or replace their tanks well in advance of the deadline. Owners and operators of UST systems have until December 22, 1998, to upgrade, replace or close substandard systems. The Leaking Underground Storage Tank (UST) Trust Fund Program provides project grants (cooperative agreements) to support state corrective action and enforcement programs that address releases from underground storage tanks containing petroleum. Funds are used to provide resources for the oversight and cleanup of petroleum releases from underground storage tanks where owners and operators are unknown, unwilling or unable to take corrective actions themselves. States may also oversee responsible party cleanups A ten percent state cost share is required.

Actual Use: The average LUST grant is $1.5 million and the range is from $300,000 to $4.3 million. All 50 states and six territories have cooperative agreements with EPA to conduct cleanups and provide oversight of responsible party cleanups. Some states, such as New York, provide additional funds to support their cleanup efforts. Funding for the grants (cooperative agreements) was approximately $50.3 million in Fiscal Year 1997. Funding estimates for Fiscal Years 1998 and 1999 are $55.25 million and $57.7 million, respectively.

Potential Use: The program can be used not only to solve the immediate problem of leaking underground petroleum storage tanks, but also to raise public awareness of the pollution threat to groundwater.

Advantages: Federal funds make it feasible for states and territories to conduct programs dealing with the environmental threat of leaking underground petroleum storage tanks. The program has been effective, reflecting the specific benefits of cleanup projects and the flexibility afforded the states to consider affordability issues and implement various financing arrangements.

Limitations: The programs are nearing a critical juncture which could lead to premature reductions in effort. The deadline for upgrading or replacing substandard systems is late December, 1998, but some small operators may not yet be in compliance due to financial difficulties.

Reference for Further Information: Contact Environmental Protection Agency, Office of Underground Storage Tanks, Implementation Division, 401 M Street, SW, Washington, DC 20460; Mail Code: 5403G, Telephone: 703-603-7175, Fax: 703-603-9163, Internet **www.epa.gov/**.

ENVIRONMENTAL PROTECTION AGENCY (EPA)
WETLANDS PROTECTION DEVELOPMENT GRANTS

Description: Environmental Protection Agency (13PA) regional offices administer project grants to State or tribal agencies, interstate/inter-tribal agencies, and local governments in developing new or enhancing existing wetlands protection programs. Grants are intended to encourage wetlands protection program development or to enhance/augment existing effective programs. Project proposals must clearly demonstrate a direct link to increasing a state's, tribe's, or local government's ability to protect its wetlands resources. The required minimum match is twenty-five percent of the total project costs. While projects funded should support the initial development of a wetlands protection program or the enhancement/refinement of an existing program, current priorities are Wetland/Watershed Protection Approach Demonstration Projects and River Corridor and Wetland Restoration Projects.

Actual Use: Each state has received at least one grant. In Fiscal Year (FY) 1997, grant obligations totaled $15 million and grant awards ranged from $1500 to $489,000. Grant obligations are estimated to remain at $15 million for both FY 1999 and FY 2000. Funds have been used to support development of wetland water quality standards which can be used as a primary tool in water quality certification decisions. Funding has been focused on wetlands/watershed protection, approach demonstrations and river corridor and wetlands reservations projects.

Potential Use: Grants can be used to support redesign of wetland and watershed protection programs that need to be changed to reflect evolving demographic and ecological realities.

Advantages: Design or improvement of wetlands protection programs can be made financially possible by these federal grants.

Limitations: Grant funds cannot be used for operational support of wetlands protection programs. The lack of operational support funds is a serious impediment to State involvement in wetlands protection.

Reference for Further Information: U.S. EPA, Office of Wetlands, Oceans and Watersheds, Wetlands Division, 401 M Street, SW, Washington, DC 20460, Mail Code: 4502F, Telephone: 800-)832-7828 or 202-260-1917, Fax:202-260-2356, Internet: **http://www.epa.gov/OWOW/wetlands/ partners.html.**

ENVIRONMENTAL TECHNOLOGY INITIATIVE (ETI)

Description: ETI is an interagency effort led by the U.S. Environmental Protection Agency (EPA) supporting partnerships and projects that promote improved public health and environmental protection by advancing the development and use of innovative environmental technologies. The Initiative promotes innovative technologies that prevent pollution, control and treat air and water pollution, remediate contaminated soil and groundwater, assess and monitor exposure levels and mange environmental protection information.

Actual Use: ETI has provided funding support in excess of $100 million for more than 250 partnerships and projects throughout the United States advancing the development and use of innovative environmental technologies. Many of the partners participating in ETI projects are investing three to four dollars for every dollar invested.

Potential Use: As the costs and an difficulties of meeting environmental challenges grow, the need for new and better environmental technologies will grow. The potential prospects for the environmental technology industry are truly staggering. The United States' environmental technology industry is already a high-wage, high growth industry. More than a million Americans are employed in over 50,000 companies nation-wide. Our market for environmental technology is the largest in the world and global markets are expected to grow by hundreds of billions of dollars in the coming years.

Advantages: Use of the innovative environmental technologies being developed and promoted by ETI partnerships and projects can cut regulatory compliance costs, reduce public health risks, gain superior environmental results, make companies more efficient and competitive, and improve community environmental services. Private sector equity, environmental incentives, and leveraging possibilities are all high.

Limitations: Before innovative environmental technologies can achieve regulatory acceptance, technology developers must decipher and meet a disjointed system of verification requirements in each State where a potential market exists. Once regulatory acceptance is achieved, the innovative technologies must then prove themselves and gain acceptance for actual field use.

Reference for Further Information: U.S. EPA; Office of Policy, Planning, and Evaluation, Policy and Technology Innovations Division, 401 M Street SW, Washington, DC 20460, Mail Code: 2127, ETI Infoline: 202-260-2686, Internet site: **http://www.epa.gov/oppe/eti.**

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FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD MITIGATION ASSISTANCE

Description: The Federal Emergency Management Agency (FEMA) provides planning grants to assist communities with development of flood mitigation plans and project grants for implementation of planned measures to reduce flood losses. State agencies, participating National Flood Insurance Program (NFIP) communities, and qualified local organizations are eligible. Planning grants support assessment of long-term risk of flood damage to homes and other structures insurable under the NFIP and identification of actions needed to reduce risk of flood losses. Communities must have Flood Mitigation Plans to be eligible for project grants. Implementation project grants may support measures such as dry flood-proofing, elevation, relocation, acquisition, or demolition of insured structures, erosion control and drainage improvements, and beach nourishment activities such as planting of dune grass. They can be used for minor, localized structural projects, such as erosion control and drainage improvements, that are not fundable by state or other federal programs.

Actual Use: The Flood Mitigation Assistance program obligated about $17 million in grants in Fiscal Year 1997, 50 risk assessments and mitigation plans were principal activities. FEMA estimates that grant obligations will be $20 million in Fiscal Years 1998 and 1999, respectively. The program's accomplishments, including examples of the types of projects funded, are contained in a Biennial Report to the Congress. This report can be obtained from FEMA upon request.

Potential Use: This program has the potential to help support coastal watershed protection and dune preservation activities.

Advantages: The Flood Mitigation Assistance program can in specific circumstances fill funding gaps left by other federal and State programs. FEMA may fund up to seventy-five percent of the cost of eligible activities. Each State and territory receives a guaranteed base funding for Planning ($10,000) and Projects ($100,000).

Limitations: Communities that have been suspended from the National Flood Insurance Program are not eligible. This is a relatively small program. A twenty-five percent non federal match is required.

Reference for Further Information: U.S. Federal Emergency Management Agency (FEMA), Mitigation Directorate, 500 C Street, SW, Washington, DC 20472, Telephone: 202-6464621, Internet: **www.fema.gov/home/MIT/fmasst.htm** FEMA Regional Offices in Boston, MA, New York, NY, Philadelphia, PA, Atlanta, GA, Chicago, IL, Denton, IX, Kansas City, MO, Denver, CO, San Francisco, CA, and Bothell, WA (check with FEMA Headquarters for appropriate contracts and numbers).

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) HAZARD MITIGATION GRANTS

Description: The Federal Emergency Management Agency (FEMA) provides State and local governments project grants to implement measures that will permanently reduce or eliminate future damages and losses from natural hazards. A State Administrative Plan and State 409 Plan, which describe projects, are required for FEMA to identity a need for funding assistance. The State solicits, reviews, prioritizes and selects applications, then forwards them with project narratives, descriptions and fact sheets to FEMA for review. FEMA can fund up to seventy-five percent of eligible project costs and the State or project applicants must provide the nonfederal share. State agencies, local governments, public entities, private non-profit organizations, Native American Tribes, and Alaskan Native villages are eligible for subgrants from the States. Funds may be used for the acquisition of real property.

Actual Use: FEMA funded 51 projects in Fiscal Year 1997 and 45 in Fiscal Year 1998. Drainage improvement and vegetation management projects are among those the types of environmentally-related activities that have been funded.

Potential Use: Real property can be required for treatments which will meet environmental objectives while mitigating natural hazards.

Advantages: The federal share can be up to seventy-five percent of total eligible costs, making otherwise unaffordable projects feasible.

Limitations: The program is based on fifteen percent of all other public and individual disaster grants. Projects must be in Presidentially declared disaster areas and applicants must work through the state agency that is responsible for setting priorities for funding. The State or project applicant must provide a twenty-five percent match. The nonfederal match, however, can be a combination of cash, in-kind services, or materials.

Reference for Further Information: U.S. Federal Emergency Management Agency (FEMA), Mitigation Directorate, Program Implementation Division, 500 C Street, SW, Washington, DC 20472, Telephone: 202-646-4621, FEMA Regional Offices in Boston, MA, New York, NY, Philadelphia, PA, Atlanta, GA, Chicago, IL, Denton, TX, Kansas City, MO, Denver, CO, San Francisco, CA, Bothell, WA, Internet: **www.fema.gov/mit/hmgp.htm**.

FOUNDATION AND CORPORATE GIVING

Description: Foundation and corporate giving are an important source of funding for activities in education, health and human services, civic and community affairs, and culture and the arts. They are also a significant and growing source of funding for environmental projects. Most such funding is in the form of grants for well-defined projects (i.e., time, cost, and deliverables) that meet the immediate priorities of the funding source, and are not funded by governments.

Actual Use: More than 7,500 major foundations in the United States with assets totaling about $170 billion make annual donations exceeding $10 billion. Corporations alone support 2,300 philanthropic programs in the form of foundations or as direct-giving programs. In 1995, 703 foundations made environmental gifts totaling more than $425 million.

The Global Futures Foundation is a nonprofit environmental foundation that supports integrated programs leading to source reduction, pollution prevention, low-cost market development and incentive driven regulatory structures which reduce economic and environmental costs. Patagonia, Inc. is a clothing firm that devotes 1% of sales to its environmental grants program and gave more than $1.1 million in 1995-6 to over 200 projects for preserving and restoring the environment.

Potential Use: Foundation and corporate giving could fund innovative environmental projects in many areas, and total support could reach more than a billion dollars. Grants typically go for research, education, and demonstration projects, but also could be used to fund projects involving planning, monitoring, and technology.

Advantages: These grants are not directly dependent on tax dollars and grant conditions may be less burdensome. Innovation is encouraged and equity provided since grantees are not supported by governments. Grantees are forced to leverage other resources or become self-sustaining.

Limitations: Funding levels may be highly variable, competition for resources is very intense and awards are usually directed to innovative projects. Environmental impacts may be limited if projects are too small and esoteric. Since funding is typically for very short, defined periods of time, it is a real challenge for grantees to succeed or become independent.

Reference for Further Information: The Foundation Directory features the nation's largest foundation funders. The National Directory of Corporate Giving profiles over 2,300 corporate philanthropic programs. These books are available from the Foundation Center, 79 Fifth Avenue, New York, NY 10003-3076, Telephone: 212-6204320. See also Environmental Data Resources, Inc., Environmental Grantmaking Foundations, 1995 Directory, Rochester, NY, 1996.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD) COMMUNITY DEVELOPMENT BLOCK GRANTS (CDBG) ECONOMIC DEVELOPMENT INITIATIVE GRANTS

Description: The CDBG Economic Development Initiative (EDI) awards project grants to help local governments eligible under HUD's Section 108 Loan Guarantee Program carry out economic development projects. The grants must enhance the security of loans guaranteed under the Section 108 Program or improve the viability of projects financed under the Section 108 Program.

Actual Use: Fiscal Year 1996 assistance ranged from $975,000 to $3.5 million, with an average grant of $1.8 million. For Fiscal Year 1998, EDA estimates $38 million in funding for 50-75 standard EDI projects and $25 million for funding for up to 25 brownfields projects. In Fiscal Year 1999, $ 400 million in EDI funds will be allocated to the proposed Community Empowerment Fund and $50 million in funds will be allocated for up to 50 brownfields projects.

Projects funded include a wide range of economic development activities including commercial, industrial and economic development revolving loan funds. Eligible activities include acquisition of real property; rehabilitation of publicly-owned real property, housing rehabilitation, economic development activities, acquisition, construction reconstruction, or installation of public facilities, and, in the colonias, public works and other site improvements. Brownfields EDI grants will result in a similar range of activities for qualified Brownfield sites.

Potential Use: Depending on interpretation of Section 108 criteria, grants might finance or leverage loans funding facilities in water, wastewater, solid waste, recycling, waste-to-energy, and small business air quality improvements.

Advantages: Equity and leveraging opportunities are high and built into the program. Some very specific environmental projects have been completed in low-income areas.

Limitations: EDI grant funds only be used in conjunction with projects and activities assisted under the Section 108 loan Program. Principal beneficiaries of the grants must be low and moderate income persons. Many non-environmental projects are funded and payment is on a cost-incurred basis.

Reference for Further Information: The U.S. Department of Housing and Urban Development (HUD) publication, Programs of HUD, contains a description of this CDBG program. Information on it can also be found in the Catalog of Federal Domestic Assistance and its Internet site at http:llaspe.os.dhhs.govlcfdalidepthud.htm -which has links to these HUD grants.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD) COMMUNITY DEVELOPMENT BLOCK GRANTS (CDBG) ENTITLEMENT GRANTS

Description: The CDBG Entitlement Grants Program seeks to develop viable urban communities by providing decent housing and a suitable living environment, and by expanding economic opportunities. It supports activities that benefit low-to moderate income citizens in cities in Metropolitan Statistical Areas (MSAs) designated by OMB as a central city of the MSA and other cities over 50,000 in MSAs and qualified urban counties of at least 200,000 (excluding entitlement cities located in such counties). Federal formula grants based on population, income, housing, and growth lag are awarded to eligible entities. Specific activities that can be carried out include acquisition of real property, relocation and demolition, rehabilitation of residential and nonresidential structures, and the provision of public facilities and improvements, such as water and wastewater treatment facilities.

Actual Use: HUD obligated more than $3 billion in entitlement grants in fiscal year (FY) 1997 and plans to obligate approximately that much in both FYs 1998 and 1999. Nine hundred and eighty-six local governments were eligible to receive these grants in FY 1998. Grantees must certify that at least seventy percent of grant funds received are spent for activities that principally benefit low- and moderate-income persons. Water and wastewater treatment facilities and brownfields-related activities are among the types of eligible projects that have been funded by these important grants.

Potential Use: Depending on interpretation of grant criteria, these CDBG grants might be used to increasingly finance brownfields cleanup and redevelopment activities, as well as air pollution and solid waste facilities.

Advantages: This grant program is HUD's major program and has been relatively stable.

Limitations: These grants assist a limited number of relatively large communities with distressed areas. To apply, communities must develop and submit a number of detailed documents including a Consolidated Plan, annual action plan and certifications. Post award requirements include annual performance reports, audits, and detailed records maintenance. Many non-environmental projects are funded, competition is fierce, and assistance is provided on a reimbursement basis.

Reference for Further Information: The U.S. Department of Housing and Urban Development (HUD) publication, *Programs of HUD*, contains a description of this CDBG program. Information on it can also be found in the *Catalog of Federal Domestic Assistance* and its Internet site at **http://aspe.os.dhhs.gov/cfda/idepthud.htm** - which has links to these HUD grants.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD) COMMUNITY DEVELOPMENT BLOCK GRANTS (CDBG) SMALL CITIES PROGRAM NONE~TLEMENT GRANTS

Description: These grants support decent housing, a suitable living environment, and expanded economic opportunities for low and moderate income persons. They fund activities in nonentitlement areas (cities with 50,000 or less people and counties with less than 200,000 people that do not receive entitlement grants) in New York and Hawaii. Eligible activities include the acquisition, rehabilitation or construction of public works facilities and improvements, clearance, housing rehabilitation, code enforcement, home ownership assistance, relocation payments, economic development, existing urban renewal projects, and certain public services.

Actual Use: HUD obligated just over $60 million for these grants in fiscal year (FY) 1997 and plans to obligate like amounts in FYs 1998 and 1999. Water and wastewater Systems are among the projects funded by this assistance. State fund allocations are determined by formula taking into account population, income levels, per room housing density; age of housing, and other factors.

Potential Use: Depending on HUD interpretation of grant criteria, these grants might be used to finance air pollution control, solid waste, recycling, and waste-to-energy facilities, as well as a range of brownfields cleanup and redevelopment activities.

Advantages: Environmental justice and equity concerns in terms of addressing ability-to-pay are good. Leveraging possibilities with State revolving loans and rural utility water and wastewater funding and/or pre-financing are high.

Limitations: Priority is given to grants that benefit low and moderate income persons or aid in the elimination of slums or blight. At least seventy percent of each grant made must benefit low and moderate income persons. For metropolitan areas, low and moderate income is a level equal to or less than HUD's Section 8 low income limit. For non-metropolitan areas, low and moderate income is defined as eighty percent of the median income for those areas in the State.

Reference for Further Information: The U.S. Department of Housing and Urban Development (HUD) publication, *Programs of HUD,* contains a description of this CDBG program. Information on it can also be found in the *Catalog of Federal Domestic Assistance* and its Internet site **at http://aspe.os.dhhs.gov/cfda/idepthud.htm** - which has links to these HUD grants.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD) COMMUNITY DEVELOPMENT BLOCK GRANTS (CDBG) STATES' GRANTS PROGRAM NONENTITLEMENT GRANTS

Description: These grants help provide communities with decent housing, a suitable living environment and expanded economic opportunities. They finance activities in nonentitlement areas (cities with 50,000 or less people and counties with less than 200,000 people which do not receive entitlement grants) that benefit low to moderate income citizens. Puerto Rico and all States except New York and Hawaii receive funds to administer these grants to localities. Each State develops its own program and funding priorities. Fundable activities include buying real property, relocation and demolition, rehabilitation of residential and nonresidential structures, and providing public facilities and improvements such as water and wastewater treatment facilities.

Actual Use: HUD obligated more than $1.2 billion in nonentitlement grants in fiscal year (FY) 1997 and plans to obligate about as much in both FYs 1998 and 1999. Grantees must ensure that seventy percent of grant funds benefit low- and moderate-income persons. Water and wastewater treatment systems are among the projects eligible for assistance. State allocations are set by formula using population, income levels, per room housing density; age of housing, and other factors.

Potential Use: Depending on each State's interpretation of grant criteria, CDGB entitlement grants might also be used to finance air pollution control, solid waste, recycling, and waste-to-energy facilities, as well as a range of brownfields cleanup and redevelopment activities.

Advantages: The program is equitable from an affordability perspective. Leveraging can be high, as communities can combine State revolving loans, as well as rural utility grants and loans, for water and wastewater systems.

Limitations: Grants are limited to low and moderate income communities experiencing distress. For metropolitan areas, low and moderate income is a level equal to or less than HUD's Section 8 low income limit. For non-metropolitan areas, it is defined as eighty percent of the median income for those areas in the State. A State may only use up to $100,000 plus two percent of its grant to administer the program and must match each federal dollar over $100,000 used for administration with a dollar of its own.

Reference for Further Information: The U.S. Department of Housing and Urban Development (HUD) Fact Sheet, State Community Development Block Grant Program, describes the program. HUD, Office of Block Grant Assistance, Small Cities Division, 415 7~ Street, SW, Washington, DC 20410, Telephone: 202-708-1322. The HUD publication, *Programs of HUD,* also has a description of this CDBG program. Information on it can also be found in the *Catalog of Federal Domestic Assistance* and its Internet site at **http://aspe.os.dhhs.gov/cfda/idepthud.htm.**

DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE NORTH AMERICAN WETLANDS CONSERVATION ACT GRANTS

Description: The North American Wetlands Conservation Act Grant Programs promote long term conservation of wetland ecosystems and the waterfowl and other migratory birds, fish and wildlife that depend upon such habitat. It provides project grants on a matching basis for acquisition, enhancement and restoration of wetlands and associated habitat. The programs are meant to encourage voluntary public-private partnerships to conserve wetland ecosystems by creating an institutional infrastructure and providing a source of funding. The funding cap for Standard Grants is $1 million, while the cap for Small Grants is $50,000. The nine-member North American Wetlands Conservation Council, created by the North American Wetlands Conservation Act of 1989, reviews the merits of wetlands conservation proposals submitted for funding. The Council considers the extent to which the project fulfills the purpose of the Act, the North American Waterfowl Management Plan, or the Canadian-Mexican-U.S. Tripartite Agreement, as well as its consistency with the National Wetlands Priority Conservation Plan developed under the Emergency Wetlands Resources Act of 1986. While anyone can apply for a grant at anytime, the Council goes through the proposal selection process three times a year. It then makes recommendations to the Migratory Bird Conservation Commission for consideration of funding.

Actual Use: In March 1998, nineteen U.S. projects in fifteen states were approved for about $10.2 million in federal funding, to be matched by almost $24.5 million from partners. For example, $655,000 was approved for the Teton River Valley Ecosystem Project in Idaho.

Potential Use: The programs can fund acquisition of real property interests such as conservation easements, fee simple title, and wildlife management agreements.

Advantages: The programs take a non-regulatory approach encouraging voluntary partnerships to develop and implement wetland conservation projects to benefit wetland dependent wildlife.

Limitations: The current funding authorization expires at the end of fiscal 1998; however, reauthorization appears likely.

Reference for Further Information: For a copy of the *1998 Grant Application Instructions,* contact the U.S. Department of the Interior, Fish and Wildlife Service, North American Wetlands Conservation Council Coordinator, North American Waterfowl and Wetlands Office, 4401 North Fairfax Drive, Room 110, Arlington, VA 22203, Telephone: 703-358-1784, E-mail: r9arw_nawwo@mail.fws.gov, Internet: **www.fws.gov/.**

STATE GRANT PROGRAMS

Description: Almost all States have environmentally-related grant programs for eligible local governmental units, and sometimes the private sector. Since the source and type of grant varies considerably from state-to-state, localities should obtain copies of State grant catalogs for specific information. State grants fall into several categories: (1) annually appropriated grant monies; (2)federally mandated grants; and (3) grants arising from referendum bond acts, which historically have been the largest source of State grant monies.

Actual Use: Annually appropriated States grants historically have been small, and typically provide funds for programs (as opposed to construction) for which there has been no federal funding, e.g., water and wastewater operator training, drinking water and air pollution, and nonpoint source control. Federally mandated grants include the twenty percent match required for the SRF, and other environmental requirements such as facility operator certification, monitoring and testing, and small business clean air audits. By far the largest State grants arise from environmental bond acts passed by referendum, which historically have been the main source of funding for environmental infrastructure, parks and conservation, and solid and hazardous waste. Recent years have seen a surge in large State referendum bond acts. For example, New York's 1996 $1.75 billion bond act included money for drinking water grants, watersheds, small business (water and air) and brownfields grants. California passed a $994 million bond act financing drinking water grants, New Jersey a $340 million bond act which included incentive matching grants for localities and nonprofits, Massachusetts a $399 bond act which included watershed and farmland protection grants, and Florida a $300 million bond act which included habitat protection grants.

Potential Use: States have become increasingly creative in leveraging grants, and providing assistance to non-traditional clients such as nonprofits and small businesses. Many States now provide matching incentive grants to localities for local fundraising and to nonprofit organizations, such as in New Jersey and New York. Minnesota and Maryland provide dollar-for-dollar matching grants for private contributions for wildlife and wetlands protection, including private mitigation.

Advantages: State grants can be directed to pressing compliance needs and small communities, thus reducing costs and enhancing equity. State grants may be more flexible and entail less red tape than federal assistance, and can be further leveraged.

Limitation: Historically, State grants have not been large or predictable. Funding tends to come and go, and monies are available on a first-come-first-serve basis, favoring projects ready to proceed. Many restrictions still apply, such as on grants to non-profits and individuals. Grants, compared to loans, may result in more costly and slower projects, since the money is regarded as "free".

Reference for Further Information: Contact State Budget Offices for further information.

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STATE REVOLVING FUND (SRF) DRINKING WATER PRINCIPAL SUBSIDIES

Description: The 1996 Amendments to the Safe Drinking Water Act (SDWA), which established the Drinking Water State Revolving Loan Fund program (DWSRF) capitalized by federal grants and State matching grants, provides for loan subsidies in the form of "forgiveness of principal" to communities defined as disadvantaged. A principal subsidy is the same as grant. The SDWA provisions from creation of revolving loan finds permits states to use up to 30% of the federal capitalization grants for principal subsidies. States must established affordability criteria which guide the circumstances when a "disadvantaged" community may received a principal subsidy. Affordability criteria typically are based on the target service charge compared to median household income. Principal subsidies are not permitted under the Clean Water SRFs.

Actual Use: Most States plan to use the principal subsidy authority under the DWSRF. Principal subsidies are available to private public purpose drinking water projects as well as publicly-owned projects. States with many small communities and low median household incomes may reach the 30% limit set by the Act. However, in many States the loan demand is so large that principal subsidies will be a smaller percentage than this limit. In New York, principal subsidies come from environmental bond act monies instead of SRF funds, and may provide up to 75% of project funding.

Potential Use: Principal subsidies may allow drinking water projects to proceed which otherwise wold be delayed or not undertaken. They also may be combined with SDWA provisions allowing a 30-year loan instead of the 20 year limit on most SRF loans. SRFs can set aside a set amount of monies for investment purposes to assist in subsidizing loans. For a $100,000 principal subsidy, an SRF could invest $71,430 a year at 7%, yielding $5,000 a year for 20 years to pay for the subsidy.

Advantages: SRF grants make projects more affordable for smaller communities and may be the crucial factor is whether such a community proceeds or not. Hence, accessibility as well as equity are enhanced. SRFs can leverage their subsidy potential through sound investments. Based on a states affordability levels, projects entitled to principal subsidies can be prequalified for assistance, thus easing administrative burdens and uncertainties.

Limitations: Principal subsidies reduce the leveraging potential of loanable funds, as well as their revolving nature. Thus, States must be very careful not to undercut the long term solvency of SRF funds by providing too many grants as opposed to loans. Accessibility to loans for other communities declines by the amount of principal subsidies offered.

Reference for Further Information: Localities should consult their State DWSRF officials to determined principal subsidies policies and affordability criteria. State Intended Use Plans published annually will describe principal subsidy benefit recipients.

DEPARTMENT OF TRANSPORTATION TRANSPORTATION EQUITY ACT FOR THE 21st CENTURY (TEA-21)

Description: The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 set new standards for environmental sensitivity. The Transportation Equity Act for the 21st Century (ThA-2 1) signed June 9, 1998, reauthorized, modified and extended ISTEA largely continuing the improved relationship between transportation and the environment. ISTEA made wetlands mitigation efforts eligible under both the National Highway System and Surface Transportation Program. Eligible activities included mitigation banking, wetland preservation and restoration efforts, and State and regional wetland planning. TEA-2 1 retains wetland mitigation project eligibility and adds natural habitat. It allows up to 20% of reconstruction, resurfacing, rehabilitation or restoration project costs for environmental restoration and pollution abatement, including retrofit or construction of stormwater treatment systems to address environmental problems caused or contributed to by transportation facilities. Other eligible activities, including purchase of scenic easements, scenic beautification and landscaping, preservation of abandoned railway corridors, and mitigation to address water pollution due to highway runoff, are reauthorized with 40% more money.

The Congestion Mitigation and Air Quality Improvement Program continues with $9.1 billion authorized. A new Clean Fuels Program is authorized at $1.2 billion. The Congestion Pricing Pilot Program becomes the Value Pricing Pilot Program and the number of project States grows from 5 to 15, with funding of $8 million/year. A new $100 million National Wetlands Restoration Pilot Program to offset wetlands degradation caused by highway construction before 12/27/77, is authorized. A 5-year, $120 million program is authorized to research relationships between transportation, community preservation and the environment, and the role of the private sector.

Actual Use: The new authorities tend to build on experience under ISTEA.
Potential Use: Contingent upon regulations implementing changes made by the reauthorization, state transportation agencies will be able to undertake a variety of measures to combat air pollution, restore and preserve wetlands, and otherwise mitigate environmental impacts.

Advantages: Inclusion of support for environmental measures diminishes counterproductive tensions between transportation infrastructure development and environmental protection.

Limitations: If the legislation's potential is to be realized, transportation agencies must be willing to take advantage of the environmental authorities conveyed.

Reference for Further Information: U.S. Department of Transportation, The Federal Highway Administration, 400 7th Street, SW, Washington, DC 20590; Telephone: 202-366-5004, Internet: **www.dot.gov/.**

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URL: http://www.epa.gov/efinpage/guidbk98/gbk2c.htm

Environmental Finance Center

Federal and State Programs for Water Quality

Stream Corridor restoration projects in Pennsylvania can use the following programs for funding assistance.

Contact the EFC by email for more information about any of the following programs.
Phone: 301-405-6383
Fax: 301-314-9581
Return to the Environmental Finance Center or see matrices for Maryland or Virginia
Also see the accompanying Pennsylvania Resources of additional technical and funding assistance!

Note: Other links within the matrix will take you to that agency's pages.

When printing this page, try setting your printer to landscape mode in order to get all the columns. If you would like us to send you a full fact sheet, please send us a check for $1, made payable to CEPP (Coastal and Environmental Policy Program), and remember to tell us which state you'd like.

Stream Corridor Protection Funding Options - PENNSYLVANIA

	Eligibility			Program Funding Areas				What's Offered			Users
Program name	*indi-viduals*	public agencies	other orgs	*capital*	*planning*	*edu-cation*	*mainten-ance*				
Conservation Reserve Program (CRP)	•							50/50% cost share and payments	NRCS 717-237-2204 or DCNR Bureau of Forestry 717-787-2703	ag,rb,w	farmers
Reforestation Tax Credit	•			• (reforestation)				10% tax credit	DCNR Bureau of Forestry 717-787-4777	rb	private
Stewardship Incentive Program (SIP)	•			•	•			cost share up to 75%	DCNR Bureau of Forestry 717-787-2105	ag,er,rb,w	private forests
Wetlands								grants for wetland	DEP Bureau of		

Replacement Program - DEP	•			•	•			construction and plant materials	Water Quality Protection 717-787-6827	rb,w	individuals
Environmental Quality Incentives Program (EQIP)	•			•	•		•	cost share and incentives	NRCS 717-237-2204 or local RC&D - see back	er,rb	ag or livestock producers
Wetlands Reserve Program (WRP)	•			•	•		•	easement cost share and incentives	NRCS 717-237-2204 or local RC&D - see back	w	private land
Wildlife Habitat Incentives Program (WHIP)	•			•	•		•	cost share up to 75%	NRCS 717-237-2204 or local RC&D - see back	ag,rb,w	private land
Woodland Incentive Program (WIP)	•			•	•		•	cost share 50% for forest practices	DCNR Bureau of Forestry 717-787-2106	rb	private forest
State Revolving Loan Fund - Water Quality (SRF)	•	•		•	•		•	low interest loans	PENNVEST 717-787-8138	er,np	local govts
Stream Improvement Program - DEP	•	•			•			planning & design assistance	Bureau of Waterways Engineering 717-787-3411	np,er	local govt, land owners
Partners for Fish & Wildlife - USFWS	•	•		•	•			grants to $10,000 to restore habitat	USFWS 814-234-4090, David Putnam	w,rb	private landowners
Advance Funding Program - PENNVEST	•	•	•		•			low interest loans & limited grants	PENNVEST 717-787-8137	er,np,rb,w	govt, public, private orgs
Water Quality											

Cooperative Agreements - CWA (Clean Water Act) section 104(b)(3) - EPA	•	•	•	•	•	•		grants -point source pollution	watershed issues: 202-260-1718; stormwater issues: 202-260-6053	np	state/local govt, orgs, individuals
Community Development Block Grants (CDBG)		•		•			•	formula grant	Bureau of Housing and Developm't 717-720-7045	np	local "central cities"
Stormwater Project Loans Or see PENNVEST		•		•			•	low interest loans	PENNVEST 717-787-8137	ag,er,np,rb,w	govt. agencies
Flood Protection Program - DEP		•		•	•			grants	Bureau of Waterways Engineering 717-787-3411	er,np,rb	local govts
Coastal Zone Management Program - Pennsylvania		•		•	•	•		matching grants	Bureau of Watershed Conservation 717-787-5259	ag,er,np,rb,w	state/local govts, univ
Construction Loan Program - PENNVEST		•		•	•		•	low interest loans, supplemental grants	PENNVEST 717-787-8137	np	local govt & agencies
County Water Supply Plan/Wellhead Protection Grants		•		•	•		•	grants	Bur. of Water Supply Managem't 717-787-0122	er,rb,w	counties
Community Grant Program - DCNR		•		•	•		•	50% cost share; 100% for small towns	Bureau of Rec & Conservation 717-783-2658	er,rb,w	municipalities (for parks)
Small Watershed Program -								grants to to	NRCS		

(Public Law 566)		•			•	•	•	65%, and loans	717-237-2215, Jeff Mahood	np	state/local govt
Stormwater Management Program DEP								grants to 75% & technical assistance	Bureau of Watershed Conservation 717-772-4048	ag,er,np,rb,w	counties, municipalities
State Planning Assistance Grant (SPAG) Program		•			•			50% local match required	Dept of Comm & Econ. Dev't 717-720-7346	ag,er,np,rb,w	counties and municipalities
Small Communities Planning Assistance Program								grants	Dept of Comm. & Econ. Dev't 717-720-7346	ag,er,np,rb,w	small local govts
Watershed Restoration & Assistance Program (WRAP)		•	•	•	•	•		grants to $50,000, and small seed grants	DCNR Division of Watershed Support 717-787-5259	ag,er,np,rb,w	org's and public agencies
Community Based Restoration Projects - NOAA								matching funds to local aquatic restoration efforts	NOAA Restoration Center 301-713-0174, Chris Doley	er,rb,w	local govt, nonprofit orgs, watershed groups
Chesapeake Bay Trust Grants						•		mostly < $5000	Chesapeake Bay Trust 410-974-2941	ag,er,np,rb,w	local govt, orgs, nonprof
Rivers Conservation Grant Program - DCNR								up to 50% cost-share, max $50,000	DCNR Bureau of Rec & Cons 717-783-2658	er,rb,w	local govt & organizations
Sustainable Development Challenge Grant (SDCG)				•				up to $250,000. 20% local match req.	EPA SDCG Program 202-260-6812, Pam Hurt	er,np,rb,w	local govt & organizations
									Chesapeake Bay Program 800-968-7229		

Chesapeake Bay Program Subcommittee Grants			•	•	•	•	•	1:1 nonfederal match	for subcommittees or DEP 717-787-5267	ag,er,np,rb,w	state/local govt, nonprofit, university
Nonpoint Source Pollution Grants - DEP		•	•	•	•	•	•	grants for planning and nonpoint source pollution control	DEP Bureau of Watershed Conservation, Division of Watershed Support 717-787-5259	ag,er,np,rb,w	state/local govt, cons dist, univ, watershed orgs
North American Wetlands Conservation Act (NAWCA)		•	•	•	•	•	•	50% nonfederal match required	NAWCA coordinator, USFWS 703-358-1784	w	local govt, other orgs
Environmental Education Grants - EPA Region 3		•	•			•		grants to nonprofits, to 75% of costs	EPA regional office 215-566-5527, Larry Brown	ag,er,np,rb,w	state/local govt, univ, nonprofit orgs
Community Forestry Program - DCNR		•	•	• (trees)	•		•	match grants: gov-50%, orgs-90%	DCNR Forestry 717-783-0385, Norman Lacasse	er, rb, np	municipalities, orgs
Land Trust Grants			•	•				up to 50% of cost	Bureau of Rec & Conservation 717-783-2658	ag,er,np,rb,w	land trusts, etc.
Environmental Education Grants - Pennsylvania DEP			•			•		grant up to $10,000	DEP Office of Policy & Comm. 717-772-1828	ag,er,np,rb,w	schools, nonprofits, orgs

*project examples: ag = agricultural, er = erosion, np = nonpoint source pollution, rb = riparian forest buffers, w = wetlands

These Federal and State programs may be supplemented by local or regional fund-generating or pollution prevention intiatives. Examples of innovative funding ideas to improve water quality are described in "Financing Alternatives for Maryland's Tributary Strategies," a 120-page report available for $5 from the EFC. View a summary with funding categories.

Also, see creative financing techniques for preserving highly valued lands, such as stream buffers, on our web site. This fact sheet briefly describes mechanisms that communities can use to encourage land preservation.

And, view other resources for projects in Pennsylvania, including foundations, agencies and nonprofit organizations.

Other Pennsylvania Links

Pennsylvania Local Government Help Center
Pennsylvania State Agency links
Penn DCNR Grants and Assistance Programs
DEP Regional Offices
Pennsylvania Forest District Contacts
Pennsylvania Environmental Council
Stormwater Management in Pennsylvania
Department of Community and Economic Development community programs
Bureau of Farmland Protection

Return to the *top of the page*

[EFC Home] [Pennsylvania resources]
[stream corridor restoration financing] [Other fact sheets]
[E-finance links]

Prepared by:
Environmental Finance Center
University System of Maryland
0112 Skinner Hall
College Park, MD 20742
Home page: http://www.mdsg.umces.edu/EFC/

Last Updated on 3/99
By EFC web-ster

NRCS WATERSHED AND RIVER BASIN PLANNING AND INSTALLATION
Public Law 83-566 (P. L. 566)

Technical and financial assistance is provided in cooperation with local sponsoring organizations, state, and other public agencies to voluntarily plan and install watershed-based projects on private lands. The program empowers local people or decision makers, builds partnerships and requires local and state funding contributions. The purposes of watershed projects include watershed protection, flood prevention, water quality improvements, soil erosion reduction, rural, municipal and industrial water supply, irrigation water management, sedimentation control, fish and wildlife habitat enhancement and create and restore wetlands and wetland functions.

Watershed plans involving an estimated Federal contribution in excess of $5,000,000 for construction, or construction of any single structure having a capacity in excess of 2,500 acre-feet, require Congressional committee approval. Other plans are approved administratively. After approval, technical and financial assistance can be provided for installation of works of improvement specified in the plans.

Project sponsors are provided assistance in installing planned land treatment measures when plans are approved. Surveys and investigations are made and detailed designs, specifications, and engineering cost estimates are prepared for construction of structural measures. Areas where sponsors need to obtain land rights, easements, and rights-of-way are delineated. Technical assistance is also furnished to landowners and operators to accelerated planning and application of needed conservation on their individual units. There are presently over 1600 projects in operation.

United States Environmental Protection Agency
Region 3 3WP12 Philadelphia, PA
EPA-903-K-97-003 September 1997

EPA

A Citizen's Handbook to Address Contaminated Coal Mine Drainage

Potential Funding Sources for Mine Drainage Abatement

Organization	Contact	Phone No.	Comments
FEDERAL GOVERNMENT			
U.S. Army Corps of Engineers Baltimore District	James Johnson	(410) 962-4900	Section 1135: applies to watershed projects damaging Corps property or if Corps projects are having a negative effect that would result in AMD formation. The project area has to be on public lands.
Philadelphia District	Robert Callegari	(215) 656-6540	
Buffalo District	Phillip Berkeley	(716) 879-4145	
Detroit District	David Dulong	(313) 226-6766	
Huntington District	Jim Everman	(304) 529-5636	Section 206: Aquatic Ecosystem Restoration Program. This program has not yet been funded.
Louisville District	Jeff Klekner	(502) 582-5658	
Nashville District	Tom Waters	(615) 736-5646	Planning assistance to states for watershed cleanups.
Pittsburgh District	Jack Goga	(412) 644-6817	
Mobile District	Roger Simmons	(205) 690-2777	Stream Bank Erosion Program.
U.S. Department of Agriculture Natural Resources Conservation Service Lexington, KY	David G. Sawyer	(606) 224-7350	*PL 566:* Small watershed program *PL534:* Flood prevention program. *Resource Conservation and Development Program:* provides technical assistance to help identify problems and locate funding. *Wildlife Habitat Incentives Program:* Under the Farm Bill.
Columbus, OH	Patrick K. Wolf	(614) 469-6962	
Harrisburg, PA	Janet L. Oertly	(717) 782-2202	
Morgantown, WV	William Hartman	(304) 291-4153	

Organization	Contact	Phone No.	Comments
U.S. Department of Energy (DOE) Morgantown Energy Center Morgantown, WV	Robert Bedick	(304) 285-4505	Availability of funds will depend on Congressional budget authorizations and proposed organizational changes.
FE-232 Office of Coal Combustion Control Systems	Douglas Uthus	(301) 903-0479	Projects of this kind are funded by the appropriate DOE Field Center.
Advanced Research and Environmental Technology	Neil H. Coats Jer Yu Shang	(301) 903-6229 (301) 903-2795	Advanced Research and Environmental Technology (Env) $2.5 Million FY96.
Coal Preparation	Randy Penington	(301) 903-3485	R&D project funding.
Environmental Science & Technology Div.	Bob Kleinman	(412) 892-6555	Provides technical assistance.
U.S. Environmental Protection Agency U.S. EPA Region III			
Environmental Justice (EJ)	Reginald Harris	(215) 566-2988	Provide financial assistance to eligible community groups. Organizations must be incorporated to receive funds.
Section 319	Hank Zygmunt	(215) 566-5750	Provides financial support for projects which demonstrate water quality improvement from non-point source pollution.
Source Watershed Protection Program			Provides financial support for projects which potentially impact drinking water supplies
Environmental Justice through Pollution Prevention (EJP2)	Jeff Burke	(215) 566-2761	To use pollution prevention resources for addressing environmental problems in low income, high minority areas.
Sustainable Development Challenge (SDC)	Mindy Lemoine/ Theresa Martella	(215) 566-2736	Provide community funding for establishing partnerships to encourage environmentally and economically sustainable business practices.
Environmental Education (EE)	Nan L. Ides	(215) 566-5546	Provide financial support for projects which design, demonstrate, disseminate environmental education practices, methods, or techniques.
Appalachian Regional Commission	Karen Holloway	(202) 884-7754	

Organization	Contact	Phone No.	Comments
U.S. Department of Interior Office of Surface Mining			
Clean Streams Initiative	James Taitt	(412) 937-2106	Provides funding for stream cleanups impacted by AMD from abandoned coal mines.
Abandoned Mine Land Program (AML)			Established by Title IV of SMCRA. Under this program, fees collected from coal operators go to the Abandoned Mine Reclamation Fund (AMRF). Most AMRF monies are potentially available for contaminated CMD cleanup.
Pittsburgh, PA	James Taitt	(412) 937-2106	AMD Program Coordinator.
Harrisburg, PA	Dave Hamilton	(717) 782-2285	PA ACSI Coordinator.
Maryland	Pete Hartman	(301) 724-4860	MD ACSI Coordinator.
Charleston, WV	Rick Buckley	(304) 347-7162	WV ACSI Coordinator.
Columbus, OH	Max Luehrs	(614) 866-0578	OH ACSI Coordinator.
Big Stone Gap, VA	Ronnie Vicars	(540) 523-0024	VA ACSI Coordinator.
Lexington, KY	Dave Beam	(606) 233-2896	KY ACSI Coordinator.
Knoxville, TN	Willis Gainer	(423) 545-4103	TN ACSI Coordinator.
STATE PROGRAMS			
Abandoned Mine Lands Program	Your state office		
Special Reclamation Fund	Your state office		
Acid Mine Drainage Abatement and Treatment Fund - 10% Set Aside.	Your state office		
State Revolving Fund	Your state office		
State Nonpoint Source Programs	Your state office		
State Division of Natural Resources	Your state office		
Civil Penalties	Your state office		
State's Development Office	Your state office		
Federal and State Appropriations	Your state office		
Governor's Discretionary Funds	Your state office		

Organization	Contact	Phone No.	Comments
State of Maryland			
State of Maryland	Suzanne Arcella *State Coordinator*	(401) 631-3584	RFPs for Maryland 319 Funds come out in April each year. The Maryland Mining Program can compete for funds.
Maryland Department of Environment *Water Management Administration*	J.L. Hearn *Director*	(410) 631-3567	MDE has an established tradition of supporting projects with funding in which they have an interest.
Maryland Bureau of Mines (BOM)	Connie Lyons John Carey	(301) 689-6764 (301) 689-6764	Source of additional contacts.
Maryland Geological Survey	James Reger Ken Schwartz Emery Cleaves	(410) 554-5523 (301) 689-6104 (410) 554-5504	Potential source of contribution; source of additional contacts.
State of Pennsylvania			
Mineral Resources Management Bureau of Abandoned Mine Reclamation	Ernie Giovennetti *Director*	(717) 783-2267	Source of potential funding; additional contacts; information.
State of Virginia			
Department of Mines, Minerals, & Energy Division of Mined Land Reclamation	Bob Herron *Coordinator*	(540) 523-8100	Source of potential funding; additional contacts; information.
State of West Virginia			
Stream Mitigation Fund	Ken Politan	(304) 759-0510	
Section 319	Lyle Bennett		
RESEARCH ORGANIZATIONS / ENDOWMENTS / TRUSTS			
Heinz Endowments	Andy McElwaine	(412) 281-5777	The Heinz Endowments holds two meetings per year (Spring and Fall) to allocate funds from two separate Heinz endowments. The Howard Heinz Endowment is solely for projects inside the State of Pennsylvania. The Vira Heinz Endowment occasionally considers projects outside of Pennsylvania and does fund AMD projects.

Organization	Contact	Phone No.	Comments
ENVIRONMENTAL ORGANIZATIONS			
Clean Water Action	David Zwick	(202) 895-0420	In-kind technical/scientific consultation; In-kind research support; networking.
American Rivers	Rebecca Wadders	(202) 547-6900	In-kind research support; media support; networking.
Friends of the Earth		(202) 783-7400	In-kind research support; media support; networking.
Friends of the River	Betsy Reifsnider	(415) 771-0400	Funds river preservation and restoration projects through Friends of the River Foundation; media support; networking.
Izaak Walton League of America		(703) 548-0150	In-kind research support; media support; networking.
National Water Resources Association	Tom F. Donnelly	(703) 524-1544	Bestows awards; networking.
River Network		(202) 364-2550	In-kind research support; media support; networking.
Sierra Club	Carl Pope	(415) 977-5500	Bestows awards; networking; media support.
Society for Ecological Restoration	William Jordan	(608) 262-9547	In-kind technical/scientific consultation; networking.
Thorne Ecological Institute	Steve Eandi	(303) 499-3647	In-kind technical/scientific consultation; networking.

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF ENVIRONMENTAL PROTECTION

TEN PERCENT SET-ASIDE PROGRAM FOR ACID MINE DRAINAGE ABATEMENT

Acid mine drainage (AMD), an old and extensive problem in Pennsylvania, is the largest non-point source water pollution problem in the state today. Approximately 2,500 miles of streams have been degraded by acid mine drainage. Abandoned coal mines, located in 45 of Pennsylvania's 67 counties, are the predominant source of acid mine drainage. It has been estimated that Pennsylvania's acid mine drainage problem would require in excess of $5 billion in capital costs to fix.

The first major legislation that addressed acid mine drainage was the Clean Streams Law of 1965. In 1967, Pennsylvania created the Land and Water Conservation and Reclamation Fund and designated

120 million dollars of the fund for prevention, control and elimination of mine drainage pollution. These monies were used to conduct a number of studies of AMD polluted watersheds and to address many AMD problems with varying degrees of success. In 1990, Pennsylvania was authorized to establish a new fund known as the Ten Percent Set Aside Fund, to be used for acid mine drainage abatement. This fact sheet provides answers to frequently asked questions about the Ten Percent Set Aside Program.

What is the Ten Percent Set-Aside AMD abatement program?

The Federal Surface Mining Control and Reclamation Act (P.L. 95-87), of August 3, 1977, known as SMCRA, established a Title IV Grants Program providing monies to eligible states for abatement of abandoned mine problems. These problems were required to be addressed in a priority manner with varying degrees of health, safety and general welfare hazards comprising the first two priorities. Acid mine drainage abatement was defined as a Priority 3 problem and could not be addressed in Pennsylvania due to the enormous inventory of higher priority problems.

In 1990, Congress amended SMCRA to include a provision allowing states to establish an acid mine drainage abatement and treatment program in an amount up to 10% of their annual abandoned mine reclamation (Title IV) grant. Pennsylvania amended its reclamation plan and received approval from the Federal Office of Surface Mining (OSM) to establish a separate, interest-bearing AMD abatement and treatment fund. The fund and program are managed by the Bureau of Abandoned Mine Reclamation in the Department of Environmental Protection (DEP).

Monies from the fund may be used to abate and treat acid mine drainage in qualified hydrologic units affected by past coal mining practices at eligible sites. Eligible sites are defined as those where mining ceased prior to August 3, 1977 and where no continuing reclamation responsibility can be determined. Those sites with Priority 1 or 2 hazards where mining occurred between August 4, 1977 and July 30, 1982 also are eligible.

Qualified hydrologic units are defined as watersheds in which the water quality has been significantly affected by acid mine drainage from coal mining practices in a manner which adversely impacts biological resources. The sites must meet all other eligibility criteria of the Surface Mining Control and Reclamation Act.

How are potential sites submitted for consideration?

Interested parties may obtain an AMD Site Submission Form by calling or writing the Bureau of Abandoned Mine Reclamation, P.O Box 149, Ebensburg, PA 15931, Telephone No. (814) 472-1800. The applicant should provide the water quality and quantity data requested on the form (if available) and provide a map indicating the location of the AMD discharge. The applicant then sends the completed form, water data and map to the address indicated on the AMD Project Form.

The Department is aware of a number of local watershed organizations currently working closely with their County Conservation Districts to remediate mine drainage impacts on selected streams. While any abandoned mine site may receive consideration, the Department is particularly interested in forming partnerships with organized groups engaged in actively addressing these problems.

What minimum guidelines must a potential site meet to be qualified?

1. Mining must have been completed or abandoned prior to August 3, 1977 (or July 30, 1982 if high priority problems exist on the sites).
2. The Landowner(s) must be in agreement with the proposed project.
3. The discharge should be capable of being abated or treated using passive treatment technologies.
4. The proposed project must have a high probability of improving the biological resources of the receiving stream.

What other factors are considered when evaluating a site?

- The length of the receiving stream to be beneficially affected
- The cost and feasibility of the proposed abatement or treatment
- The water quality upstream of the proposed site
- The potential for improved use of public lands
- The potential for improved fishing and other water oriented recreation
- The potential for improved raw water quality for a public water supply
- The potential for forming partnerships with organized groups active in improving the watershed

How are projects selected for funding?

1. DEP reviews AMD Project Forms, the data submitted with the forms and any information that may exist in DEP files.
2. DEP reviews the sites, collects water samples, makes flow determinations and contacts the property owners.
3. If sufficient information exists, DEP proposes a solution and prepares a cost estimate for sites meeting program eligibility guidelines.
4. If insufficient information exists, arrangements are made to collect additional samples and flow data for eligible sites.
5. Information and data collected for each site are then presented to an internal review committee to be reviewed.
6. The internal review committee will then determine which sites may need more data, which sites are eligible for funding, and how those sites will be ranked. In ranking, the committee will consider local input, including Conservation Districts and watershed organizations.
7. DEP then proceeds to prepare abatement plans in conjunction with the Natural Resource Conservation Service and submits these plans to the federal grants agency for funding approval.

Who designs and constructs projects?

- DEP's Bureau of Abandoned Mine Reclamation or professional consultants under contract with the Bureau of Abandoned Mine Reclamation design the projects.
- The projects then are constructed by private contractors through Pennsylvania's public bidding process.

How can local agencies, watershed associations and individuals participate in the program?

- They can submit potential sites for consideration.
- They can assist in data collection such as water sampling and flow monitoring.
- They can assist in landowner contacts.
- They can assist in monitoring and maintaining constructed facilities.
- They can provide local sponsorship.
- They can seek other sources of funding which can be used in combination with Ten Percent Set-Aside funds to achieve more remediation.

For additional information contact:

Bureau of Abandoned Mine Reclamation

P.O. Box 149

Ebensburg, PA 15931

(814) 472-1800

Commonwealth of Pennsylvania
Tom Ridge, Governor

Department of Environmental Protection
James M. Seif, Secretary

5400-FS-DEP1672 Rev. 2/96
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"WORKING" DRAFT

PENNSYLVANIA'S NONPOINT SOURCE (NPS) MANAGEMENT PROGRAM

1998 UPDATE

Commonwealth of Pennsylvania
Department of Environmental Protection
Bureau of Watershed Conservation
Division of Watershed Support
Nonpoint Source Management Section

Tom Ridge, Governor
Commonwealth of Pennsylvania

James Seif, Secretary
Department of Environmental Protection

3940-BK-DEP2275

B. Funding

1. **PA'S NPS Financial Management and Status Reporting**

Pennsylvania's Section 319 Program uses the Commonwealth's Integrated Central System (ICS) to manage all funds including the matching funds. The ICS provides information systems in the areas of accounting, budget preparation, payroll/personnel, and purchasing. It also provides for the interchange of common information among the systems. The ICS Accounting System consists of five subsystems relating to revenue and receipts, general ledger, budget control, commitment and expenditure control, and special(grant and project) accounting. The Grant Accounting Subsystem identifies and reports transactions related to federal grants. In addition to ICS, the Nonpoint Grants Database tracks the budgets off all contracts receiving 319 funds. Financial Status Reports (FSRs) are sent to EPA by the Commonwealth of Pennsylvania's Public Protection and Recreation Comptroller annually.

Pennsylvania Department of Environmental Protection also prepares annual grant workplans which identify specific projects to reduce nonpoint source pollution along with a schedule for their implementation over a two year period. In addition to watershed implementation projects, watershed assessments and statewide education projects, the grant workplan describes the specific activities to be carried out by the PADEP under its base operating program during the same time period. Progress in satisfying the milestones stated in the annual grant workplan is evaluated every six months and reported in PADEP's periodic status report to EPA.

2. **Pennsylvania's NPS Grants Tracking And Reporting System (GRTS)**

Pennsylvania was part of the pilot program to develop a computerized system, the Section 319 Grant Reporting and Tracking System, for use by states and EPA in managing and reporting data on Section 319 grants. Information on all of the individual 319 funded projects is currently input using the new Lotus Nbtes.

3. **Use of the Clean Water State Revolving Fund (CWSRF) for Nonpoint Source Management**

Responsibility for implementation of the CWSRF in Pennsylvania is shared between the Pennsylvania Infrastructure Investment Authority (PENNVEST) and the Department of Environmental Protection (DEP). As the CWSRF capitalization grant recipient, PENNVEST is responsible for financial management of the Fund. DEP provides technical support to PENNVEST, which includes developing the project priority rating system, conducting technical and environmental reviews of projects and providing project ratings to PENNVEST.

Each year, PENNVEST provides between $90 and $100 million in CWSRF and state loan funds, and a limited amount of state grant funds, to traditional sewage collection and treatment projects. Funding for stormwater system improvements is also provided using only state funds.

PENNVEST'S Loan Program for Stormwater Projects

Act 16 of 1988 was amended to authorize the Pennsylvania Infrastructure Investment Authority (PENNVEST) to provide low interest loans to construct, improve or rehabilitate public stormwater facilities. Construction of projects consisting of new storm drains, detention basins, or storm sewer rehabilitation may be funded by these PENNVEST loans. Facilities eligible for this funding are: (1) new or updated storm sewer systems to reduce stormwater flooding or to separate stormwater from sanitary sewers, (2) detention basins to control stormwater runoff, and (3) stormwater facilities to implement best management practices that reduce nonpoint source pollution.

As of September 3,1998, there were a total of forty-four approved loans with a cumulative loan amount of approximately $24.5 million. Construction of approximately twenty-five of these projects was completed by the end of 1997. For the 1997 calendar year, PENNVEST approved stormwater facility loans of $4.6 million for 7 projects.

PENNVEST'S Loan Program for Onlot Disposal Systems

Individual Onlot Sewage Disposal Systems Program provides lot interest loans to homeowners with an interest rate of one percent and a term of up to 15 years. Loans are for a minimum of $1,500 to a maximum of $15,000. Owners of individual onlot sewage disposal systems are eligible if the owner occupies the single family residential housing unit served by the system and if the owner's family income does not exceed 150 percent of the statewide median household income, adjusted for inflation. For 1997, the family income limit is $52,913.

This program is a cooperative effort among PENNVEST, the Pennsylvania Housing Finance Agency (PHFA), the Department of Environmental Protection (DEP), and local financial institutions to provide funding to address the public health and environmental needs which result from malfunctioning onlot systems in areas where public collection and treatment facilities are not practical in the immediate future. Eligible costs include all testing, design, permits, and construction costs associated with the repair, rehabilitation, improvement, expansion or replacement of an existing individual onlot sewage disposal system.

Title VI of the federal Clean Water Act authorizes the use of CWSRF funds to address nonpoint source problems through implementation of a management program under Section 319 of the Act.

While many states have elected to utilize CWSRF funds for a variety of such purposes, Pennsylvania has so far elected to do so on a fairly limited extent through implementation of its On-Lot Sewage Disposal System Loan Program for the Individual Homeowner.

This program was initiated in 1994 and, as of late 1997, has offered low interest loans totaling $2.8 million to 194 homeowners. The loans are used to repair or replace malfunctioning on-lot sewage disposal systems, eliminating related ground water and stream contamination problems.

Both PENNVEST and DEP recognize that the federal government is interested in seeing more varied and widespread use of CWSRF funds to address nonpoint source problems. Prior to making a significant shift in this direction, there are several important factors to be considered, including:

Short and long term impacts on the financial integrity and stability of the CWSRF;

- Identification and prioritization of watersheds impacted by point and nonpoint sources (and determining their relative significance);
- Identification of other nonpoint source funding programs and the demand for additional funding;
- Development of an integrated priority rating system to assist in making project funding decisions;

- Identification of loan recipients and associated mechanisms for awarding and managing loans for nonpoint source projects;
- Demonstration(s) of how the CWSRF can be used for nonpoint source projects;
- Making appropriate revisions to Pennsylvania's CWSRF Intended Use Plan.
- Pennsylvania's use of CWSRF funding for nonpoint source problems will ultimately be reflected in future revisions to this Nonpoint Source Management Program and the CWSRF Intended Use Plan.

4. **Agriculture Linked Investment Program**

The Agriculture Linked Investment Act (Act 90, amended 1998) provides a low-interest loan program as an incentive to encourage the adoption of agricultural best management practices required in an approved nutrient management plan written under the Nutrient Management Act of 1993 (Act 6). The Agriculture Linked Investment Program (Agri-Link Program) provides $25 million in Treasury Department funds for low-interest loans to farm owners or operators participating in the Nutrient Management Act program. Farmers with approved Act 6 nutrient management plans are eligible for loans to a maximum of $75,000 over a seven-year loan period.

Farmers may apply with a participating lender (commercial bank, community bank, or Farm Credit Service) who will determine the eligibility of each applicant. The Treasury Department will provide Agri-Link Program funds to the eligible farmer through the participating lender. The State Conservation Commission will buy down the interest rates on loans provided through the program, resulting in interest rate to the farmer at below market rates. Targeted interest rates to the farmer may range from three (3) to five (5) percent. Information on the Agri-Link Program will be available through the State Conservation Commission, local conservation districts and participating lenders. Program funding will be available October 1998.

5. The following pages contain a listing of 319 funded projects by grant year and category for FY99 through FY90. For more information on 319 projects see Section I.

6. USDA's Environmental Quality Incentive Program (EQIP) grants for 1998 and 1997 are listed by watershed. For more information on EQIP refer to Section I.B. Agriculture.

Rural Abandoned Mine Program (RAMP)

Contact: USDA, Natural Resources Conservation Service

RAMP is authorized by Section 406 of the Surface Mining Control and Reclamation Act (SMCRA) of 1977 as amended by the "Abandoned Mine Reclamation Act of 1991" as subtitled under the Budget Reconciliation Act (PL-101-508). It is authorized for the purpose of reclaiming the soil and water resources of rural lands adversely affected by past coal mining practices. There were approximately 1.1 million acres of abandoned coal-mined land needing reclamation in 1977. The U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), formally the Soil Conservation Service (SCS) administers the program, and funding is provided from money deposited in the Abandoned Mine Reclamation Fund. The program provides technical and financial assistance to land users who voluntarily enter into 5- to 10-year contracts for reclamation of up to 320 acres of eligible abandoned coal-mined lands and waters. The land user with NRCS technical assistance involved prepares a reclamation plan.

All active coal mining operators pay into the Abandoned Mine Reclamation fund at a rate of 35 cents per ton of coal produced from surface mining and 15 cents per ton of coal produced by underground mining. The fees are deposited in the interest-bearing fund, which is used to pay reclamation costs of AML projects. Expenditures from the fund are authorized through the regular congressional budgetary and appropriation's process.

Source: http://nrcs.usda.gov/NRCSProg.html

Note: The RAMP program was not funded in 1998/99, but may receive funding in the future.

ENVIRONMENTAL PROTECTION REGULATORY AUTHORITY

Following are excerpts from the Clarion River Basin Study, Pennsylvania Rivers Conservation Program (August 1997), identifying state and federal regulations for environmental protection.

STATE REGULATORY AUTHORITIES

Clean Streams Law Clean Water Act

Authority: Clean Streams Law, Clean Water Act, Act of June 22, 1937, P.L. 1987, as amended, 25 PA Code, Chapter 25, National Pollutant Discharge Elimination System; Chapter 93, Water Quality Standards, Chapter 102, Erosion Control.

Function: Provides regulations to control discharges of sewage or industrial waste into streams and lakes. Exclusively enforced by DEP, Bureau of Water Quality. Use regulated through a permit system.

Dam Safety and Encroachments Act

Authority: Dam Safety and Encroachments Act, the Act of November 26, 1978, P.L. 1375, No. 325 as amended, 25 PA Code, Chapter 105.

Purpose: Provide for the comprehensive regulation and supervision of dams, reservoirs, water obstructions and encroachments in the Commonwealth in order to protect the health, safety, welfare, and property of the people.

Endangered and Threatened Species - Fish, Amphibians, Reptiles, and Aquatic Organisms

Authority: Title 30 Chapter 75, Fish and Boat Code, revised February 9, 1991, PA Fish Commission.

Purpose: Protect Fish, Amphibians, Reptiles and Aquatic Organism of special concern.

Endangered and Threatened Species - Plant Species

Authority: Conservation of Pennsylvania Native Wild Plant, Title 25 Chapter 82, January 1, 1988, DEP.

Provision: Protect native wild plant species of special concern.

Endangered and Threatened Species - Wild Birds and Mammals

Authority: Title 34 Chapter 133, Game and Wildlife Code, revised December 1, 1990, PA Game Commission.

Provision: Protect wild birds and mammals species of special concern.

Fish and Boat Code

Regulatory Authority: Commonwealth of Pennsylvania, Fish and Boat Act 1980-175, Title 30, PA. Consolidated Statues.

Purpose: To provide direction and guidance to the Commission in executing its mission of providing fishing and boating opportunities through the protection and management of aquatic resources.

Floodplain Management Act

Authority: Floodplain Management Act (Act 166) October 4, 1978, P.L., No. Regulations, 16 PA Code 38, 1 et. seq.

Provision: Encourage the proper management of floodplain areas.

High Quality and Exceptional Value Waters

Authority: Clean Streams Law - P.L. 1987, 25 PA Code Chapters 93 and 95, (93.3, 93.9, 95.1)

Provision: High quality waters shall be maintained and protected at their existing quality ore-enhanced-unless proposed new, additional or increased discharge of pollutants is justified as a result of necessary economic or social development which is of significant public value and the proposed discharge, alone or in combination with other anticipate discharges, will not violate applicable water quality standards. Exceptional Value waters shall be maintained and protected, at a minimum, at their existing quality.

Historic Preservation Act

Authority: Act of 37 PA C.S. Sec. 500 et. seq.

Provision: The conservation of Pennsylvania's historic and natural heritage and the preservation of public records, historic documents and objectives of historic interest, and the identification, restoration and preservation of architecturally and historically significant sites and structures are duties vested primarily in the PA Historical and Museum Commission.

Oil and Gas Development

Authority: The Oil and Gas Act; the Oil and Gas Conservation Law; the Clean Streams Law; Solid Waste Management Act, the Dam Safety and Encroachment Act; the Coal and Gas Resources Coordination Act; the Administrative Code; and 25 PA Code Chapters 78, 79, 91, 92, 93, 95, 97, 101, 102, and 105.

Purpose: The Oil and Gas Act is the basic law governing oil and gas wells.

Pennsylvania Sewage Facilities Act

Authority: Pennsylvania Sewage Facilities Act of January 1966 P.L. (1965) 1531, as amended, Regulations 25 PA Code, 71.1 et. seq.

Provision: Requires individuals to obtain a sewage permit for on-lot sewage disposal systems. Generally administered by either township or county. Sewage permits are normally required prior to obtaining building permit.

Solid Waste Management

Authority: The Solid Waste Management Act - Act 97 of 1980 and the residual and municipal waste regulations promulgated there under.

Provision: To regulate the ongoing generation, transportation, treatment, storage, and disposal of residual, municipal and hazardous waste.

Storm Water Management

Authority: Pennsylvania Storm Water Management Act of October 1978 (No. 167, P.L. 864) 32 P.S. 680 et.seq.

Purpose: Planning and Management of Storm water to address increased rates and volumes of runoff due to land development including Forest Management activities.

Surface Mining Conservation and Reclamation Act

Authority: Pennsylvania Surface Mining Conservation and Reclamation Act of May 31, 1945 (P.L. 1198), amended May 26, 1996.

Purpose: To regulate surface mining of coal resources in PA; permits are required for coal surface mining activities.

Water Rights Act

Authority: Water Rights Act of June 24, 1939, 32 P.S. Sections 631-641.

Provision: The Act provides for the permitting of surface water withdrawals by public supply agencies vested with the power, authority, right of franchise to sell water to the public. A water allocation permits is issued by the Department.

FEDERAL REGULATORY AGENCIES

Section 404 of the Clean Water Act

Authority: Section 404 of the Clean Water Act, enacted by Congress in 1972.

Provision: This gives the Corps of Engineers jurisdiction over "all waters of the United States," this includes water of the basin, its tributaries, adjacent and isolated wetland area.

Federal Endangered Species Act

Authority: Act of December 28, 1973, P.L. 93-205, 87 Stat. 884 as amended, 16 U.S.C. 50 CFR Part 17.

Provision: Gives federal protection to threatened and endangered species.

Federal Wilderness Act

Authority: Act of September 3, 1964, P.L. 88-577.

Provision: Protects certain public lands which have been designated as a component of the "National Wilderness Preservation System."

G. I file

PA FISH AND BOAT COMMISSION
COMMENTS AND RECOMMENDATIONS
March 24, 1999

WATER: Casselman River (819F) Sections 01, 02, and 04 Somerset County

EXAMINED: October 1998

BY: Gary Smith and Rick Lorson

Bureau Director Action: William R Dell Date: 3-29-99

Division Chief Action: Richard A Snyder Date: 3-24-99

WW Unit Leader Action: Robert M Jerantas Date: 3/31/99

CW Unit Leader Action: R. Thomas Greene Date: 3/24/99

AREA COMMENTS:

The Casselman River enters Pennsylvania from Maryland near Lease Hill, which is 2.1 km west of SR 0219. It flows northeast to Meyersdale, PA, turns northwest to Rockwood, PA, then flows southwest to its mouth on the Youghiogheny River at Confluence, PA. The Casselman River has been severely degraded by acid mine drainage since the early 1900s. Water quality and aquatic life were slowly recovering from pollution until an increase of acid mine drainages from the Coal Run/Shaw Mines Complex (Coal Run, Weir 11, and Shaw Mines Run) killed all aquatic life in the Casselman River from Boynton to the Youghiogheny River in 1993.

The purpose of this survey was to: 1) assess water quality and the occurrence and abundance of Casselman River's fish populations, 2) to compare the 1998 survey results to previous surveys, 3) use data to update the fish management strategies for Casselman River, 4) collect and enumerate all fish species for Index of Biotic Integrity (IBI) metrics as an aid in monitoring future water quality changes in the Casselman River, and 5) determine the extent of water quality and aquatic life improvement since the fish kill of 1993.

At the seven sites in Sections 01, 02, and 04, the pH level ranged from 6.9 to 8.5 and total alkalinity ranged from 16 to 32 mg/l. A total of 25 species of fish were collected at seven sites on the Casselman River. Final IBI metric ranking of the seven sites surveyed in the Casselman River indicated that Site 0102 in Section 01 was the best site followed by Site 0404 and Site 0401 in Section 04. Site 0203 (below Shaw Mines Run) and Site 0201 (below Coal Run) were the most degraded and second-most degraded sites surveyed in 1998 based on IBI fish community metrics, respectively. These rankings corresponded well to the known pollution sources of the Casselman River in Pennsylvania.

The fish communities in Sections 02 and 04 of the Casselman River have recovered dramatically from the 1993 fish kill and are better than in 1983.

Fish species composition at Site 0204 and 0401 in 1998 have changed completely from 1983. However, the 1998 survey from Sections 01, 02, and 04 provides evidence of continued AMD pollution from Coal Run and Shaw Mines Run. The 1998 data can be used to determine the effects of any future fish kills on the Casselman River. Work must continue to eliminate and reduce pollution sources in the Casselman River watershed. Pollution abatement can potentially lead to the increase of Casselman River fish populations and ultimately provide more recreational angling days.

AREA RECOMMENDATIONS:

1) Mine drainage in the Casselman River watershed is a major problem. Efforts at reduction in the watershed have benefitted water quality and fish populations. This work should continue. A copy of this report should be sent to:

    a) Steve Kepler, Fisheries Biologist, Pennsylvania Fish and Boat Commission, Division of Environmental Services, 450 Robinson Lane, Bellefonte, PA 16823.

    b) Scott Horrell, District Mining Manager, Pennsylvania Department of Environmental Protection, Bureau of Mining and Reclamation, Ebensburg District Mining Office, 437 South Center Street, P.O. Box 625, Ebensburg, PA 15931.

    c) Bud Baker, Pennsylvania Department of Environmental Protection, Bureau of Mining and Reclamation, 5th Floor, Rachel Carson Office Building, 400 Market Street, Harrisburg, PA 17105.

    d) Tom Proch, Aquatic Biologist, Pennsylvania Department of Environmental Protection, 400 Water Front Drive, Pittsburgh, PA 15222.

    e) Dave Steele, Somerset County Conservation District, 1590 North Center Avenue, Suite 103, Somerset, PA 15501

    f) Mark Killar, Western Pennsylvania Coalition for Abandoned Mine Reclamation, Donohoe Center, RD#12 Box 202B, Greensburg, PA 15601.

    g) Len Lichvar, Southern Alleghenies Conservancy, 702 West Pitt Street, Fairlawn Court, Suite #7, Bedford, PA 15522.

2) Casselman River, Section 01, should continue to be managed with planting of catchable trout. Stocking rate and frequency should be determined by classification for Approved Trout Waters.

3) A limited recreational fishery currently exists in Section 04 of the Casselman River. Fingerling trout should continue to be stocked in Section 04. Smallmouth bass fingerlings, which were stocked in 1998 should be stocked in 1999 to restore that population and fishery.

) Longnose sucker, a PA endangered species, were found at the Garrett, PA site. The Casselman River drainage is the only one in Pennsylvania where longnose sucker were found to inhabit. Efforts must continue to maintain and improve water quality to avoid longnose sucker from becoming extirpated in Pennsylvania.

5) When a follow-up survey is conducted on Casselman River, the same sampling protocol as in 1998 should be followed, so that IBI metric values can be compared to the 1998 values.

CWU COMMENTS:

The Casselman River (819F), Sections 01, 02 and 04, were examined during October 1998 as part of an effort to assess water quality and the overall status of the fish community. This survey was conducted using the IBI (Index of Biotic Integrity) fish sampling methodology to aid in documenting any improvements that may have occurred in the Casselman River fishery following chronic degradation from Mine Acid discharge and a severe event in May of 1993.

Section 01

Section 01 can be characterized as a large, freestone stream. This segment was not effected by the Mine Acid discharge in May of 1993. Historically, Section 01 has been managed with the planting of PFBC catchable trout. The 1998 examination recorded the presence of 16 fish species, including, sparse populations of wild brook trout, smallmouth bass and brown trout of hatchery origin.

Section 02

This segment can be characterized as a large, freestone stream that was heavily impacted by Mine Acid discharge in May of 1993. The 1998 inventory (conducted at four sites) indicated that both water quality and the fish community had improved dramatically from previous conditions. Overall, a total of 21 fish species were sampled in 1998 including, smallmouth bass, greenside darter, johnny darter, hatchery brown trout and longnose sucker, a Pennsylvania listed endangered species. In comparison, only 11 fish species were captured during the previous fisheries inventory effort in 1983.

Section 04

Section 04 can be characterized as a large, freestone stream. This segment was also impacted by Mine Acid discharge in 1993. The 1998 examination (conducted at two sites) recorded the presence of 13 fish species, including smallmouth bass, one wild brook trout and brown trout of hatchery origin. Improvements in water quality and the fish community were also noted in Section 04 during the 1998 inventory.

Overall, the IBI sampling methodology appears to provide a good tool for measuring the recovery of fish communities that have suffered from past environmental insult.

CWU RECOMMENDATIONS:

1. Callelman River (819F), Section 01, should continue to be managed with the planting of PFBC catchable trout. Stocking rate and frequency should be determined by classification according to program guidelines.

2. Casselman River (819F), Section 02, should be managed as a biomass Class D water under the Natural Yield option. Conventional statewide regulations should apply.

3. Casselman River (819F), Section 04, should be managed with the planting of fingerling brown and rainbow trout. Conventional statewide regulations should apply.

4. A copy of this report should be forwarded to Nongame and Endangered Species Unit Leader Shiels, due to the recorded presence of longnose sucker (a Pennsylvania listed endangered species) at Site RM 29.39.

WWU COMMENTS & RECOMMENDATIONS:

The four (4) sections of the Casselman River examined in 1998 in this report can each be characterized as productive warmwater stream sections (total alkalinity ≥ 20 mg/l). Despite this characterization densities of sport fish such as smallmouth bass, rock bass, and other sunfishes appear relatively lo compared to other Pennsylvania warmwater streams such as Laurel Hill Creek or Bald Eagle Creek. Also sizes of fish captured were relatively small, perhaps characteristic of a young population resulting from recent recolonization or reduced growth associated with loss of aquatic forage organisms following the 1993 fish kill. Despite improvements in water quality documented in this report, Area personnel note that past and current pollution levels continue to limit fish populations in the Casselman River particularly in Sections 2 and 4 and likewise limit recreational fishing opportunities. I concur with the recommendation to stock smallmouth bass fingerlings in Section 04 in 1999 as well as 2000 to assist in restoration of this indigenous sport fish.

This work made possible by funding from the Sport Fish Restoration Act Project F-57-R Fisheries Management.

PENNSYLVANIA FISH AND BOAT COMMISSION
BUREAU OF FISHERIES
FISHERIES MANAGEMENT DIVISION
Fisheries Management Area 8

Casselman River (819F) Management Report
Sections 01, 02, & 04

Prepared by
Gary Smith and Rick Lorson

Date Sampled: October 1998 Date Prepared: February 1999

Introduction

The Casselman River enters Pennsylvania from Maryland near Lease Hill, which is 2.1 km west of SR 0219. It flows northeast to Meyersdale, PA, turns northwest to Rockwood, PA, then flows southwest to its mouth on the Youghiogheny River at Confluence, PA. Total length in Pennsylvania is 77 km. Land uses in the 1,528 km^2 watershed consist mainly of agriculture and mining. Acid mine drainage affects most of the Casselman River. The Department of Environmental Protection (DEP) Chapter 93 designation for Casselman River is Warm Water Fishes (WWF) (Pennsylvania Department of Environmental Protection 1998).

In May 1993, an increase of acid mine drainage from the Coal Run/Shaw Mines Complex (Coal Run, Weir 11, and Shaw Mines Run) killed all aquatic life in the Casselman River from Boynton to the Youghiogheny River. The initial cause of this kill was considered to be the result of heavy rainfall and snow melt runoff during fall and winter of 1992 and 1993. This runoff then infiltrated the Shaw Mines Complex deep mines. The result was a greatly increased mine pool and discharge of acidic water to the Casselman River in Spring 1993. Subsequent to this, it was discovered that from 1991 to February 1996, Action Mining Company was channeling untreated acidic discharges through illegal underground pipes into Coal Run. There has been disagreement on whether the illegal discharges had a significant contribution to the cause of the fish kill. After the 1993 fish kill, Action Mining Company remined shallow coal seams in the Shaw Mine complex to reduce the mine pool. The reduction of the mine pool resulted in a decrease in the Weir 11 discharge. Anoxic limestone drains and limestone ditches are in use at the Coal Run/Shaw Mines Complex. Required treatment of illegal acid mine discharges, some remining to include mine pool reduction, and minor remediation projects of the Coal Run/Shaw Mines Complex have been the factors in improved water quality (Lorson et al. 1998).

The Casselman River is divided into four management sections (Table 1). Section 01 of the Casselman River begins at the PA-MD state line (River Mile [RM] 47.40) and extends 9.4 km to the mouth of Coal Run 300 m downstream of the SR 2014 bridge in Boynton, PA (RM 41.70) (Figure 1). Section 01 is an approved trout water and is currently managed with one preseason and one inseason plant of brown trout *(Salmo trutta)* and brook trout *(Salvelinus fontinalis)*. At the downstream boundary, the first large source of mine drainage enters the Casselman River via Coal Run.

Casselman River, Section 02, starts at the mouth of Coal Run 300 m downstream of the SR 2014 bridge in Boynton, PA, (RM 41.70) and extends 31.1 km to the mouth of Coxes Creek at Rockwood, PA (RM 22.20) (Figures 1 and 2). The primary sources of acid mine drainage within Section 02 are Coal Run, Weir 11, Shaw Mines Run, and Buffalo Creek at Garrett, PA. The section also receives sewage discharges from Meyersdale, PA, and Garrett, PA, and agricultural runoff from the area between Boynton, PA, and Garrett, PA.

Section 03 of the Casselman River begins at the mouth of Coxes Creek at Rockwood, PA, (RM 22.20) and extends 9.8 km to a point 1 km upstream of the SR 3011 bridge at Markleton, PA (RM 16.10) (Figure 2).

Casselman River, Section 04, starts at a point 1 km upstream of the SR 3011 bridge at Markleton, PA, (RM 16.10) and extends 25.8 km to its mouth on the Youghiogheny River (RM 0.00) (Figure 3). Fingerling trout plants had occurred in Section 04 from 1991 to 1993 prior to the mine drainage fish kill of May 1993. Fingerling trout management was restored to Section 04 subsequent to October 1997 water quality sampling. Smallmouth bass *(Micropterus dolomieu)* fingerlings, which were stocked in 1998, are planned to be stocked in 1999 to restore that population and fishery.

The Pennsylvania Fish and Boat Commission (PFBC) conducted a complete survey of Section 01 in 1979 (Boyer et al. 1979) and 1990 (Shervinskie and Lorson 1993). Water quality data were also collected at Section 01 in 1991 and 1997 (Lorson et al. 1998). Casselman River, Sections 02-04, were surveyed in 1983 (Weirich et al. 1984). Water quality data were also collected at Sections 02-04 in 1991 and 1997 and at Section 02 in 1995 (Lorson et al. 1998).

The purpose of this survey was to: 1) assess water quality and the occurrence and abundance of Casselman River's fish populations, 2) to compare the 1998 survey results to previous surveys, 3) use data to update the fish management strategies for Casselman River, 4) collect and enumerate all fish species for Index of Biotic Integrity (IBI) metrics as an aid in monitoring future water quality changes in the Casselman River, and 5) determine the extent of water quality and aquatic life improvement since the fish kill of 1993. DEP Bureau of Mining and Reclamation and PFBC Division of Environmental Services assisted with the survey.

Methods

One site in Section 01 was surveyed in 1998 to characterize the section. Site 0102 was located 420 m downstream of T-805 bridge at RM 43.67 near Salisbury, PA (Figure 1). Site 0102 was at the same location as Boyer et al. (1979) and Shervinskie and Lorson (1993).

Four sites in Section 02 were sampled in 1998 to represent the section (Figure 2). Site 0201 was located 100 m downstream of T-502 bridge near Boynton, PA, at RM 40.90. Site 0202 was located at the SR 2028 bridge upstream of the Shaw Mines discharge at RM 36.48. Site 0203 was located at the T-385 bridge, which is downstream of the Shaw Mines discharge at RM 32.58. The last survey site in Section 02, Site 0204, was 200 m downstream of the SR 2037 bridge in Garrett, PA, at RM 29.39. All sites in Section 02 were at the same location as Weirich et al. (1984).

Two sites in Section 04 were sampled in 1998 to characterize the section. Site 0401 was located at the SR 3011 bridge in Markleton, PA, at RM 13.66 (Figures 2 and 3). Site 0404 was 100 m upstream of the SR 0523 bridge in Harnedsville, PA, at RM 3.41 (Figure 3). Both sites in Section 04 were at the same location as Weirich et al. (1984).

Data from Sections 01, 02, and 04 were collected for physical, chemical, fish occurrence and abundance. Additional water quality analysis and aquatic marcoinvertebrates analysis were conducted by DEP Bureau of Mining and Reclamation. Fish sampling was accomplished with two Coffelt model BP-1C backpack electrofishers operated at 100-150 volts AC and 125-150 watts. Each site was 200 meters long with the two backpacks operating side by side for a total effort that ranged between 36 to 65 minutes. Two netters per backpack were used at each site to collect all fish. The assessment was conducted from October 13-15, 1998 according to *Procedures for Stream and River Inventory Information Input* (Marcinko et al. 1986).

All fish species were collected and enumerated because the data were used to calculate Index of Biotic Integrity (IBI) metrics. The IBI is a composite index based on an array of ecological attributes of fish communities in regards to: species richness, indicator taxa, trophic guilds, fish abundance, and the incidence of hybridization, disease, and anomalies. The original IBI contained 12 metrics and was developed by Karr (1981) for small, warmwater streams in the Midwest. Each metric received a score of five points if it had a value similar to that expected for a fish community characteristic of a system with little human influence; a score of one point if it had a value similar to that expected for a fish community that deviates strongly from the reference condition; and a score of three points if it deviated somewhat from reference expectations. An IBI score is computed by summing each metric score. An IBI score reflects the overall integrity of a stream compared to a non-impaired stream. Since Karr's original version was developed, others have built on the original's fundamentals, modifying it for other regions and different ecosystems (Mundahl and Simon 1998; Leonard and Orth 1986; Lyons 1992; Lyons et al. 1996). The new versions still had the multimetric structure, but differed from the original in the quantity, scoring, and in the use of new metrics.

Currently, Pennsylvania does not have a version of the IBI to evaluate streams in the state. However, a one year project in 1996/1997 by the PFBC initiated the process to develop IBI metrics that would be used for Pennsylvania streams (Smith et al. 1997). In 1998, PFBC's Division of Environmental Services received funding to continue to develop an IBI for Pennsylvania.

Given the status of the undeveloped Pennsylvania IBI, IBI metrics for this study were extracted from Karr (1981), Lyons (1992), Lyons et al. (1996), Ohio Environmental Protection Agency (1987), and Smith et al. (1997). The metrics used in this report were taken from warmwater IBIs and coldwater IBIs. Presently, a coolwater IBI has not been developed for any region of the United States. The Casselman River should be considered as a coolwater stream. The metrics selected for this study may not be the best suited metrics for a coolwater stream but are the best available metrics at this time. Life history and pollution tolerance designations for fish species collected in the Casselman River were taken from Smith et al. (1997) (Table 2). Halliwell et al. (1998) classified fish species in northeastern United States, excluding Pennsylvania. Pollution tolerance designations for some fish species differ between Smith et al. (1997) and Halliwell et al. (1998). Until further discussion among PA fisheries biologists occur, pollution tolerance designations from Smith et al. (1997) are deemed appropriate.

Each metric was computed from the data, but a score was not assigned to each metric because reference conditions from Pennsylvania streams and scoring criteria are not available. Therefore, an IBI score was not computed for the survey sites. Each metric was ranked from 1 to 7 based upon the metric value at the seven survey sites. A rank of 1 was assigned to the metric if the metric value represented the best stream condition among the seven sites. Lower rankings were given to metrics as the metric value represented worsening stream conditions among the seven sites. Metric rankings were summed to provide a total ranking for the seven sites surveyed in 1998. Hatchery trout were excluded from the metrics. The occurrence of hatchery trout does not necessarily indicate long term, site-specific environmental conditions. Halliwell et al. (1998), Lyons et al. (1996), and Simon and Lyons (1995) have recommended the exclusion of stocked fish.

The IBI rankings will provide: (1) comparisons among the seven sites surveyed in 1998 and (2) a tool to measure the degree of change for future fish population changes to the Casselman River.

Results

SECTION 01

Site 0102 (RM 43.67)

The canopy was open and consisted of trees along the bank. The stream banks were moderately eroded. Rubble and silt were the dominant substrates at the site. The pH level increased from 7.5 standard units (SU) in 1997 to 8.5 SU in 1998 (Table 3). Total alkalinity decreased from 41 mg/l in 1997 to 32 mg/l in 1998.

Sixteen species of fish were collected in 1998 compared to 16 species in 1979 and 9 species in 1990 (Table 4). Northern hog sucker *(Hypentelium nigricans)* and golden shiner *(Notemigonus crysoleucas)* were present in 1998 but not in 1979 or 1990. Hatchery rainbow trout *(Oncorhychus mykiss)*, brown bullhead *(Ameiurus nebulosus)*, and stonecat *(Noturus flavus)* were present in 1979 and 1990 but not in 1998. In 1998, three brook trout in the 125 mm and 175 mm length groups, 11 smallmouth bass from 50 mm to 100 mm length groups, and 16 rock bass *(Ambloplites rupestris)* from 25 mm to 150 mm length groups were collected at Site 0102 (Table 5).

Site 0102 was the only site in 1998 that had common shiner *(Luxilus cornutus)* present (Table 18). Site 0102 had the highest number of northern hog sucker, rock bass, mottled sculpin *(Cottus bairdi)*, total fish species, and cyprinid species of the seven sites surveyed in 1998 (Table 19). Ten percent of the individuals at Site 0102 were stenothermal coldwater and coolwater species, which was the highest percentage of the seven sites. Total catch-per-unit-effort (CPUE) and CPUE excluding tolerant species at Site 0102 were the highest from the seven sites in 1998. The trophic composition of the fish community was primarily insectivores.

SECTION 02

Site 0201 (RM 40.90)

Water quality had improved since 1995. The pH of 7.0 SU and alkalinity of 24 mg/l in 1998 were similar to the levels in 1997 but much higher than levels prior to 1997 (Table 3). In 1983, 1991, and 1995, pH ranged from 4.7 to 5.6 SU and alkalinity ranged from 0 to 2 mg/l. Stream banks were moderately eroded and silt was the predominant substrate type. Wild celery *(Vallisneria americana)* was very abundant at Site 0201.

Eleven species of fish were collected in 1998 compared to two species in 1983 (Table 6). Pumpkinseed *(Lepomis gibbosus)* was the only species collected in 1983 but not in 1998. Seven species collected at Site 0102 in 1998 were absent from Site 0201. Four smallmouth bass in the 50 mm and 100 mm length groups and eight rock bass from 25 mm to 125 mm length groups were collected at Site 0201 in 1998 (Table 7). In 1983, only one 50 mm rock bass and one 150 mm pumpkinseed were collected in a 600 m site.

Site 0201 was the only site in 1998 that had yellow bullhead *(Ameiurus natalis)* present (Table 18). Site 0201 had the highest number of johnny darters *(Etheostoma nigrum)* of the seven sites surveyed in 1998. Two percent of the individuals at Site 0201 were stenothermal coldwater and coolwater species, which was the second

lowest percentage of the seven sites (Table 19). The trophic composition of the fish community was primarily insectivores.

Site 0202 (RM 36.48)

Water quality had improved since 1995. The pH of 7.1 SU, alkalinity of 20 mg/l, and hardness of 141 mg/l in 1998 were similar to the levels in 1997 but were dramatically better than levels prior to 1997 (Table 3). In 1983, 1991, and 1995, pH ranged from 3.1 to 5.1 SU, alkalinity was 0 mg/l, and hardness was 800 mg/l or greater. Habitat consisted of one slow velocity pool with no riffles present in the 200 m site. Stream banks were lightly eroded, and silt covered the stream bed.

Twelve fish species were collected in 1998 (Table 8). Site 0202 was not electrofished in 1983 because of poor water quality and poor habitat. Pumpkinseed dominated the total catch at Site 0202, and Site 0202 had the highest number of pumpkinseed and sunfish species of the seven sites (Tables 18 and 19). Site 0202 was the only site where bluegill *(Lepomis macrochirus)* was collected. Site 0202 had the lowest number of intolerant species of the seven sites. Five smallmouth bass in the 25 mm and 50 mm length groups and one rock bass in the 50 mm length group were also collected (Table 9). Stenothermal coldwater and coolwater species were absent from Site 0202 (Table 19). Seventy-eight percent of the individuals collected were insectivores.

Site 0203 (RM 32.58)

Similar to Sites 0201 and 0202, Site 0203 water quality had improved since 1995 (Table 3). The pH and alkalinity levels in 1998 at 6.9 SU and 16 mg/l were similar to the 1997 levels. These levels were much higher than the pH range of 3.9 to 5.9 SU and alkalinity range of 0 to 1 mg/l in 1995 and 1983, respectively. Boulder and silt were the major substrate types with more silt upstream of Blue Lick Creek. The mouth of Blue Lick Creek entered the Casselman River at the middle of Site 0203.

Ten fish species were collected at Site 0203 in 1998 compared to eight species in 1983 (Table 10). Hatchery brown trout, brown bullhead, greenside darter *(Etheostoma blennioides)*, johnny darter, and mottled sculpin were present in 1998 but not in 1983. The hatchery brown trout was in the 400 mm length group (Table 11). Three fish species (rock bass, bluegill, and golden shiner) that were captured in 1983 were absent in 1998.

Site 0203 was the furthest site downstream that bluntnose minnow *(Pimephales notatus)* and creek chub *(Semotilus atromaculatus)* were collected and the furthest site upstream that greenside darter were collected (Table 18). Site 0203 had the lowest percentage of individuals that were insectivores (24%), the lowest CPUE excluding tolerant species, and the second lowest number of intolerant species (Table 19). Seventy-nine percent of individuals collected were tolerant species, which was the highest of the seven sites.

Site 0204 (RM 29.39)

Habitat at Site 0204 was different than at the upstream sites due to a much higher gradient and water velocity. Boulder was the main substrate type at Site 0204. The water quality trend at the other sites in Section 02 continued at Site 0204 (Table 3). The pH (7.2 SU) and alkalinity (21 mg/l) levels in 1998 were similar to 1997 and higher than in previous years. Hardness decreased from 516 mg/l in 1997 to 212 mg/l in 1998.

The fish community at Site 0204 had changed dramatically since the last survey in 1983. Twelve fish species were collected in 1998 compared to six in 1983 (Table 12). White sucker *(Catostomus commersoni)* was the only species collected in 1983 and 1998. In 1998, six smallmouth bass from 100 mm to 175 mm length groups and one rock bass in the 200 mm length group were collected at Site 0204 (Table 13).

Site 0204 was the only site that longnose sucker *(Catostomus catostomus)*, a PA endangered species, was collected and the furthest site downstream that johnny darters were collected (Table 18). Thirty-nine percent of the individuals were generalist/omnivores, which was the second highest percentage of the seven sites (Table 19).

SECTION 04

Site 0401 (RM 13.66)

Habitat at Site 0401 was similar to Site 0204 with high stream gradient and boulders. The stream banks were covered with shrubs and were lightly eroded. The pH level decreased from 8.2 SU in 1997 to 7.3 SU in 1998 (Table 3). Alkalinity also decreased from 35 mg/l in 1997 to 30 mg/l in 1998. The pH and alkalinity levels in 1998 were higher than the levels in 1983 (6.7 SU and 4 mg/l).

Seven species of fish were collected in 1998 compared to eight species in 1983 (Table 14). The fish communities in 1983 and 1998 were completely different; no fish species was collected in both years. One 250 mm wild brook trout, four hatchery brown trout in the 175 mm and 200 mm length groups, and 11 smallmouth bass from 100 mm to 200 mm length groups were captured at Site 0401 in 1998 (Table 15).

Site 0401 had the lowest number of species and lowest CPUE of the seven sites (Table 19). Zero percent of the individuals were tolerant species. One hundred percent of the individuals were insectivores and 50% of the individuals were piscivores, which were the highest percentages of the seven sites (Table 19). Some fish species, such as smallmouth bass and brook trout, are both insectivores and piscivores.

Site 0404 (RM 3.41)

In 1998, pH (7.2 SU) and alkalinity (26 mg/l) at Site 0404 were lower than in 1997 but higher than 1983, which was similar to the trend at Site 0401 (Table 3). Trees provided no shading to the 48 m wide site. The substrate consisted of boulders and rubble.

The number of fish species doubled from five in 1983 to 11 in 1998 (Table 16). Bluntnose minnow, creek chub, and johnny darter were collected in 1983 but not in 1998. One 200 mm hatchery brown trout and 13 smallmouth bass from 50 mm to 175 mm length groups were captured in 1998 (Table 17). Smallmouth bass were not collected in 1983.

Site 0404 had the highest total number of darters and smallmouth bass and the second highest CPUE and CPUE excluding tolerant species (Tables 18 and 19). Site 0404 was the only site where fantail darters (*Etheostoma flabellare*) were collected. Ninety percent of the individuals were insectivores, which was the second highest percentage of the seven sites.

Discussion

To assess the overall health of the fish communities throughout the Casselman River, IBI metrics were computed for each site and ranked relative to other sites in the Casselman River. Most applications of the IBI have been used on warmwater streams. The Casselman River can be characterized as a coolwater stream, because it contains warmwater (e.g., brown bullhead), coolwater (e.g., smallmouth bass), and coldwater (e.g., mottled sculpin) species throughout its entire length. Some of the metrics, such as number of sunfish species, used in this study may not be suitable. However, until further testing of IBI metrics for Pennsylvania streams is completed, these metrics will be used to examine the fish communities in the Casselman River during 1998. If metrics need to be modified in the future, the 1998 data could still be used to recalculate the modified metrics.

Laurel Hill Creek, a tributary of the Casselman River, is a high quality stream that contains low and high gradient sections similar to the Casselman River. Laurel Hill Creek was used to compare Casselman River fish communities to fish communities characteristic of a system with considerably less human influence. October 1992 survey data from Laurel Hill Creek were used to calculate only species richness metrics, because the Laurel Hill Creek 1992 survey contained only presence/absence data on non-game fish (Table 21). Comparisons of species richness metrics, based on stream gradient, can be made between Laurel Hill Creek and Casselman River. Low gradient sites on the Casselman River are Sites 0102, 0201, 0202, and 0203. High gradient sites on the Casselman River are Sites 0204, 0401, and 0404.

In warmwater streams, the number of fish species (or species richness) decrease with most types of degradation. Section 01 had the highest number of species. The number of species decreased in Section 02, which includes negative influences from Coal Run, Weir 11, and Shaw Mines Run. Species richness in Section 04 was slightly lower than at Section 02. The lower number of species in Section 04 may be due to the change in habitat from low gradient in Section 02 to high gradient in Section 04. Two low gradient sites on Laurel Hill Creek contained 19 and 15 species (Table 21). Site 0102 in Section 01, Casselman River had 15 species of fish, which is similar to the low gradient reference sites of Laurel Hill Creek. The low gradient sites within the Coal Run/Shaw Mines Complex (Casselman River Sites 0201, 0202, and 0203) had lower number of species than the low gradient reference sites of Laurel Hill Creek. The Laurel Hill Creek high gradient site had 11 fish species, which is similar to Site 0204 (12 species) and Site 0404 (10 species) of the Casselman River. Casselman River Site 0401 had only six species. The number of species at Casselman River Sites 0201, 0202, 0203, and 0401 indicate impairment when compared to the number of species at Laurel Hill Creek reference sites.

The number of intolerant species ranged between 2 and 5 for the seven sites in the Casselman River. The lowest number of intolerant species (2, 3, and 4 per site) was found at Casselman River Sites 0201, 0202, and 0203 (Coal Run/Shaw Mines Complex). The low and high gradient reference sites at Laurel Hill Creek had five to six intolerant species present. This suggests a degree of impairment at the Coal Run/Shaw Mines Complex.

Darters are small benthic species that tend to be intolerant of many types of environmental degradations and are mainly insectivores. The seven Casselman River sites had one or two darter species present. The two Laurel Hill Creek low gradient reference sites had three darter species present and the Laurel Hill Creek high gradient reference site had one darter species present (Table 21). Based on the Laurel Hill Creek low gradient sites, the low gradient sites on the Casselman River, without degradation, should have one or two more darter species.

The number of cyprinid species was highest at Site 0102 in Section 01 with seven species present. The other six sites on the Casselman River had one to four cyprinid species. The Laurel Hill Creek low and high gradient reference sites had between six and eight cyprinid species. The fish communities in Sections 02 and 04 should contain more cyprinid species than was found during the 1998 survey if stream health was better.

The fish communities at six out of seven sites were predominately ($\geq$ 50%) composed of insectivores. Site 0203 (below Shaw Mines Run) had the lowest percentage of insectivores with only 24% of the sample population as insectivores and 76% as generalists/omnivores. A high quality warmwater stream in Wisconsin would have greater than 60% of individuals that are insectivores (Lyons 1992). Generalists/omnivores can feed on a variety of food items. A high percentage of generalists/omnivores, which are non-specialized trophic species, usually indicates a degraded system. This metric suggests Casselman River Site 0203 to be the most degraded site.

Final metric ranking of the seven sites surveyed in the Casselman River indicated that Site 0102 in Section 01 was the best site followed by Site 0404 and Site 0401 in Section 04 (Table 20 and Figure 4). Site 0203 (below Shaw Mines Run) and Site 0201 (below Coal Run) were the most degraded and second-most degraded sites surveyed in 1998 based on IBI fish community metrics, respectively.

These rankings corresponded well to the known pollution sources of the Casselman River in Pennsylvania.

The Casselman River has been severely degraded by acid mine drainage since the early 1900s. Water quality and aquatic life were slowly recovering from pollution until an increase of acid mine drainages from the Coal Run/Shaw Mines Complex (Coal Run, Weir 11, and Shaw Mines Run) killed all aquatic life in the Casselman River from Boynton to the Youghiogheny River in 1993. At the seven sites in Sections 01, 02, and 04, the pH level ranged from 6.9 to 8.5 and total alkalinity ranged from 16 to 32 mg/l. A total of 25 species of fish were collected at seven sites on the Casselman River. Water chemistry and fish communities in the Casselman River, Sections 02 and 04, have improved since 1983. The pH levels at the six sites in Sections 02 and 04 were greater than the levels in 1983 and 1995. Total alkalinity at all sites had increased at least 15 mg/l. Total number of fish species increased in Sections 02 and 04 from 1983 to 1998. In Section 01, total number of fish species in 1998 was similar to the number in 1979 but greater than the number in 1990.

In considering the lower six sites sampled and affected by AMD to varying degrees, trout were sampled at three out of six sites in 1998, rock bass at four out of six, and smallmouth bass at five of six sites sampled in 1998. A very limited recreational fishery exists currently based on numbers and sizes found, but if water quality conditions are sustained, population levels and fishing for these species will increase over the next few years.

The presence of a state endangered species, longnose sucker, at the Garrett, PA, site is also reason to heighten efforts to maintain and improve water quality parameters in the Casselman River. This drainage is the only one in Pennsylvania where longnose sucker were found to inhabit. Effort must continue to be expended to avoid these species from becoming extirpated in PA.

The fish communities in Sections 02 and 04 of the Casselman River have recovered dramatically from the 1993 fish kill and are better than in 1983. Fish species composition at Site 0204 and 0401 in 1998 have changed completely from 1983. However, the 1998 survey from Sections 01, 02, and 04 provides evidence of continued AMD pollution from Coal Run and Shaw Mines Run. The 1998 data can be used to determine the effects of any future fish kills on the Casselman River. Work must continue to eliminate and reduce pollution sources in the Casselman River watershed. Pollution abatement can potentially lead to the increase of Casselman River fish populations and ultimately provide more recreational angling days.

Management Recommendations

1) Mine drainage in the Casselman River watershed is a major problem. Efforts at reduction in the watershed have benefitted water quality and fish populations. This work should continue. A copy of this report should be sent to:

   a) Steve Kepler, Fisheries Biologist, Pennsylvania Fish and Boat Commission, Division of Environmental Services, 450 Robinson Lane, Bellefonte, PA 16823.

   b) Scott Horrell, District Mining Manager, Pennsylvania Department of Environmental Protection, Bureau of Mining and Reclamation, Ebensburg District Mining Office, 437 South Center Street, P.O. Box 625, Ebensburg, PA 15931.

   c) Bud Baker, Pennsylvania Department of Environmental Protection, Bureau of Mining and Reclamation, 5th Floor, Rachel Carson Office Building, 400 Market Street, Harrisburg, PA 17105.

   d) Tom Proch, Aquatic Biologist, Pennsylvania Department of Environmental Protection, 400 Water Front Drive, Pittsburgh, PA 15222.

   e) Dave Steele, Somerset County Conservation District, 1590 North Center Avenue, Suite 103, Somerset, PA 15501

   f) Mark Killar, Western Pennsylvania Coalition for Abandoned Mine Reclamation, Donohoe Center, RD#12 Box 202B, Greensburg, PA 15601.

   g) Len Lichvar, Southern Alleghenies Conservancy, 702 West Pitt Street, Fairlawn Court, Suite #7, Bedford, PA 15522.

2) Casselman River, Section 01, should continue to be managed with planting of catchable trout. Stocking rate and frequency should be determined by classification for Approved Trout Waters.

3) A limited recreational fishery currently exists in the Section 04 of the Casselman River. Fingerling trout should continue to be stocked in Section 04. Smallmouth bass fingerlings, which were stocked in 1998, should be stocked in 1999 to restore that population and fishery.

4) Longnose sucker, a PA endangered species, was found at the Garrett, PA site. The Casselman River drainage is the only one in Pennsylvania where longnose sucker were found to inhabit. Efforts must continue to maintain and improve water quality to avoid longnose sucker from becoming extirpated in Pennsylvania.

5) When a follow-up survey is conducted on Casselman River, the same sampling protocol as in 1998 should be followed, so that IBI metric values can be compared to the 1998 values.

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Table 1. Section catalog for Casselman River (819F), Somerset County; 1998.

Section No.	Section length (km)	Boundary limits	Management designation
01	9.4	UPS: PA-MD state line (RM 47.40) DNS: Mouth of Coal Run 300 m downstream of SR 2014 bridge in Boynton, PA (RM 41.70)	Catchable trout
02	31.1	UPS: Mouth of Coal Run 300 m downstream of SR 2014 bridge in Boynton, PA (RM 41.70) DNS: Mouth of Coxes Creek at Rockwood, PA (RM 22.20)	Natural Yield
03	9.8	UPS: Mouth of Coxes Creek at Rockwood, PA (RM 22.20) DNS: 1 km upstream of SR 3011 bridge at Markleton, PA (RM 16.10)	Natural Yield
04	25.8	UPS: 1 km upstream of SR 3011 bridge at Markleton, PA (RM 16.10) DNS: Mouth on Youghiogheny River (RM 0.00)	Fingerling trout

Table 2. Species occurrence and Index of Biotic Integrity (IBI) designations for the 25 fish species collected in Casselman River (819F), Somerset County; October 1998. I = insectivore, P = piscivore, O = omnivore, G = generalist feeder; t = tolerant, I = intolerant

	IBI group	Trophic group	Tolerance designation	Stenothermal coolwater & coldwater
Brook trout	salmonid	I/P	I	X
Brown trout	salmonid	I/P		X
Bluntnose minnow	cyprinid	O	t	
Blacknose dace	cyprinid	G	t	
Longnose dace	cyprinid	I		X
River chub	cyprinid	I	I	
Creek chub	cyprinid	G	t	
Central stoneroller	cyprinid	H		
Rosyface shiner	cyprinid	I	I	
Golden shiner	cyprinid	O	t	
Common shiner	cyprinid	I		
White sucker	sucker	O	t	
Northern hog sucker	sucker	I	I	
Longnose sucker	sucker	I		X
Brown bullhead	--	I	t	
Yellow bullhead	--	I	t	
Stonecat	--	I		
Rock bass	sunfish	I/P	I	
Pumpkinseed	sunfish	I		
Bluegill	sunfish	I		
Smallmouth bass	--	I/P		
Greenside darter	darter	I	I	
Fantail darter	darter	I		
Johnny darter	darter	I		
Mottled sculpin	sculpin	I	I	X

Table 3. Chemical characteristics of Casselman River (819F), Somerset County; June 1979, June and July 1983, June 1990, September 1991, September 1995, October 1997, and October 1998.

Site	Mo/Yr	pH	Alkalinity	Hardness	Conductivity
0101 - RM 47.10	6/79	7.2	18	48	170
(PA/MD State Line)	6/90	7.1	14	37	157
	10/97	7.4	40	77	322
0102 - RM 43.67	6/79	6.9	18	156	575
(at Salisbury)	6/90	7.0	13	40	142
	9/91	7.5	54	128	406
	10/97	7.5	41	86	330
	10/98	8.5	32	84	267
0201 - RM 40.90	6/83	5.6	2	160	265
(at Boynton)	9/91	4.7	0	216	734
	9/95	5.1	1	216	625
	10/97	6.8	26	140	474
	10/98	7.0	24	119	385
0202 - RM 36.48	6/83	5.1	0	800	315
(Above Shaw Mines Run)	9/91	3.1	0	INT	967
	9/95	3.9	0	INT	663
	10/97	7.0	22	142	471
	10/98	7.1	20	141	441
0203 - RM 32.58	7/83	5.9	1	200	450
(Below Shaw Mines Run)	9/95	3.9	0	264	776
	10/97	6.9	15	214	607
	10/98	6.9	16	206	587
0204 - RM 29.39	7/83	4.8	0	800	625
(at Garrett)	9/91	4.5	0	INT	960
	10/97	7.1	20	516	712
	10/98	7.2	21	212	602
0205 - RM 23.25	7/83	5.0	0	200	490
(at Rockwood)	9/91	4.7	0	INT	980
	10/97	6.9	18	504	720

Table 3. (continued)

Site	Mo/Yr	pH	Alkalinity	Hardness	Conductivity
0301 - RM 18.65	7/83	5.6	1	220	455
(at Casselman)	9/91	7.3	28	276	650
0401 - RM 13.66	7/83	6.7	4	160	440
(at Markleton)	9/91	7.5	24	254	651
	10/97	8.2	35	182	602
	10/98	7.3	30	226	706
0402 - RM 9.30	7/83	6.6	2	188	500
(at Fort Hill)	9/91	7.5	26	260	653
	10/97	8.0	31	166	547
0403 - RM 4.74	7/83	6.7	1	180	490
(above Harnedsville)	9/91	7.4	20	290	686
0404 - RM 3.41	7/83	6.7	1	196	480
(at Harnedsville)	10/97	8.2	32	209	555
	10/98	7.2	26	180	596
0405 - RM 0.17	7/83	6.8	2	170	INT
(near mouth)	9/91	7.6	20	268	639

Table 4. Species occurrence at Site 0102 (River Mile 43.67) for Section 01 of Casselman River (819F), Somerset County; June 1979, June 1990, and October 1998.

Common name	Scientific name	06/79	06/90	10/98
Rainbow trout - hatchery	*Oncorhychus mykiss*	X	X	
Brown trout - hatchery	*Salmo trutta*	X		X
Brook trout	*Salvelinus fontinalis*		X	X
Central stoneroller	*Campostoma anomalum*	X		X
Common shiner	*Luxilus cornutus*	X		X
Bluntnose minnow	*Pimephales notatus*	X		X
Blacknose dace	*Rhinichthys atratulus*	X	X	X
Creek chub	*Semotilus atromaculatus*	X		X
River chub	*Nocomis micropogon*	X	X	X
White sucker	*Catostomus commersoni*	X		X
Northern hog sucker	*Hypentelium nigricans*			X
Yellow bullhead	*Ameiurus natalis*	X		
Brown bullhead	*Ameiurus nebulosus*	X	X	
Stonecat	*Noturus flavus*	X	X	
Rock bass	*Ambloplites rupestris*	X	X	X
Pumpkinseed	*Lepomis gibbosus*	X		X
Smallmouth bass	*Micropterus dolomieu*		X	X
Johnny darter	*Etheostoma nigrum*	X		X
Mottled sculpin	*Cottus bairdi*	X	X	X
Golden shiner	*Notemigonus crysoleucas*			X
Species Total		16	9	16

Table 5. Length/frequency distribution for brook trout (ST), brown trout - hatchery (HBT), smallmouth bass (SMB), rock bass (RB), and pumpkinseed (PPS) at Site 0102 (River Mile 43.67) for Section 01 of Casselman River (819F), Somerset County; October 1998.

Length group (mm)	ST	HBT	SMB	RB	PPS
25				4	
50			5	5	
75			1	4	1
100			5		1
125	1				
150				3	
175	2				
200					
225		1			
250		1			
TOTAL	3	2	11	16	2

Table 6. Species occurrence at Site 0201 (River Mile 40.90) for Section 02 of Casselman River (819F), Somerset County; June 1983 and October 1998.

Common name	Scientific name	06/83	10/98
Bluntnose minnow	*Pimephales notatus*		X
Creek chub	*Semotilus atromaculatus*		X
River chub	*Nocomis micropogon*		X
White sucker	*Catostomus commersoni*		X
Northern hog sucker	*Hypentelium nigricans*		X
Yellow bullhead	*Ameiurus natalis*		X
Stonecat	*Noturus flavus*		X
Rock bass	*Ambloplites rupestris*	X	X
Pumpkinseed	*Lepomis gibbosus*	X	
Smallmouth bass	*Micropterus dolomieu*		X
Johnny darter	*Etheostoma nigrum*		X
Mottled sculpin	*Cottus bairdi*		X
Species Total		2	11

Table 7. Length/frequency distribution for smallmouth bass (SMB) and rock bass (RB) at Site 0201 (River Mile 40.90) for Section 02 of Casselman River (819F), Somerset County; October 1998.

Length group (mm)	SMB	RB
25		2
50	2	3
75		1
100	2	1
125		1
TOTAL	4	8

Table 8. Species occurrence at Site 0202 (River Mile 36.48) for Section 02 of Casselman River (819F), Somerset County; October 1998.

Common name	Scientific name	10/98
Bluntnose minnow	*Pimephales notatus*	X
Creek chub	*Semotilus atromaculatus*	X
White sucker	*Catostomus commersoni*	X
Northern hog sucker	*Hypentelium nigricans*	X
Brown bullhead	*Ameiurus nebulosus*	X
Rock bass	*Ambloplites rupestris*	X
Pumpkinseed	*Lepomis gibbosus*	X
Bluegill	*Lepomis macrochirus*	X
Smallmouth bass	*Micropterus dolomieu*	X
Johnny darter	*Etheostoma nigrum*	X
Central stoneroller	*Campostoma anomalum*	X
Golden shiner	*Notemigonus crysoleucas*	X
Species Total		12

Table 9. Length/frequency distribution for smallmouth bass (SMB), rock bass (RB), pumpkinseed (PPS), and bluegill (BG) at Site 0202 (River Mile 36.48) for Section 02 of Casselman River (819F), Somerset County; October 1998.

Length group (mm)	SMB	RB	PPS	BG
25	2			
50	3	1	6	
75			19	
100			3	1
125			2	
TOTAL	5	1	30	1

Table 10. Species occurrence at Site 0203 (River Mile 32.58) for Section 02 of Casselman River (819F), Somerset County; July 1983 and October 1998.

Common name	Scientific name	07/83	10/98
Brown trout - hatchery	*Salmo trutta*		X
Bluntnose minnow	*Pimephales notatus*	X	X
Creek chub	*Semotilus atromaculatus*	X	X
White sucker	*Catostomus commersoni*	X	X
Northern hog sucker	*Hypentelium nigricans*	X	X
Brown bullhead	*Ameiurus nebulosus*		X
Rock bass	*Ambloplites rupestris*	X	
Pumpkinseed	*Lepomis gibbosus*	X	X
Bluegill	*Lepomis macrochirus*	X	
Greenside darter	*Etheostoma blennioides*		X
Johnny darter	*Etheostoma nigrum*		X
Mottled sculpin	*Cottus bairdi*		X
Golden shiner	*Notemigonus crysoleucas*	X	
Species Total		8	10

Table 11. Length/frequency distribution for brown trout - hatchery (HBT) and pumpkinseed (PPS) at Site 0203 (River Mile 32.58) for Section 02 of Casselman River (819F), Somerset County; October 1998.

Length group (mm)	HBT	PPS
50		2
75		1
400	1	
TOTAL	1	3

Table 12. Species occurrence at Site 0204 (River Mile 29.39) for Section 02 of Casselman River (819F), Somerset County; July 1983 and October 1998.

Common name	Scientific name	07/83	10/98
Central stoneroller	*Campostoma anomalum*		X
Common shiner	*Luxilus cornutus*	X	
Rosyface shiner	*Notropis rubellus*		X
Blacknose dace	*Rhinichthys atratulus*	X	
Longnose dace	*Rhinichthys cataractae*		X
Creek chub	*Semotilus atromaculatus*	X	
River chub	*Nocomis micropogon*		X
White sucker	*Catostomus commersoni*	X	X
Northern hog sucker	*Hypentelium nigricans*		X
Longnose sucker	*Catostomus catostomus*		X
Brown bullhead	*Ameiurus nebulosus*		X
Rock bass	*Ambloplites rupestris*		X
Bluegill	*Lepomis macrochirus*	X	
Smallmouth bass	*Micropterus dolomieu*		X
Greenside darter	*Etheostoma blennioides*		X
Johnny darter	*Etheostoma nigrum*		X
Mottled sculpin	*Cottus bairdi*	X	
Species Total		6	12

Table 13. Length/frequency distribution for smallmouth bass (SMB) and rock bass (RB)at Site 0204 (River Mile 29.39) for Section 02 of Casselman River (819F), Somerset County; October 1998.

Length group (mm)	SMB	RB
100	1	
125	1	
150	2	
175	2	
200		1
TOTAL	6	1

Table 14. Species occurrence at Site 0401 (River Mile 13.66) for Section 04 of Casselman River (819F), Somerset County; July 1983 and October 1998.

Common name	Scientific name	07/83	10/98
Brook trout	*Salvelinus fontinalis*		X
Brown trout - hatchery	*Salmo trutta*		X
Rosyface shiner	*Notropis rubellus*	X	
Bluntnose minnow	*Pimephales notatus*	X	
Blacknose dace	*Rhinichthys atratulus*	X	
Creek chub	*Semotilus atromaculatus*	X	
River chub	*Nocomis micropogon*		X
White sucker	*Catostomus commersoni*	X	
Northern hog sucker	*Hypentelium nigricans*		X
Rock bass	*Ambloplites rupestris*		X
Bluegill	*Lepomis macrochirus*	X	
Smallmouth bass	*Micropterus dolomieu*		X
Greenside darter	*Etheostoma blennioides*		X
Johnny darter	*Etheostoma nigrum*	X	
Fantail darter	*Etheostoma flabellare*	X	
Species Total		8	7

Table 15. Length/frequency distribution for brook trout (ST), brown trout - hatchery (HBT), smallmouth bass (SMB), and rock bass (RB) at Site 0401 (River Mile 13.66) for Section 04 of Casselman River (819F), Somerset County; October 1998.

Length group (mm)	ST	HBT	SMB	RB
75				1
100			1	
125			8	1
150			1	1
175		1		
200		3	1	
225				
250	1			
TOTAL	1	4	11	3

Table 16. Species occurrence at Site 0404 (River Mile 3.41) for Section 04 of Casselman River (819F), Somerset County; July 1983 and October 1998.

Common name	Scientific name	07/83	10/98
Brown trout - hatchery	*Salmo trutta*		X
Central stoneroller	*Campostoma anomalum*		X
Rosyface shiner	*Notropis rubellus*	X	X
Bluntnose minnow	*Pimephales notatus*	X	
Longnose dace	*Rhinichthys cataractae*		X
Creek chub	*Semotilus atromaculatus*	X	
River chub	*Nocomis micropogon*	X	X
Northern hog sucker	*Hypentelium nigricans*		X
Smallmouth bass	*Micropterus dolomieu*		X
Stonecat	*Noturus flavus*		X
Greenside darter	*Etheostoma blennioides*		X
Johnny darter	*Etheostoma nigrum*	X	
Fantail darter	*Etheostoma flabellare*		X
Mottled sculpin	*Cottus bairdi*		X
Species Total		5	11

Table 17. Length/frequency distribution for brown trout - hatchery (HBT) and smallmouth bass (SMB) at Site 0404 (River Mile 3.41) for Section 04 of Casselman River (819F), Somerset County; October 1998.

Length group (mm)	HBT	SMB
50		1
75		4
100		
125		4
150		3
175		1
200	1	
TOTAL	1	13

Table 18. Fish abundance for the seven sites in Casselman River (819F), Somerset County; October 1998. For site descriptions, refer to the Methods section.

	0102	0201	0202	0203	0204	0401	0404
Brook trout	3					1	
Brown trout - hat.	2			1		4	1
Bluntnose minnow	58	4	2	13			
Blacknose dace	1						
Longnose dace					1		1
River chub	5	1			6	1	13
Creek chub	40	6	4	20			
Central stoneroller	97		6		1		14
Rosyface shiner					7		20
Golden shiner	7		1				
Common shiner	69						
White sucker	40	18	1	19	30		
Northern hog sucker	85	27	6	3	20	10	18
Longnose sucker					1		
Brown bullhead			1	2	1		
Yellow bullhead		2					
Stonecat		1					3
Rock bass	16	8	1		1	3	
Pumpkinseed	2		30	3			
Bluegill			1				
Smallmouth bass	11	4	5		6	11	13
Greenside darter				1	2	4	25
Fantail darter							26
Johnny darter	6	9	7	4	1		
Mottled sculpin	46	2		3			3
Total Effort (min)	65	36	38	42	54	54	58

Table 19. Index of Biotic Integrity (IBI) metrics for the seven sites in the Casselman River (819F), Somerset County; October 1998.

IBI Metrics	0102	0201	0202	0203	0204	0401	0404
Species Richness and Composition Metrics							
# of species (excl hatchery trt)	15	11	12	9	12	6	10
# of salmonid & sculpin sp	2	1	0	1	0	1	1
# of cyprinid sp	7	3	4	2	4	1	4
# of darter sp	1	1	1	2	2	1	2
# of sucker sp	2	2	2	2	3	1	1
# of sunfish sp	2	1	3	1	1	1	0
# of intolerant sp	5	4	2	3	5	5	5
% of individuals that are tolerant sp	30	37	14	79	40	0	0
% of individuals that are stenothermal coolwater & coldwater	10	2	0	4	3	3	3
Trophic Composition Metrics							
% of individuals that are generalists/omnivores	30	34	12	76	39	0	0
% of individuals that are insectivores	50	66	78	24	60	100	90
% of individuals that are piscivores	6	15	9	0	9	50	10
Abundance Metrics							
Catch-per-unit-effort (CPUE) (#/hr)	449	137	103	97	86	33	141
CPUE (#/hr), excluding tolerant sp	314	87	88	20	51	33	141

Table 20. Index of Biotic Integrity (IBI) metric rankings for the seven sites in the Casselman River (819F), Somerset County; October 1998 (Ranking: 1 = best to 7 = worst).

IBI Metrics	0102	0201	0202	0203	0204	0401	0404
Species Richness and Composition Metrics							
# of species (excl hatchery trt)	1	4	2	6	2	7	5
# of salmonid & sculpin sp	1	2	6	2	6	2	2
# of cyprinid sp	1	5	2	6	2	7	2
# of darter sp	4	4	4	1	1	4	1
# of sucker sp	2	2	2	2	1	6	6
# of sunfish sp	2	3	1	3	3	3	7
# of intolerant sp	1	5	7	6	1	1	1
% of individuals that are tolerant sp	4	5	3	7	6	1	1
% of individuals that are stenothermal coolwater & coldwater	1	6	7	2	3	3	3
Trophic Composition Metrics							
% of individuals that are generalists/omnivores	4	5	3	7	6	1	1
% of individuals that are insectivores	6	4	3	7	5	1	2
% of individuals that are piscivores	5	2	4	7	4	1	3
Abundance Metrics							
Catch-per-unit-effort (CPUE) (#/hr)	1	3	4	5	6	7	2
CPUE (#/hr), excluding tolerant sp	1	4	3	7	5	6	2
Total Score	34	54	51	68	51	50	38
Final Ranking	1	6	4	7	4	3	2

Table 21. Index of Biotic Integrity (IBI) species richness metrics for the seven sites in the Casselman River (819F), Somerset County; October 1998 and Laurel Hill Creek (819E), Somerset County; October 1992.

IBI Metrics	Casselman River - low gradient sites				Laurel Hill Ck - low gradient sites	
	0102	0201	0202	0203	0502	0503
# of species (excl hatchery trt)	15	11	12	9	19	15
# of salmonid & sculpin sp	2	1	0	1	0	1
# of cyprinid sp	7	3	4	2	8	6
# of darter sp	1	1	1	2	3	3
# of sucker sp	2	2	2	2	2	1
# of sunfish sp	2	1	3	1	3	2
# of intolerant sp	5	4	2	3	5	6

IBI Metrics	Casselman River - high gradient sites			Laurel Hill Ck - high gradient site
	0204	0401	0404	0404
# of species (excl hatchery trt)	12	6	10	11
# of salmonid & sculpin sp	0	1	1	0
# of cyprinid sp	4	1	4	6
# of darter sp	2	1	2	1
# of sucker sp	3	1	1	2
# of sunfish sp	1	1	0	1
# of intolerant sp	5	5	5	6

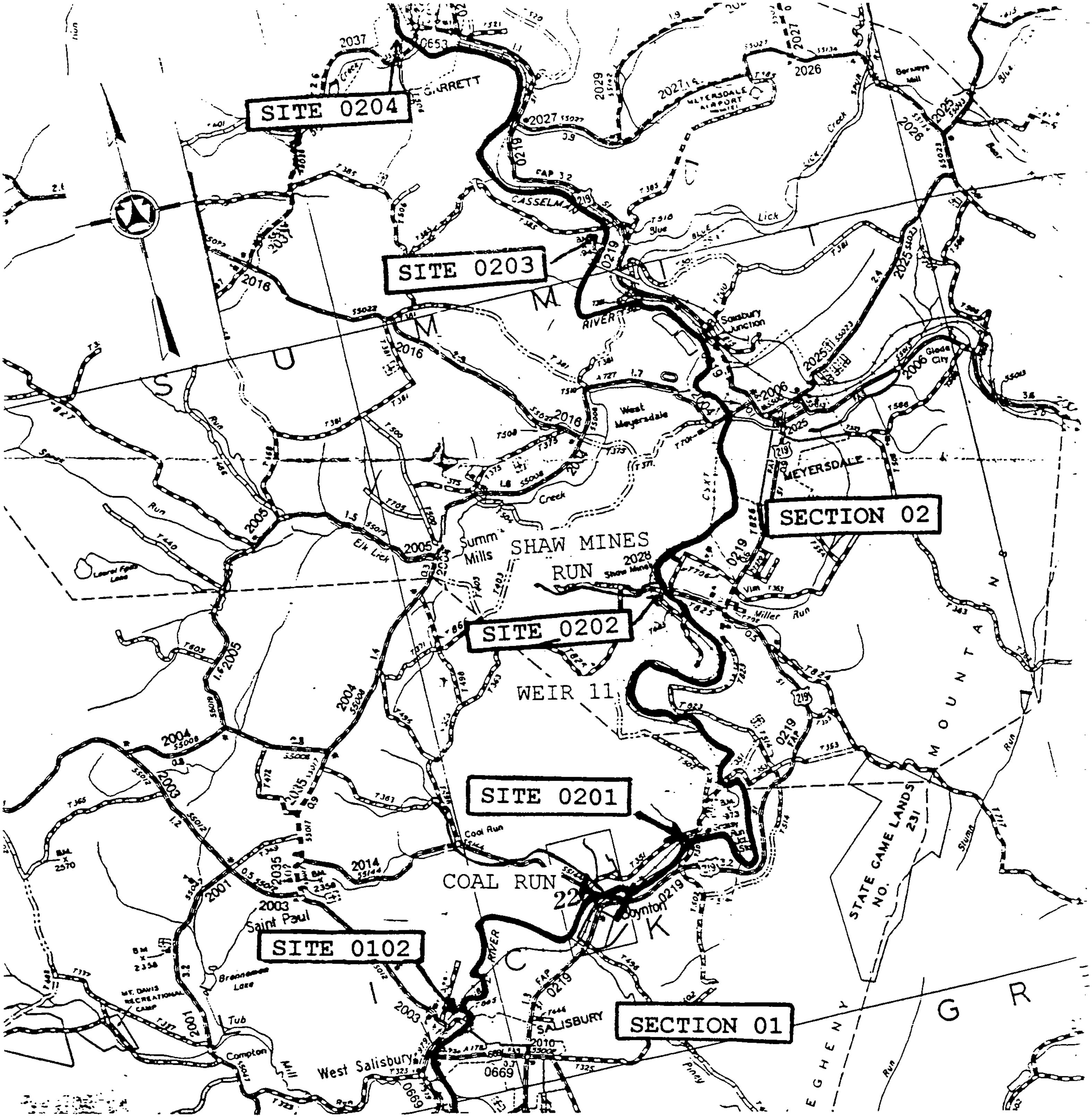


Figure 1. Site locations and lower section limit for Section 01
and upper section limit for Section 02 of Casselman
River (819F), Somerset County; October 1998.

MAP SCALE

1 0.5 0 1 2 3 MILES

1 0.5 0 1 2 3 4 KILOMETRES

LEGEND

I = Section Limit

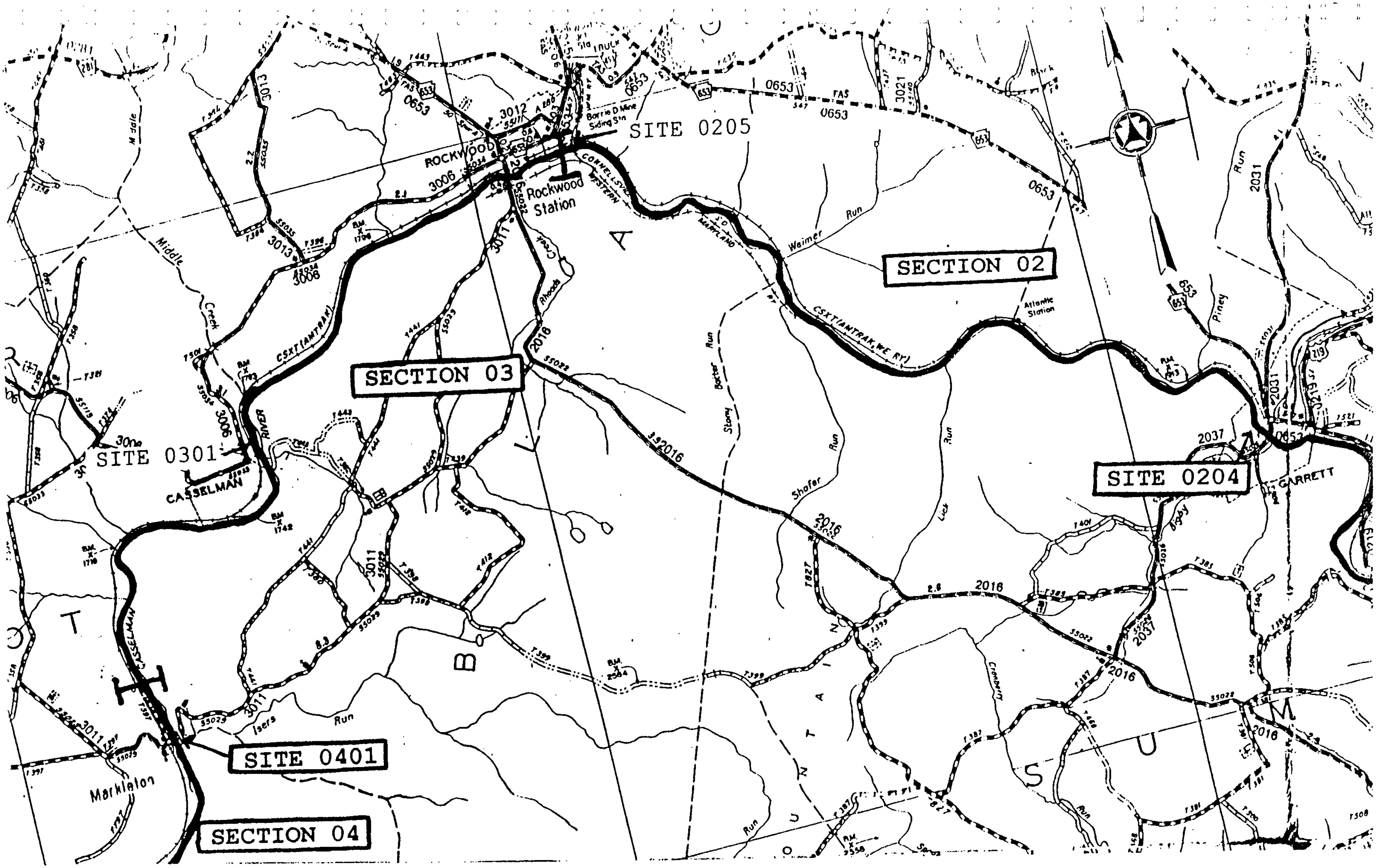


Figure 2. Site locations and lower section limit for Section 02 and upper and lower section limits for Section 03 of Casselman River (819F), Somerset County; October 1998.

MAP SCALE

1 0.5 0 1 2 3 MILES

1 0.5 0 1 2 3 4 KILOMETRES

LEGEND

I = Section Limit

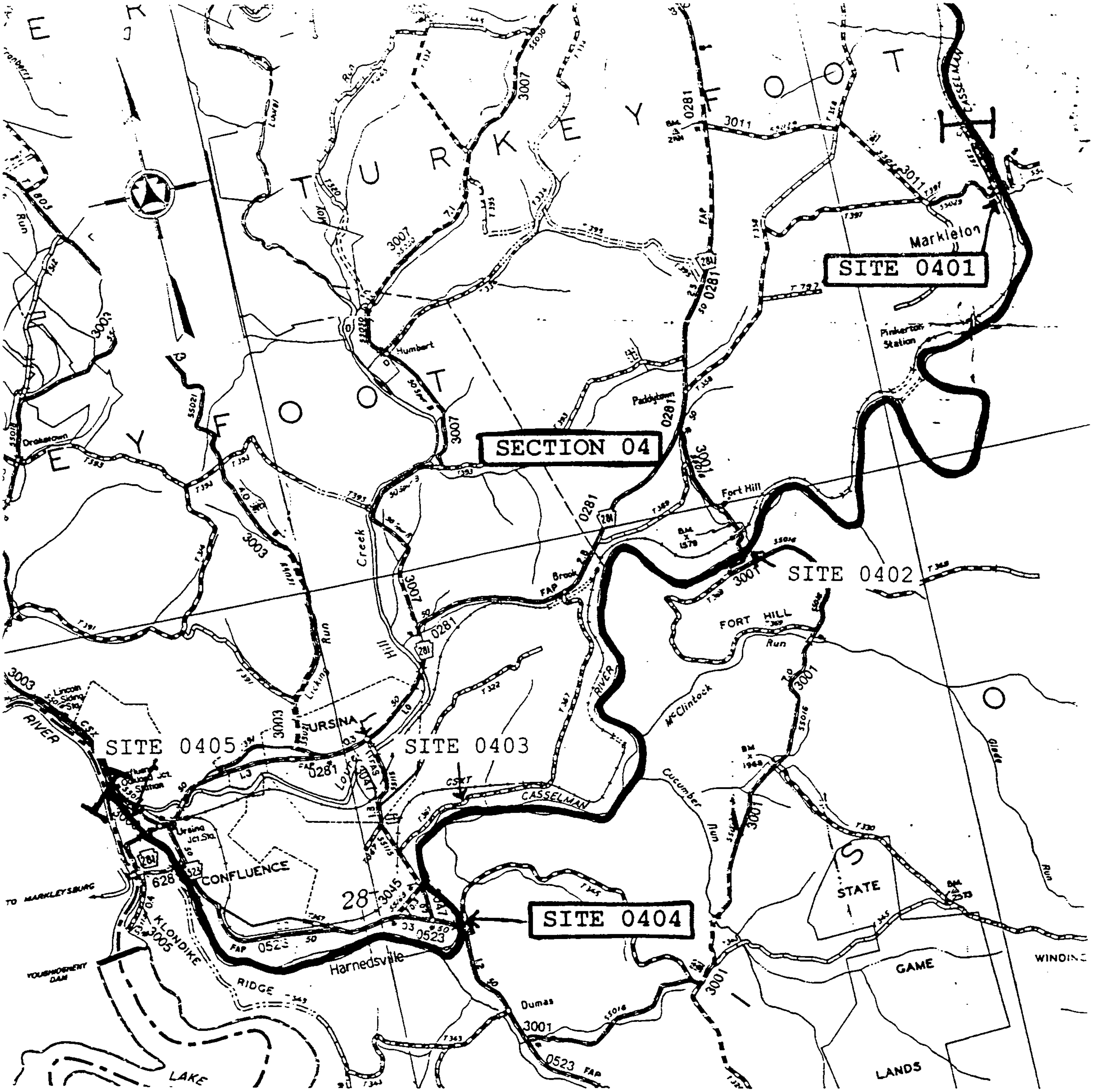
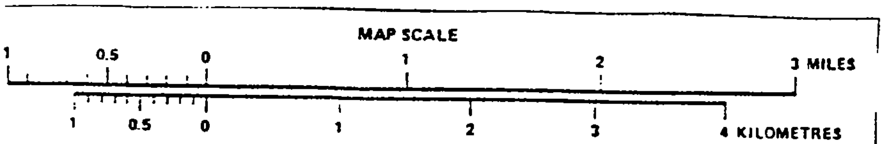


Figure 3. Site locations and lower section limit for Section 03 and upper and lower section limits for Section 04 of Casselman River (819F), Somerset County; October 1998.



LEGEND

I = Section Limit

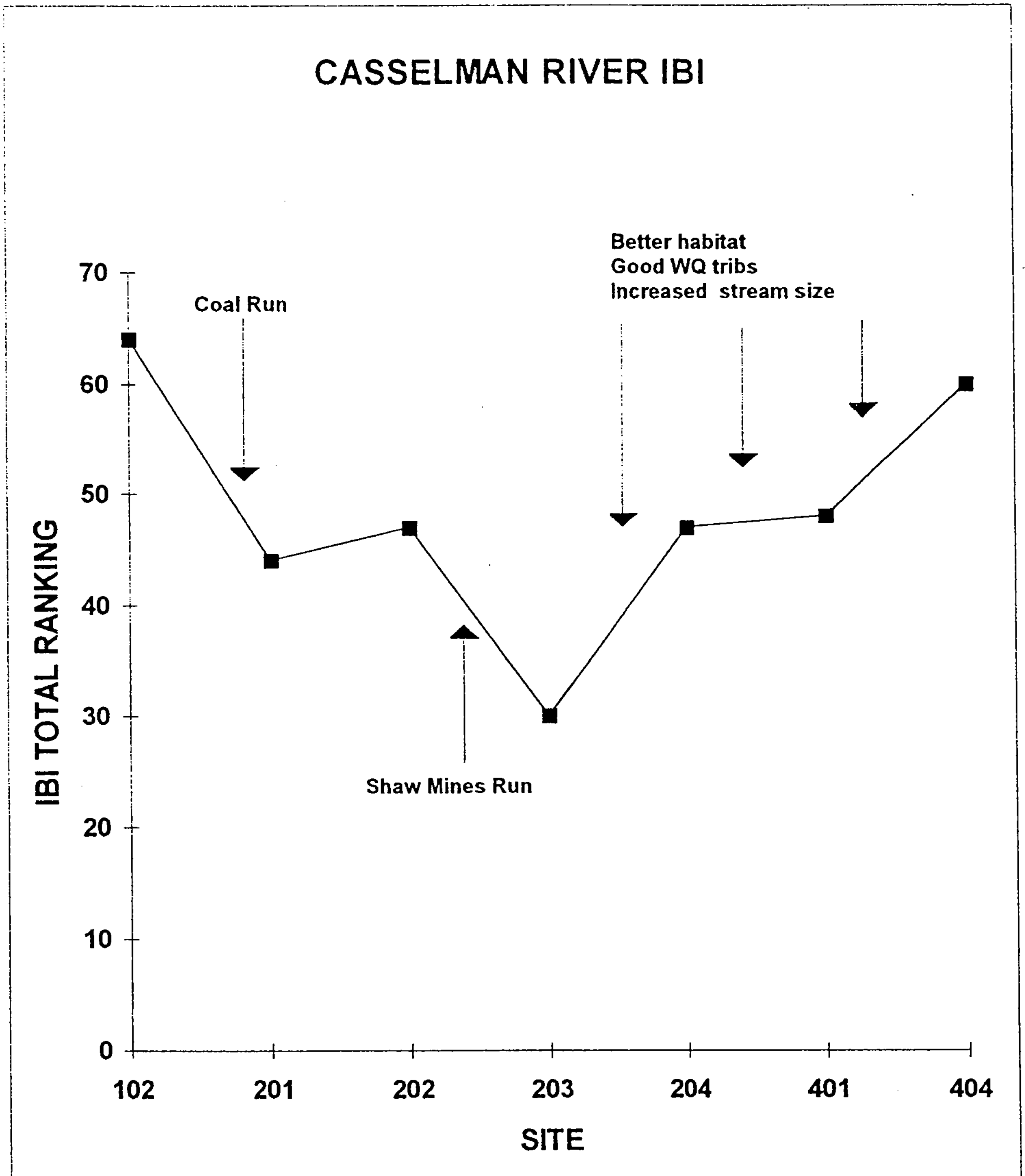


Figure 4. Index of Biotic Integrity (IBI) total rankings for seven sites in the Casselman River (819F), Somerset County; October 1998. Higher IBI total ranking indicates better stream health, which is the opposite of the ranking in the report.

The following pages provide information on potential funding sources for action plan items identified in this River Conservation Plan. This information is not all-inclusive, but it does identify many commonly used funding vehicles. Sources for further information and detail are also provided.

Contents of this section include:

On-Line Funding Source Information

A wealth of funding information is available from agency and organization websites. A partial listing of some valuable sites is provided in the table on the following page.

General Watershed Issues

- DEP Fact Sheet Potential Funding Sources for Watershed Groups
- DCNR Community Conservation Partnership Initiative
- EPA Environmental Finance Program Guidebook of Financial Tools, Section 2. C. Grants
- EPA Environmental Finance Program Stream Corridor Protection Funding Options – Pennsylvania
- NRCS Watershed and River Basin Planning and Installation

AMD and Other Water Quality Issues

- Potential Funding Sources for Mine Drainage Abatement from EPA's A Citizen '5 Handbook to Address Contaminated Coal Mine Drainage
- DEP Ten Percent Set-Aside Program for Acid Mine Drainage
- Funding excerpt from Working Draft of DEP's Pennsylvania's Nonpoint Source (NPS) Management Program 1998 Update
- NRCS Rural Abandoned Mine Program

Following this information is a summary of environmental protection regulatory authority.

ON-LINE FUNDING INFORMATION

Item	Agency/ Organization	Web Address
Guidebook of Financial Tools	EPA	http://www.epa.gov/efinpage/guidebk/guindex.htm
Environmental Finance Center – University of Maryland	EPA/ University of Maryland	http://www.mdsg.umd.edu/EFC/elinks.html
Potential Funding Sources for Watershed Groups	DEP	http://www.dep.state.pa.us/dep/deputate/watermgt/wc/Fact Sheets.htm#Watershed Support Fact Sheets
Wetland and Riparian Stewardship in Pennsylvania	DEP	http://www.dep.state.pa.us/dep/deputate/watermgt/wc/Subjects/nonpointsourcepollution.htm
Sources of Funding for Watershed Activities	DEP	http://www.dep.state.pa.us/dep/deputate/enved/watershed/Sources_Funding_Watershed.htm
Community Conservation Partnership Initiative	DCNR	http://www.dcnr.state.pa.us/grants.htm
United Environment Fund	United Environment Fund	http://www.uef.org
The Foundation Center	The Foundation Center	http://www.fdncenter.org
USDA Conservation Programs	NRCS	http://www.nrcs.usda.gov/NRCSProg.html

POTENTIAL FUNDING SOURCES FOR WATERSHED GROUPS

Many watershed groups have volunteers to work on numerous projects within their watershed boundaries. They try to resolve or remediate current problems by giving many hours of service, and they may help in the prevention of future water quality problems as well.

However, to perform these services, groups need money for the purchase of equipment and supplies. This funding is not always easy to find. The following is a list of potential funding sources and references for use by watershed groups. This is not all inclusive, and you may find other sources not currently on the list. Make sure you are aware of the administrative requirements for any grant you pursue. The Department of Environmental Protection does not endorse the use of any specific group from the list and is supplying names for informational purposes only.

SOURCE OF ASSISTANCE	CONTACT PHONE NUMBER	BRIEF DESCRIPTION OF PROGRAM	PLANNING	IMPLE-MENTA-TION	OTHER
DEP Nonpoint Source Management Program, Harrisburg, PA	717-787-5259	Grants for planning and nonpoint source pollution control projects.	X	X	X
DEP Stormwater Management Program, Harrisburg, PA	717-772-4048	Watershed planning for stormwater control (counties) and implementation of programs at local levels (municipalities).	X	X	
DEP Coastal Zone Management Program, Harrisburg, PA	717-787-5259	Grants for planning and construction in the Lake Erie and the Delaware Estuary Coastal Zones.	X	X	
NRCS, PL 83-566, The Watershed Protection and Flood Prevention Act, Harrisburg, PA	717-782-4429	Plan development for natural resource concerns within a watershed area; cost-sharing available to carry out plan.		X	
DCNR Rivers Conservation Program, Harrisburg, PA	717-787-2316	Conserve and enhance river resources by offering planning grants, technical assistance, implementation grants, development grants, and acquisition grants.	X	X	
Canaan Valley Institute, West Virginia	304-866-4739 800-922-3601	Promotes the development and growth of local associations committed to improving or maintaining the natural resources of their watersheds, in the Mid-Atlantic Highlands portions of PA, MD, VA and all of WV.	X	X	X
Great Lakes Protection Fund, Pennsylvania Office - Meadville, PA	312-201-0660	Occasional small planning grants and natural resource grants for regional efforts in the Great Lakes area. For information specific to Pennsylvania call 814-332-6816.	X	X	
EPA National Estuary Grant Program	202-260-6502	Supports the development of programs to protect coastal watersheds in estuaries of national significance, which includes the Delaware Estuary in Pennsylvania.	X		

SOURCE OF ASSISTANCE	CONTACT PHONE NUMBER	BRIEF DESCRIPTION OF PROGRAM	PLANNING	IMPLE-MENTA-TION	OTHER
Vira I. Heinz ndowment, . ittsburgh, PA	814-669-4847 John Dawes	Provides funds to the Western Pennsylvania Watershed Protection Program to implement comprehensive ecosystem management programs in selected western Pennsylvania watersheds. In addition, small matching grants are provided to DCNR for the Coldwater Heritage Program.	X	X	X
Western Pennsylvania Watershed Protection Program sponsored by the Howard Heinz Endowments	814-669-4847 John Dawes, Grant Administrator	Provides funding to grassroots organizations and watershed associations for site specific watershed remediation in western Pennsylvania.	X	X	
The Leo Model Foundation, Inc., Philadelphia, PA	215-546-8058	Grants for habitat conservation, watershed conservation, and species preservation in the USA and other countries.	X	X	
The William Penn Foundation, Philadelphia, PA	215-988-1830	Grants to preserve natural areas, including environmental education and planning, within the Foundation's geographic area (primarily southeastern Pennsylvania).	X	X	X
Educational Mini-Projects Program, Harrisburg, PA	717-236-1006	Small grants for Pennsylvania-based, grassroots educational projects that address nonpoint source watershed concepts.			X
EPA Environmental Education Grants, Region III, Philadelphia, PA	215-566-5546	Grants awarded to small nonprofit groups for various projects in Region III.	X	X	
'rrisburg . oundation, Harrisburg, PA	717-236-5040	Grants awarded to groups for environmental projects. They also administer special foundation grants set up for specific environmental projects by specific donors. The Foundation serves Cumberland, Dauphin, Perry, Lebanon and Franklin Counties in southcentral Pennsylvania.	X	X	
Charles A. and Anne Morrow Lindburgh Foundation, Minneapolis, MN	612-338-1703	Grants awarded for the conservation of natural resources and water resource management.	X		X
Fish American Foundation, Alexandria, VA	703-548-6338	Grants awarded for: streambank stabilization materials, instream habitat improvements, contracted heavy equipment, and stream morphology work.		X	
Coldwater Heritage Partnership, Partnership between Department of Conservation and Natural Resources, PA Fish and Boat Commission and Trout Unlimited, Harrisburg, PA	717-787-2316	Grants for prioritizing watersheds in need of protection, for assessment of coldwater ecosystems and for the development of watershed conservation plans.	X	X	X
American Canoe ^ssociation, ringfield, VA	703-451-0141 Contact: David Jenkins	May provide funding for various watershed-related projects including starting groups and lobbying.	X		X

SOURCE OF ASSISTANCE	CONTACT PHONE NUMBER	BRIEF DESCRIPTION OF PROGRAM	PLANNING	IMPLE-MENTA-TION	OTHER
Dirt and Gravel Road Maintenance, Harrisburg, PA	State Conservation Commission at 717-787-8821 or local County Conservation District	This is available to local municipalities and state agencies who have jurisdiction over dirt and gravel roads. Groups may be able to work with their local municipality regarding projects dealing with best management practices for erosion and sedimentation control problems and fugitive dust in watersheds.	X	X	
National Park Service, Rivers, Trails and Conservation Assistance Program, Philadelphia, PA	215-597-1581 Joseph DiBello, Chief	The National Park Service works with communities to conserve land and river resources and provides funding for various projects dealing with the conservation of these resources including the development of trails and greenways.	X	X	

Further references:

1. A Guidebook of Financial Tools. In draft. Being produced by the EPA Environmental Financial Advisory Board and the Environmental Finance Center. Web address: http://www.epa.gov/efinpage/guidebk/guindex.htm
2. Catalog of Federal Domestic Assistance. U.S. General Services Administration. Web address: http://www.gsa.gov/fdac.htm
3. Wetland and Riparian Stewardship in PA - A Guide to Voluntary Options for Landowners, Local Governments and Organizations. The guide lists various technical and financial assistance programs available to reduce impacts from nonpoint source pollution. Contact the Alliance for the Chesapeake Bay at 717-236-8825.
4. 1997 Directory of Funding Sources for Grassroots River and Watershed Groups. This is a directory of foundations and others that fund watershed efforts. Available for $35 from River Network at 800-423-6747 or e-mail rivernet2@aol.com
5. Consideration of performance of a Community Environmental Project (CEP) instead of civil penalties in certain cases where the alleged violator has suggested a CEP. The Department of Environmental Protection will coordinate with local government and groups to identify appropriate projects. Contact local DEP regional office for more information.
6. For information about training regarding grant proposal writing and winning grants contact the Nonprofit Management Development Center at LaSalle University in Philadelphia. There is a cost associated with the training. 215-951-1701.
7. Your local library has information about grants including the Environmental Grant Making Foundations Book. Some libraries, including the Dauphin County Library in Harrisburg, have a computer database that can be searched by subject for funding sources pertaining to watersheds or streams.
8. The United Environment Fund fosters growth of environmental organizations throughout the United States by helping them develop a stronger, more diversified funding base. Web address: http://www.uef.org
9. The Foundation Center is an independent, nonprofit information clearinghouse that collects, organizes, analyzes and disseminates information about foundations, corporate giving, etc. They maintain five foundation libraries throughout the United States, and they have cooperating collections of information located in public libraries including libraries in Pennsylvania. Besides publications and supplementary materials, some libraries provide other services for grant seekers. For information about these cooperating collections call 1-800-424-9836. Foundation web address: http://www.fdncenter.org
10. Catalog of Federal Funding Sources for Watershed Protection. USEPA. 1997. Provides information on federal funding programs for watershed protection and local-level watershed projects. Call the National Center for Environmental Publications and Information at 513-489-8190 or 800-490-9198, ask for EPA Document 841-B-97-008.

This fact sheet and related environmental information are available electronically via Internet. Access the DEP website at http://www.dep.state.pa.us) choose Information by Subject/Water Management/Watershed Conservation/Watershed Support).

DCNR

Community Conservation Partnership Initiative

NOTE: This information was obtained from the DCNR website at <u>www.dcnr.state.pa.us/grants.htm</u> and it has been edited to fit the format of this River Conservation Plan.

<u>DCNR Opens Application Period for Keystone Grants</u>

<u>Planning, Implementation and Technical Assistance Grants</u>
<u>Technical Assistance Program</u>
<u>Acquisition and Development Grants</u>

The new Department of Conservation and Natural Resources (DCNR) establishes cabinet-level status for Pennsylvania's state parks and forests and also places conservation and recreation programs dealing with local recreation, heritage parks, rivers conservation, greenways, trails, and open spaces under a single agency. A key priority of this agency is to bring its programs into towns and cities across Pennsylvania and to provide leadership linking agency resources with local conservation efforts.

The Community Conservation Partnership initiative joins DCNR with communities, nonprofit groups and the private sector in conserving Pennsylvania's valuable natural and cultural heritage. DCNR partnership involve greenways, open spaces, community parks, rail trails, river corridors, natural areas, indoor and outdoor recreation and environmental education. Agency programs will be liked with efforts to conserve natural and historic resources, provide recreation, enhance tourism, and foster community development.

DCNR Partnership Opportunities

The new DCNR provides a single point of contact for communities and nonprofit conservation agencies seeking state assistance in support of local conservation initiatives. This assistance can take the form of grants, technical assistance, information exchange and training. These programs are described below:

Heritage Parks Grants promote public-private partnerships to preserve and enhance natural, cultural, historic and recreation resources to stimulate economic development through heritage tourism. Grants are available to municipalities, nonprofit organizations or federally designated commissions acting on behalf of the municipalities in a heritage park area. Grants are awarded for a variety of purposes including feasibility studies; development of management action plans for heritage park areas; specialized studies; implementation projects; and hiring of state heritage park managers. Grants require a 25-50 percent local match.

Community Grants are awarded to municipalities for recreation, park and conservation projects. These include the rehabilitation and development of parks and recreation facilities; acquisition of land for park and conservation purposes; and technical assistance for feasibility studies, trails studies, and site development planning. Grants require a 50 percent match except for some technical assistance grants and projects eligible as small community projects. The small community component provides 100 percent funding - $20,000 maximum - for material costs and professional design fees to municipalities with fewer than 5,000 residents so they may develop basic recreation projects.

Land Trust Grants provide 50 percent funding for acquisition and planning of open space and natural areas which face imminent loss. Lands must be open to public use and priority is given to habitat for threatened species. Eligible applicants are nonprofit land trusts and conservancies.

River Conservation Grants are available to municipalities, counties, municipal and intermunicipal authorities, and river support groups to conserve and enhance river resources. River support groups must be nonprofits which are designated to act on behalf of interested municipalities. Planning grants are available to identify significant natural and cultural resources, threats, concerns and special opportunities and to develop river conservation plans. Implementation grants are available to carry out projects or activities defined in an approved river conservation plan. Grants require a 50 percent match.

Rails-to-Trails Grants provide 50 percent funding for the planning, acquisition or development of rail-trail corridors. Eligible applicants include municipalities and nonprofit organizations established to preserve and protect available abandoned railroad corridors for use as trails or future rail service.

Special Projects

The Bureau plays a pivotal role in special projects like:

The Governor's Conference on Greenways and Trails
The State Recreation Planning Program
The June Rivers Month Sojourn

Community Conservation Partnership Initiative

Planning, Implementation and Technical Assistance Grants

Community Grant Program

Municipalities are the only eligible applicants. The Department provides grant funding at a level not to exceed 50 percent of eligible costs except when noted otherwise. A municipality may submit one grant application for one project type listed under this program per funding cycle. Project types include:

- Circuit Riders: Three-year grant program to hire a full-time recreation and/or park director to share services through an intergovernmental cooperative effort created by two or more municipalities. Available grant funding for the circuit rider's salary decreases from 100 percent the first year to 75 percent the second and 50 percent the third. No funding is provided in the fourth year.

- Comprehensive Recreation, Park and Open Space Plans: Grants to develop a comprehensive long-range planning document that provides strategies to address a municipality's recreation, park and open space needs.

- Feasibility Studies (Swimming Pool/Recreation Facilities): Grants to determine the feasibility of acquiring, developing or rehabilitating swimming pools, ice rinks, sports complexes, recreation centers, etc. DCNR usually requires the completion of these studies before a municipality is funded for development or rehabilitation of major facilities under the Keystone Acquisition and Development Grants.

- Greenways: Grants to explore establishing, developing and managing linear corridors of open space along streams, shorelines, wetlands, canals, ridge tops, etc. These corridors are studied to create recreational trails and bikeways, park connectors, and for environmental protection. DCNR has separate grant programs for river conservation and rail-trail planning.

- Master Site Plans: Grants to design the proposed development of a neighborhood, community, or regional park. Site control, either through ownership or a long-term lease, is required.

- County Natural Areas Inventories: Grants to inventory important natural areas, habitats for species of special concern, significant natural plant communities and areas important for open space, recreation and wildlife habitat. Inventories are done on a county or multi-county area.

- Peer-to-Peer Technical Assistance: Grants of up to 90 percent of eligible costs ($7,500 maximum) to study problem-specific issues dealing with the administration of park and recreation facilities and/or services. These are short-term projects conducted primarily by experienced park and recreation professionals who work closely with community leaders.

Rails-to-Trails Grant Program

Both municipalities and appropriate organizations are eligible applicants. The Department provides grant funding at a level not to exceed 50 percent of eligible costs. An eligible applicant may submit one application per funding cycle under this program.

- Rail-Trail Feasibility Studies: Grants to determine the feasibility of converting an available railroad rights-of-way to a trail. Site control, either through ownership or a long-term lease is not required in order to conduct the study.

  Rail-Trail Master Plans: Grants to develop a design detailing the proposed development of the trail. Site control, either through ownership or a long-term lease, is required.

- Rail-Trail Special Purpose Studies: Grants to develop a detailed study on a particular issue or structure (culverts, bridges, tunnels) that impacts the conversion of a rail corridor to a trail. Site control, either through ownership or a long-term lease, is required.

Rivers Conservation Grant Program

Both municipalities and appropriate organizations are eligible applicants. The Department provides grant funding at a level not to exceed 50 percent of eligible costs (maximum $50,000 grant). An applicant may submit **one** application per funding cycle under this program.

- Rivers Conservation Plans: Grants to study watersheds or rivers, including streams and creeks, to identify significant river resources, potential threats to these resources, and recommend restoration, maintenance or enhancement actions.

- Rivers Implementation Projects: Grants directed to resolution of specific issues for a river that is on the Pennsylvania Rivers Conservation Registry. Examples of eligible projects under the PITA program include: investigations into river access, water quality monitoring, and preparation of ordinances and zoning documents.

Note: A municipality or appropriate organization may submit one application per grant program (Community, Rivers, or Rails Program) and no more than two grant applications per funding cycle.

Community Conservation Partnership Initiative

Technical Assistance Program

The program helps local governments, land trusts, rails4o-trails and river conservation groups and others interested in recreation, parks, open space and conservation provide services to their constituents through various means. Other organizations, including municipal and civic associations, state agencies, schools, trusts, day care centers, camps, etc., take advantage of the services.

Consultations

Professional recreation and park advisors in the central and field offices provide assistance on numerous issues. Whether one-on-one over the phone, or in meetings with one or more officials in a community or organization, advisors bring a wealth of resources.

- Personnel - Hiring practices, job descriptions, salaries, the "Personal Referral Service"

- Management - Developing citizen boards, governmental and organizational cooperation, facility design, delivery system evaluation, feasibility studies

- Finance - Budgeting, untapped revenue sources

- Liability - Risk management information, techniques/sources

- Rails-to-Trails - Advise on the planning, acquisition and development of rail-trail corridors

- Rivers Conservation - Advise and assist in the development of river conservation plans

Workshops

The Bureau sponsors annual workshops series and also instructs at conferences sponsored by others.

- Swimming Pool Management - the Bureau sponsors a dozen or more sessions yearly, for public and private pool and beach operators, to train participants in the safe and cost-effective facility management and operation.

- Playground Design/Safety - the Bureau sponsors yearly sessions to train municipal, school, day care and other playground providers in facility safety-design, operation and maintenance.

- Instructional Participation at Other Conferences - the Bureau participates in numerous conferences and programs to explain its programs and assist other organizations.

  PA Recreation and Park Society
  PA Planning Association
  PA State Assoc. of Township Supervisors, etc.
  The Civil Engineers Society
  PA Municipal Secretaries Institute

Publications

The Bureau offers dozens of publications and hundreds of sample items requests for proposals, concession arrangements, intergovernmental agreements, surveys) to help local governments and other organizations understand how similar groups deal with these issues.

Budget and Salary Survey
Hiring Municipal Recreation and Park Personnel
Swimming Pool Management Manual
"Recreation Outreach" newsletter
"PA Rivers Newsletter"
"A Stream Stabilization and Management Guide for Landowners"
PA Scenic Rivers Program
PA Rivers Conservation Program

Community Conservation Partnership Initiative

Acquisition and Development Grants

Community Grant Program

Municipalities are the only eligible applicants. The Department provides grant funding at a level not to exceed 50 percent of eligible costs except for Small Communities/Small Projects type which is 100 percent funding for approved material costs and professional design fees. A Municipality may submit one application for one project type and no more than two applications per funding cycle. Projects include:

Acquisition - grants for the purchase of land for park, recreation and conservation purposes. Projects may include acquisition of land for new areas, inholdings or expansion of existing sites.

Park Rehabilitation and Development - grants for the rehabilitation of existing parks, indoor and outdoor recreation facilities and development of new park and recreation areas.

Small Communities/Small Projects - this is a special component for municipalities with a population of 5,000 or less. Grants are limited to a maximum of $20,000 and will provide up to 100 percent funding of only material costs and professional design fees. Grants are for the rehabilitation and development of basic outdoor park and recreation facilities and minor indoor recreation renovations. The labor and construction equipment must be provided by the municipality or donated.

Rails-to-Trails Grant Program

Both municipalities and appropriate organizations are eligible applicants. The Department provides grant funding at a level not to exceed 50 percent of the eligible costs. Applicants may submit one application per project type and no more than two grant applications in any funding cycle. Projects include:

Rails-to-Trails Acquisition - grants for the purchase of abandoned railroad rights-of-way for public recreational trail use and purchase of adjacent land for access or related support facilities.

Rails-to-Trails Rehabilitation and Development Projects - grants for the rehabilitation and development of abandoned rights-of-way and support facilities for public recreational trail use.

Rivers Conservation Grant Program

Both municipalities and appropriate organizations are eligible applicants. The Department provides grant funding at a level not to exceed 50 percent of the eligible costs. Rivers conservation acquisition and development grants are limited to a maximum of $50,000. Applicants may submit one application per project type and no more than two grant applications in any funding cycle. Projects include:

> Rivers Conservation Acquisition Projects - grants for the purchase of land for rivers conservation purposes.
>
> Rivers Conservation Development Projects - grants for the development of river conservation projects as recommended in the approved Rivers Conservation Plan.

EPA United States Environmental protection Agency

Environmental Finance Program

A Guidebook of Financial Tools
Section 2.C.
Grants

NOTE: This information was obtained from the EPA website at www.epa.gov/efinpage/guidbk98/gbk2c.htm and it has been edited to remove material not relevant to this River Conservation Plan and to fit the format of this document.

2.C. GRANTS

Description: A grant is a sum of money awarded to an eligible entity without a demand for repayment. Typically, grants are awarded by the federal government to State or local governments, or by States to local governments, for the purpose of financing a particular activity or facility. The grant award represents a monetary transfer payment from one organization to another for a purpose deemed necessary or desirable by the awarding organization. Grants also can be made by or to the private sector, particularly non-profit organizations. Matching grants, for example, on a one-to-one basis, are now being used both the public and private sectors.

Advantages: The primary advantage of grants is that State and local governments and other eligible recipients do not have to use their own resources to pay the specific eligible costs that the grant monies cover. In cases where grant recipients do not have the needed resources, grants enable valuable work to move forward. In other cases, grants make it possible for recipients to pursue additional environmental and/or other activities or to forgo expenditures entirely. Grants can be highly equitable when they address affordability concerns, and may be the only way that some recipients, such as smaller communities, can proceed. Furthermore, grants can leverage additional resources through matching funds.

Limitations: Applying for grants can be costly, time-consuming, and problematical. It requires trained staff on the part of the grantee to determine grant opportunities and submit often detailed grant applications. These grant applications can often take months for the awarding organizations to process and award. Even then, due to the intense competition at both the State and the local levels for the limited pool of grant funds, State and local governments and other recipients may find it increasingly difficult to acquire funding for many projects.

Due to grant project eligibility limitations, only a percentage of the total project costs may be eligible for project assistance. Providing matching funds, often ranging from 5 to 50 percent, may be difficult. Even when grant funding is approved, the grantee may need to seek short-term debt instruments to cover cash shortages while awaiting the arrival of the funds.

Grant funds often have conditions that affect the scope, intent, nature or cost of the project or program in question. For example, USEPA Section 105 grants are negotiated grant agreements which obligate State air programs to use the funds to perform certain activities that may or may not coincide with the State's own priorities for its air program. Certain grant conditions, such as mandatory grant reviews and production of detailed reports, may increase the overall cost of the project. Most federal grants also require that grantees comply with other federal laws and regulations regarding a range of factors such as wage rates, anti-discrimination and environmental requirements. In recent years, grant funding has been increasingly unstable, making it difficult to plan ahead.

Summary: Grants remain the cheapest way for grant recipients to fund environmental work, and may be the only way to get a project moving, particularly those of smaller, disadvantaged entities. Federal grants are still the largest source of environmental grant monies compared to States, communities, and then non-profit sector. Grants clearly demonstrate the federal commitment specific environmental priorities. However, federal grants have many limitations. These grant monies tend to be unstable, slow-moving, highly competitive, and not readily expandable, compared to other financing tools such as bonds. Because of the large number of different federal grants and constantly changing requirements, grants are not summarized in a Comparison Matrix at the end of the section. Potential grant recipients should, and need to, consult the **Catalog of Federal Domestic Assistance** available from the U.S. General Services Administration. The catalog also can be accessed electronically on the World Wide Web at **http://aspe.os.dhhs.gov/cfda/index.htm.** The catalog has its own write-up in the Guidebook in **Section 5.B.: Electronic Services.**

LIST OF GRANTS
(In Alphabetical Order)

1. Agriculture: Forest Service -- Cooperative Forestry Assistance
2. Agriculture: Forest Service -- Economic Action Programs
3. Agriculture: Forest Service -- Landowner Assistance programs
4. Agriculture: Forest Service -- Urban and Community Forestry Program
5. Agriculture: NRCS -- Environmental Quality Incentives Program
6. Agriculture: Rural Business-Cooperative Service -- Business Enterprise Grants
7. Agriculture: Rural Business-Cooperative Service -- Economic Development Grants
8. Agriculture: Rural Utilities Service -- Distance Learning and Telemedicine Grants
9. Agriculture: Rural Utilities Service -- Water and Wastewater Disposal Systems Grants
10. Appalachian Regional Commission Supplemental Grants
11. Commerce: EDA -- Public Works and Infrastructure Development Grants
12. Commerce: EDA -- Special Economic Development & Adjustment Assistance Grants
13. Commerce: NOAA -- Coastal Services Center Cooperative Agreements
14. Commerce: NOAA -- Coastal Zone Management Administration Implementation Awards
15. Defense: Army Corps of Engineers -- Civil Works Projects
16. EPA: Environmental Education and Training Grants
17. EPA: Environmental Justice Grants to Small Community Groups
18. EPA: Environmental Monitoring for Public Access & Community Tracking Grants
19. EPA: Performance Partnership Grants
20. EPA: Program Grants
21. EPA: Section 319 Nonoint Source Pollution Control Grants
22. EPA: Superfund Technical Assistance Grants
23. EPA: Sustainable Development Challenge Grants
24. EPA: Underground Storage Tank Trust Fund Program Grants
25. EPA: Wetlands Protection Development Grants
26. Environmental Technology Initiative
27. FEMA: Flood Mitigation Assistance
28. FEMA: Hazard Mitigation Assistance
29. Foundation and Corporate Giving
30. HUD: CDBG -- Economic Development Initiative Grants
31. HUD: CDBG -- Entitlement Grants
32. HUD: CDBG -- Small Cities Program Nonentitlement Grants
33. HUD: CDBG -- States' Grants Program Nonentitlement Grants
34. Interior: Fish and Wildlife Service -- National Coastal Wetlands Conservation Grants

LIST OF GRANTS Continued

[Special Note: We received a writeup for an innovative new grant tool after this section was completed. Please see the write-up for the **EPA: Clear Air Partnership Fund in Appendix A** on page A-4.]

DEPARTMENT OF AGRICULTURE
FOREST SERVICE
COOPERATIVE FORESTRY ASSISTANCE

Description: Cooperative Forestry Assistance provides formula grants to State forestry agencies to assist in the advancement of forest resource management with respect to non-federal forests and other rural lands. Among the program's objectives are encouragement of the production of timber, control of insects and diseases affecting trees and forests, control of rural fifes, improvement and maintenance of fish and wildlife habitat, planning and conduct of urban and community forestry programs, and efficient utilization of wood and wood residues, including the recycling of wood fiber. State agencies can use the assistance to provide funds to owners of non-federal lands, rural communities, urban municipalities, nonprofit organizations, and State and local agencies for programs which help to achieve ecosystem health and sustainability by improving wildlife habitat, conserving forest land, reforestation, improving soil and water quality, preventing and suppressing damaging insects and diseases, wildfire protection, expanding economies of rural communities, and improving urban environments.

Actual Use: In Fiscal Year 1997, cooperative forestry grant obligations totaled $91,629,000, with individual grant amounts ranging from $25,000 to $6 million. Almost sixteen thousand landowners and 2.15 million acres were enrolled in forest stewardship programs. Approximately 1,800 rural and 8,000 urban communities were being assisted.

Potential Use: State forestry agencies can support a wide range of environmental protection and enhancement activities. Sound forestry practices can be essential to watershed protection and preservation of streams, lakes and wetlands. The Forest Service estimates that program grant obligation totals in each of Fiscal Years 1998 and 1999 will be about $104,000,000. The Service projects that more than 4,000,000 acres will be enrolled in forest stewardship programs by the end of the year 2000.

Advantages: This program provides State forestry agencies with resources they would not otherwise have to promote and support environmental protection and remediation.

Limitations: Some cooperative forestry assistance is restricted to owners of non-industrial private forest land.

Reference for Further Information: Contact U.S. Department of Agriculture, Forest Service, State and Private Forestry Division, Cooperative Forestry Staff, P.O. Box 96090, Washington, DC 20090-6090, Telephone: 202-205-1657, Fax: 202-205-1174, Intemet: **www.fs.fed.us/spf/**.

DEPARTMENT OF AGRICULTURE
FOREST SERVICE
ECONOMIC ACTION PROGRAMS

Description: The Economic Action Programs framework under Cooperative Forestry Assistance includes a set of programs aimed at helping communities to diversify and strengthen their local economies through a whole range of forest-based resources. It focuses on integrating economic development and environmental protection concerns in the context of sustainable community development goals. The three major program components are Rural Community Assistance, Forest Products Conservation and Recycling, and Market Development and Expansion Rural Community Assistance focuses on helping the whole community capitalize on available local human and natural resources to improve the quality of life and the social and economic situation. Communities are helped to organize, plan, and implement actions that are community-based, comprehensive, and partnership oriented. Forest Products Conservation and Recycling encourages and facilitates more efficient use of forest resources to enhance economic development and promote better stewardship of the forest resource. Emphasis is on stimulating public and private sector innovation. Opportunities include new uses for wood and other forest based resources through recycling and value-added secondary manufacturing, and alternative goods and services. Market Development and Expansion is meant to strengthen local and regional economies through the creation of domestic and international markets for forest resources.

Actual Use: The Michigan Forest Management Division emphasizes employment retention through sustainable economic activities in the forest products industry. The New Mexico Forestry Division has initiated a forest health/rural wealth partnership to assist forest-based communities to utilize forest products in ways that help improve the health of forest ecosystems.

Potential Use: State foresters can promote conservation and recycling of forest resources in conjunction with the production and marketing of environmentally friendly goods.

Advantages: Economic Action Programs focus on integrating economic development and environmental protection concerns. They can help organize diverse community interests for renewable resource based economic development and conservation.

Limitations: State forestry agencies must participate meaningfully in the program if it is to provide needed environmental assistance while promoting forest-based economic development

Reference for Further Information: U.S. Department of Agriculture, Forest Service, State and Private Forestry Division, Cooperative Forestry Staff, P.O. Box 96090, Washington, DC 20090-6090, Telephone: 202-205-1657, Fax: 202-205-1174, Internet: **www.fs.fed.us/spf/**.

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DEPARTMENT OF AGRICULTURE
FOREST SERVICE
LANDOWNER ASSISTANCE PROGRAMS

Description: Cooperative Forestry Assistance includes technical and financial assistance to help private landowners create sustainable forest land management plans and implement their forest stewardship objectives. The Forest Stewardship Program (FSP) uses cooperative agreements with State forestry agencies to deliver professional natural resource management advice to non-industrial private forest (NIPF) land owners. It provides technical and planning guidance to landowners who agree to maintain the land under a detailed natural resource management plan for at least ten years. A completed Forest Stewardship plan is required of landowners seeking cost share assistance via the Stewardship Incentives Program (SIP). This program supports a wide range of forest management activities to

develop and implement Forest Stewardship plans. Eligible activities beyond plan development include reforestation and afforestation, forest and agroforest improvement, soil and water protection and improvement, riparian and wetland protection and improvement, fisheries habitat enhancement, wildlife habitat enhancement, forest recreation enhancement, and windbreak and hedgerow establishment, maintenance and renovation. Preference is given activities designed to attain multiple objectives, such as forest and agroforest improvements which enhance wildlife habitat or create recreation opportunities. Federal reimbursement of approved landowner expenses may be up to 75%, to a maximum of $10,000/year, in exchange for landowner agreement to maintain and protect SIP-funded practices for at least ten years. The Forest Legacy (FL) Program supports State acquisition of partial interests (e.g., conservation easements) in privately owned forest lands to restrict development of environmentally sensitive areas.

Actual Use: Landowner assistance programs have been a basic component of cooperative forestry and typically involve thousands of landowners and millions of acres.

Potential Use: These programs can improve environmental management of privately owned non-industrial forest land and can induce landowners to replant and maintain private forests.

Advantages: Federal funds help states provide otherwise unaffordable technical assistance and cost sharing to private land owners.

Limitations: Participation by private forest owners is voluntary and the limit on federal reimbursement reduces the attractiveness of the program while program accomplishment standards may promote emphasis on larger parcels within the pool of eligible lands.

Reference for Further Information: U.S. Department of Agriculture, Forest Service, State and Private Forestry Division, Cooperative Forestry Staff; P.O. Box 96090, Washington, DC 20090-6090, Telephone: 202-205-1389, Fax: 202-205-1271, Internet: **www.fs.fed.us/spf/**.

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DEPARTMENT OF AGRICULTURE
FOREST SERVICE
URBAN AND COMMUNITY FORESTRY PROGRAM

Description: The Urban and Community Forestry Program is implemented through Forest Service Regional/Area Offices working with State Foresters and key cooperators such as Soil and Water Conservation Districts, state forestry associations, and city foresters/arborists. Each State Forester is required to establish a State Urban Forestry Advisory Council and a full-time Urban and Community Forestry coordinator position. The State advisory councils recommend program and funding priorities and assist the State foresters in preparing State Urban and Community Forestry Strategic Plans. Projects must include community volunteerism as a major element and must have the objective of solving some specific, described problem. States may use no more than twenty percent of their annual funding for purchasing, planting, or maintaining trees in communities. Direct funding grants for the purchase and planting of trees or for maintenance activities are on a 50/50 matching basis.

Actual Use: The Ohio Department of Natural Resources' Division of Forestry works with the Ohio Environmental Protection Agency and Attorney General's Office to use' air pollution fines for pass-through grants to communities for targeted tree planting projects.

Potential Use: State forestry agencies can support restoration of urban watersheds and help preserve forest lands threatened by residential and commercial growth, in coordination with related environmental projects.

Advantages: The program explicitly promotes ethnic and cultural diversity in urban and community forestry efforts.

Limitations: Grants to communities and nonprofit urban forestry organizations require a 50% match, potentially eliminating participation by low-income communities.

Reference for Further Information: U.S. Department of Agriculture, Forest Service, State and Private Forestry Division, Cooperative Forestry Staff; P.O. Box 96090, Washington, DC 20090, Telephone: 202-205-1389, Fax: 202-205-1271, Internet: **www.fs.fed.us/spf/**. Ohio Department of Natural Resources, Division of Forestry, 1855 Fountain Square Court, Columbus, Ohio 43224, Telephone: 614-265-6694, Intemet: www.hcs.ohio-state.edu/ODNR/Forestry.htm.

DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE (NRCS)

ENVIRONMENTAL QUALITY INCENTIVES PROGRAM

Description: The Environmental Quality Incentives Program (EQIP), authorized by the Federal Agricultural Improvement and Reform Act of 1996, is a single, voluntary conservation program, that replaces the Agricultural Conservation Program, Agricultural Water Quality Incentives Program, Great Plains Conservation Program and Colorado River Basin Salinity Control Program, It provides technical, financial, and educational assistance to farmers and ranchers through the NRCS. In line with maximizing the overall environmental benefits, the NRCS may designate a watershed, an area or a region of special environmental sensitivity as a priority area and give special consideration to applicants who have conservation plans that address the natural resource concern(s) for which the priority area was designated. Half of the program's assistance is targeted to livestock-related natural resource concerns and half to general conservation priorities. It includes cost-share assistance for up to 75% of the cost of conservation practices such as grassed waterways, filter strips, manure management facilities, capping abandoned wells, and wildlife habitat enhancement. Incentive payments can be made for up to three years to encourage livestock and agricultural producers to adopt land management practices such as nutrient, manure, irrigation water, wildlife, and integrated pest management Total cost-share and incentive payments are limited to $10,000 per person per year and $50,000 for the contract term of 5 to 10 years. Cost-sharing assistance may not be given to construct animal waste storage or treatment facilities serving large confined livestock operations.

Actual Use: In Fiscal Year 1997, EQUIP made $171,000,000 in grants and provided $5,066,644 in educational assistance. The NRCS estimates that EQUIP will make $156,000,000 and $174,000,000 in grant obligations in Fiscal Years 1998 and 1999, respectively.

Potential Use: This program is expected to have a static funding level through fiscal 2002. It can be used for a wide range of water quality protection measures.

Advantages: The effective consolidation of programs can make it easier to use for both the clients and the administering agency, but the cost-share limit may retard participation.

Limitations: if a federal income tax deduction is taken for agricultural soil and water conservation expenses, cost-sharing payments cannot be excluded from gross income. The program has a $200 million/year authorization but annual funding could be less.

Reference for Further Information: U.S. Department of Agriculture, Natural Resources Conservation Service, Conservation Operations Division, P0 Box 2890, Washington, D.C. 20013, Telephone: 202-720-1845; Fax: 202-720-1838; Internet: **www.nhq.nrcs.usda.gov/CCS/FB96OPA/ EQIPfinal.html**.

DEPARTMENT OF AGRICULTURE
FOREST SERVICE
ECONOMIC ACTION PROGRAMS

Description: The Economic Action Programs framework under Cooperative Forestry Assistance includes a set of programs aimed at helping communities to diversify and strengthen their local economies through a whole range of forest-based resources. It focuses on integrating economic development and environmental protection concerns in the context of sustainable community development goals. The three major program components are Rural Community Assistance, Forest Products Conservation and Recycling, and Market Development and Expansion. Rural Community Assistance focuses on helping the whole community capitalize on available local human and natural resources to improve the quality of life and the social and economic situation. Communities are helped to organize, plan, and implement actions that are community-based, comprehensive, and partnership oriented. Forest Products Conservation and Recycling encourages and facilitates more efficient use of forest resources to enhance economic development and promote better stewardship of the forest resource. Emphasis is on stimulating public and private sector innovation. Opportunities include new uses for wood and other forest based resources through recycling and value-added secondary manufacturing, and alternative goods and services. Market Development and Expansion is meant to strengthen local and regional economies through the creation of domestic and international markets for forest resources.

Actual Use: The Michigan Forest Management Division emphasizes employment retention through sustainable economic activities in the forest products industry. The New Mexico Forestry Division has initiated a forest health/rural wealth partnership to assist forest-based communities to utilize forest products in ways that help improve the health of forest ecosystems.

Potential Use: State foresters can promote conservation and recycling of forest resources in conjunction with the production and marketing of environmentally friendly goods.

Advantages: Economic Action Programs focus on integrating economic development and environmental protection concerns. They can help organize diverse community interests for renewable resource based economic development and conservation.

Limitations: State forestry agencies must participate meaningfully in the program if it is to provide needed environmental assistance while promoting forest-based economic development

Reference for Further Information: U.S. Department of Agriculture, Forest Service, State and Private Forestry Division, Cooperative Forestry Staff, P.O. Box 96090, Washington, DC 20090-6090, Telephone: 202-205-1657, Fax: 202-205-1174, Internet: **www.fs.fed.us/spf/**.

DEPARTMENT OF AGRICULTURE
FOREST SERVICE
LANDOWNER ASSISTANCE PROGRAMS

Description: Cooperative Forestry Assistance includes technical and financial assistance to help private landowners create sustainable forest land management plans and implement their forest stewardship objectives. The Forest Stewardship Program (FSP) uses cooperative agreements with State forestry agencies to deliver professional natural resource management advice to non-industrial private forest (NIPF) land owners. It provides technical and planning guidance to landowners who agree to maintain the land under a detailed natural resource management plan for at least ten years. A completed Forest Stewardship plan is required of landowners seeking cost share assistance via the Stewardship Incentives Program (SIP). This program supports a wide range of forest management activities to

FY 1997 ranged from $2,150 to $1,500,000 with an average of $170,402. Funding estimates in FY 1998 and 1999, were $104,305,000 and $55,994,000, respectively.

Potential Use: The types of physical infrastructure projects supported could include more water and wastewater treatment systems and could be extended to include solid waste facilities, recycling facilities, waste4o~nergy facilities, small business air pollution and waste audits, and recreation. Project resources might also be devoted to brownfields cleanup and redevelopment activities.

Advantages: Funding for the Appalachian Regional Commission has been quite stable over the years, and highly equitable given the economic need of the region as a whole. Project funding is specific and remains an opportunity.

Limitations: Grants are limited to counties in all or part of the States comprising Appalachia -- including Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia and West Virginia. The program generally only supplements other federal grants and 20 percent of eligible costs must come from sources other than the federal government. ARC supplemental grant assistance is limited to 50 percent of total project costs except in distressed counties where assistance is limited to 80 percent

Reference for Further Information: U.S. Environmental Protection Agency (EPA), Environmental Financial Advisory Board (EFAB) Advisory, Small Community Financing Strategies for Environmental Facilities, August 9, 1991 (this report contains a general description of the ARC supplemental grant program). Additional information on these grants and ARC programs can be found in the Catalog of Federal Domestic Assistance and at its World Wide Web site: **http://aspe.os.dhhs.gov/cfda/index.htm** - wherein there the assistance programs of all federal departments and agencies can be accessed via various organizational and topical formats.

DEPARTMENT OF DEFENSE
ARMY CORPS OF ENGINEERS
CIVIL WORKS PROJECTS

Description: The Army Corps of Engineers' Civil Works Directorate has numerous environmental responsibilities. Not only is the Corps the largest provider of water-based recreation facilities, it also administers a major environmental permitting program and operates hydropower facilities which provide 24 percent of the nation's electricity. Now among the Corps' responsibilities is management of the Formerly Used Sites Remedial Action Program (FUSRAP), which was transferred from the Department of Energy in 1997. Although major projects require congressional approval, the Corps' Continuing Authority projects, which must cost under $5 million, can take care of emergency repairs to streambanks and shorelines, small beach erosion control projects, Section 107 Small Navigation Projects, projects to mitigate shore damage at federal navigation projects, small flood control projects, and snagging and clearing for flood control. Some types of projects have federal cost limits of $500,000. Depending upon the type of project, cost sharing may be 50 percent federal, 80 percent federal, or potentially more complicated. For most assistance, preapplication consultation and coordination is essential and the application is simply a letter to the District Engineer, indicating clear intent to provide all required local participation.

Actual Use: The Corps spends about $500 million a year on environmental activities. The Continuing Authorities Program had $50 million for Fiscal Year 1998 and the President's budget requests $47 million for Fiscal Year 1999. Recent projects include work to prevent Judsonia, Arkansas', sewage lagoon levee from collapsing into the Little Red River and plans to combine structural flood control with creation of fish and wildlife habitats in New Jersey's Raritan River Basin.

Potential Use: State and local governments can work with the Corps' District Engineer to define environmentally sensitive project objectives and identify realistic sources of the non-federal share of costs.

Advantages: The Continuing Authorities Program eliminates the need for project-specific congressional authorizations for relatively small projects and the federal share of costs can make such projects affordable for state and local governments.

Limitations: Projects must be engineering feasible, economically justified, and complete within themselves.

Reference for Further Information: Contact U.S. Army Corps of Engineers, Directorate of Civil Works, 20 Massachusetts Avenue, NW, Washington, DC 20314-1000; Phone: 202-272-1975; Internet: **www.usace.army.mil/.**

ENVIRONMENTAL PROTECON AGENCY (EPA)
ENVIRONMENTAL EDUCATION AND TRAINING GRANTS

Description: The National Environmental Education Act authorizes project grants to establish environmental education and training programs. EPA's Office of Environmental Education runs an Environmental Education and Training Program (EETP), to train educational professionals in the development and delivery of environmental education programs, and Environmental Education Grants (EEG), to support projects to design, demonstrate, or disseminate practices, methods or techniques related to environmental education and training. EETP supports classroom training in environmental education and studies including environmental sciences and theory, educational methods and practices, environmental career or occupational education, and topical environmental issues and problems. It also supports development of environmental education programs and curricula, including those to meet the needs of diverse ethnic and cultural groups. EEGs support the design, demonstration, or dissemination of environmental curricula, including development of educational tools and materials. Projects must focus on improving environmental education teaching skills, or educating communities, the general public, teachers, or students about public health, or building State, local or tribal government capacity to develop environmental education programs.

Actual Use: In Fiscal Year 1997 EPA awarded a small grant to Haskell Indian Nations University to support extension of environmental education to under-served American Indian audiences through distance learning (See Section 2.C., Agriculture: RUS - Distance Learning and Telemedicine Loans and Grants). Large awards have been made to the University of Michigan and the North American Association for Environmental Education. In Fiscal Year 1997, grant obligations totaled $1.95 million. For Fiscal Years 1998 and 1999, grant obligations are estimated at $1.95 and $1.82 million, respectively.

Potential Use: Environmental Education Grants can be used to develop a grass-roots capability to understand and evaluate environmental conditions and measures proposed to address them.

Advantages: Grants make environmental education projects feasible in circumstances in which they are not otherwise possible. Environmental education prepares voters to deal rationally with critical issues which might be manipulated by vested interests.

Limitations: Funds cannot be used for acquisition of real property, including buildings, or the construction or substantial modification of any building. These grants require a 25% non-federal match and the training program grants are for five years subject to the availability of funds.

Reference for Further Information: U.S. EPA, Office of Communications, Education and Public Affairs, Environmental Education Division, Mail Code 1704, 401 M Street, SW, Washington, DC 20460, Telephone: 202-2604965, Fax: 202-2604095, Internet: **www.epa.gov/.**

ENVIRONMENTAL PROTECTION AGENCY (EPA)
ENVIRONMENTAL MONITORING FOR PUBLIC ACCESS

AND COMMUNITY TRACKING (IMPACT) GRANTS

Description: The EMPACT grants program is a pilot program designed to provide public access to clear, understandable, timely and accurate environmental monitoring data in at least 75 of the 86 larger metropolitan areas. The purpose is to assist the public in day-to-day decision-making about their health and the environment. The emphasis is on active partnerships between local and state government, research institutions, non-governmental organizations, the private sector, and the federal government in the use of advanced and innovative technologies to monitor environmental conditions and communicate clearly understandable, time-relevant and credible information to the lay public. Proposed partnerships must be established with formal agreements which outline the roles and responsibilities of individual partners. Each application must include provision for an Internet home page used for describing the program and for posting local environmental data. Grant or cooperative agreement awards range from $250,000 to $600,000 for a period of 12 to 24 months.

Actual Use: This is a new $3.5 million pilot program, for which full applications were due on May 15, 1998.

Potential Use: If the program is expanded, it could support provision of contemporaneous environmental information in a form readily understood by and useful to voters and taxpayers.

Advantages: Federal funding can facilitate the public understanding of environmental information that is essential for reasoned decision mating in both public and private policy arenas.

Limitations: While it may yield valuable experience, this pilot program is for the most populous metropolitan areas and there is no assurance that it will be expanded or continued.

Reference for Further Information: Contact Environmental Protection Agency, Office of Research and Development, National Center for Environmental Research and Quality Assurance, Environmental Engineering Research Division, Mail Stop 8722R, Washington, DC 20460, Telephone: 202-564-6824, Fax: 202-565-2446, E-mail: karn.barbara@epa.gov, Internet: **es.epa.gov/ ncerqa/rfa/empact.html.**

ENVIRONMENTAL PROTECTION AGENCY (EPA)
PERFORMANCE PARTNERSHIP GRANTS

Description: Performance Partnership Grants (PPGs) are multi-program grants made to State or Tribal agencies by EPA from funds allocated and otherwise available for categorical grant programs. They are voluntary and provide States and Tribes the option to combine funds from two or more categorical grants into one or more PPGs. PPGs are authorized by the 1996 Omnibus Consolidated Rescissions and Appropriations Act ~L 104-134). The authority covers the following sixteen program grants funded from EPA's State and Tribal Assistance Grants appropriation:

1. Air pollution control (CAA section 105);
2. Water pollution control (CWA section 106);
3. Nonpoint source management;
4. Water quality cooperative agreements (CWA section 104(b)(3));
5. Wetlands program development CWA section 014(b)(3));
6. Public water supervision (SDWA sections 1443(a) and 1451 (a)(3));
7. Underground water source protection (SDWA section 1443(1,));
8. Hazardous waste management (Solid Waste Disposal Act section 3011(a)):

9. Underground storage tank (Solid Waste Disposal Act section 2007(f)(2));
10. Radon assessment and mitigation (TSCA section 306);
11. Lead-based paint activities (TSCA section 404(g));
12. Toxics compliance and monitoring (TSCA section 28);
13. Pollution prevention incentives for States ~PA section 6605);
14. Pesticide cooperative enforcement (FIFRA section 23(a)(1));
15. Pesticides and program implementation ~IFRA section 23(a)(l))
16. Pesticide applicator certification & training/pesticide program (FIFRA section 23(a)(2)); and
17. General Assistance Grants to Indian Tribes (Indian Environmental General Assistance Act

Actual Use: States began to seek PPG authority and negotiate with EPA in FY 1997.

Potential Use: All fifty States and the Tribal agencies could negotiate and implement PPGS allowing them increased flexibility in implementing and funding environmental priorities. $169,900,000 in grants were obligated in Fiscal Year 1997.

Advantages: PPGs give States and Tribes more flexibility to address their highest environmental priorities, thus increasing equity and environmental incentives. They provide incentives to States and Tribes to improve environmental performance and links between program goals and outcomes. PPGs also cut administrative burdens/costs for recipients and EPA by reducing the numbers of grant applications, budgets, work plans and reports. EPA will build partnerships with States and Tribes via shared goals and division of responsibilities.

Limitations: No extra funds are available via use of PPGs. States and Tribes must first develop environmental indicators and performance measures to ensure progress is made to agreed on goals.

Reference for Further Information: U.S. EPA, Office of the Administrator, Office of Regional Operations and State/Local Relations, 401 M Street, SW, Washington, D.C. 20460, Mail Code: 1501.

ENVIRONMENTAL PROTECTION AGENCY (EPA) PROGRAM GRANTS

Description: Federal grants for various purposes including State and local program research, demonstrations, development, and implementation. The amount available, application criteria, and requirements differ from grant to grant, depending on Congressional authorization and internal EPA grant policies. Some grant programs are specifically authorized for a particular purpose, while other grant programs give significant discretion to the supervising EPA office.

Actual Use: The table on the following page provides a partial list of EPA grants, organized by the office that administers the grant. This list is provided only as an example; it is not necessarily comprehensive or current, since grants change from year to year according to Congressional authorization. Historically, EPA grants have funded both State and local programs in all environmental media. A number of grants are targeted to research and demonstration projects; other grants provide support for State and local program activities that coincide with federal environmental quality priorities.

Potential Use: State and local governments could use EPA grant funds to cover the costs of whatever program activities and/or capital purchases meet the applicable grant criteria.

Advantages: Federal grants provide State and local governments with the means of meeting national environmental quality goals. They may also provide funds otherwise unavailable to State or local programs, thus enhancing equity, environmental incentives, and financial leveraging considerations.

Limitations: Funds may be targeted to specific statutory goats. Programs must compete for limited funds and sign EPA grant agreements to perform activities. Each grant is very specific, thus limiting State and local flexibility.

Reference for Further Information: U.S. EPA grants can be accessed on the Agency's Web Page under: Grant Programs Administered by EPA at **http://www.epa.gov/ogd/grants.htm**. The respective EPA program offices will also have information on the grant programs that they oversee. In addition, the Catalog of Federal Domestic Assistance contains descriptions of all federal grant programs, including EPA's, and can be obtained at the Government Printing Office. EPA grant programs can also be accessed in the Catalog electronically through it Internet Website at **http://aspe.os.dhhs.gov/cfda/ideptaa.htm** - which is the section for Independent Agencies.

PARTIAL LISTIING OF EPA PROGRAM GRANTS BY OFFICE, 1995

Office of Water	Water Pollution Control State and Interstate Program Support Grants (Section 106) Water Quality Control Information System Grants
	State Public Water System Supervision Grants
	State Underground Water Source Protection Grants
	Water Pollution Control -- Lake Restoration Cooperative Agreements
	National Estuary Program Grants
	Nonpoint Source Planning Grants
	Nonpoint Source Set-Asides (under Title VI of the CWA)
	Wetlands Protection -- State Development Grants
Office of Research and Development	Solid Waste Disposal Research Grants
	Water Pollution Control - Research, Development and Demonstration Grants
	Toxic Substances Research Grants
	Safe Drinking Water Research and Demonstration Grants
	Environmental Protection -- Consolidated Research Grants
	Air Pollution Control Research Grants
	Pesticides Control Research Grants
Office of Administration	Environmental Protection Consolidated Grants -- Program Support
Office of Prevention, Pesticides, and Toxic Substances	Consolidated Pesticide Compliance Monitoring and Program
	Pollution Prevention Grants Program
	Cooperative Agreements
	Toxic Substances Compliance Monitoring Program Grants
	Asbestos Hazard Abatement (Schools) Assistance
	Toxic Release Inventory Data Quality Assurance Program
Office of Solid Waste and Emergency Response	Hazardous Waste Management State Program Support
	Superfund State Core Program Cooperative Agreements
	Hazardous Substance Response Trust Fund (Superfund)
	State Underground Storage Tank Trust Fund Program
	Solid Waste Management Assistance Grants
	Superfund Innovative Technology Evaluation Program

ENVIRONMENTAL PROTECTION AGENCY (EPA)
SECTION 319 NONPOINT SOURCE POLLUTION CONTROL GRANTS

Description: Section 319(h) of the Clean Water Act provides for formula grants to States and tribes to implement projects or programs that will help to reduce non-point sources of water pollution within identified priority watersheds. All project funding must implement EPA-approved nonpoint source management programs and include at least 40 percent nonfederal match.

Fundable projects include the design, demonstration, implementation, and evaluation of Best Management Practices (BMPs) for animal waste, nonpoint pollution reduction in priority watersheds, groundwater protection from nonpoint sources, public education programs on nonpoint source management (e.g., basin-wide landowner and homeowner education). Also covered now are lake projects previously funded under the Clean Water Act Section 314 Clean Lakes Program. Nonprofit organizations may submit applications to State lead agencies for funds in accordance with the State's work program.

Actual Use: State grants average $2 million and range from $268,651 to $5,310,372. Indian tribe grants average $50,000 and range from $45,000 to $55,000. In Fiscal Year 1997, grant obligations totaled $100 million. Grant obligation estimates for Fiscal Years 1998 and 1999 are $1 Os million and $200 million, respectively. Best management practices have been designed and implemented for stream, lake and estuary watersheds and for animal wastes and sediment, pesticide and fertilizer control. Several States have used Section 319 funds to support their Farm*A*Syst source water protection programs (see **Section 5.A., Cooperative Extension Systems**).

Potential Use: States can use funds to implement portions of nonpoint source management programs addressing critical priorities.

Advantages: Grant funds can make some otherwise unaffordable water quality activities feasible.

Limitations: States must provide a non-federal match of at least forty percent and meet maintenance of effort requirements. Only $100 million is available nationally and projects or programs must be conducted within the state's non-point source priority watersheds.

Reference for Further Information: U.S. EPA, Office of Wetlands, Oceans and Watersheds, Assessment and Watershed Protection Division, Nonpoint Source Control Branch, Mail Code: 4503F, 401 M Street, SW, Washington, DC 20460; Telephone: 202-260-7100, E-mail: ow.general~epa.gov, Internet: www.epa.govIowowINPSIguide.html. A description of this grant program can be found in the Catalog of Federal Domestic Assistance and at the Catalog's World Wide Web site, http:/laspe.os.dhhs.govlcfdalideptdoc.htrn.

ENVIRONMENTAL PROTECTION AGENCY (EPA)
SUPERFUND TECHNICAL ASSISTANCE GRANTS

Description: EPA's Office of Solid Waste and Emergency Response administers Superfund Technical Assistance Grants (TAG) for Citizen Groups at Priority Sites. The program provides project grants for incorporated community groups to hire technical advisors who can assist them in interpreting technical information concerning the assessment of potential hazards and the selection and design of appropriate remedies at sites eligible for cleanup under the Superfund program. Funds may be used at sites listed or proposed for listing on the National Priority List (NPL) where cleanup is underway to obtain technical assistance in interpreting information regarding the nature of the hazard, remedial investigation and feasibility study, record of decision, selection and construction of remedial action, operation and maintenance, or removal action.

Incorporated groups of individuals who may be affected by a release or threatened release at any Superfund facility are eligible. Affected individuals are homeowners, landowners and others who can demonstrate direct effects from the site, such as actual or potential health or economic injury. Competing groups are encouraged to consolidate and submit a single application. Only one grant is made per site, for a maximum of $50,000 unless waived for up to an additional $50,000. A twenty percent match, including in-kind contributions, is required unless waived or lowered due to financial burden The Superfund TAG Handbook provides detailed application instructions.

Actual Use: These grants help citizens acquire technical advisors to help them understand proposed clean-up remedies, better understand the technical problem at the site, and respond to EPA actions. Since the program began in March 1988, EPA has issued 196 awards totaling more than $72 million (including new awards, waivers and deviations). EPA superfund technical assistance grant obligations totaled $700,000 in Fiscal Year 1997 and are projected to be $1,000,000 and $500,000 in Fiscal Years 1998 and 1999, respectively.

Advantages: Technical assistance grants provide resources to help those directly affected by hazardous chemical waste sites to understand the situation and what is being done to correct it.

Limitations: Grants are limited to Superfund site communities and can be no more than $50,000-$ 100,000 for what is typically a six-year period. Funds cannot be used to develop new information or underwrite legal actions.

Reference for Further Information: U.S. EPA, Office of Solid Waste and Emergency Response, Office of Emergency and Remedial Response, Community Involvement and Outreach Center, Mail Code 5204G, 401 M Street, SW, Washington, DC 20460, Telephone: 703-603-8863; Fax: 703-603-9100; E-mail:superfund.info@epa.gov; Internet: **www.epa.gov/oerrpage/superfnd/web/tools/tag/ index.htm.**

ENVIRONMENTAL PROTECTION AGENCY (EPA)
SUSTAINABLE DEVELOPMENT CRALLENGE GRANTS

Description: This EPA grant program is designed to encourage people, organizations, governments and businesses to work cooperatively to develop flexible, locally-oriented approaches that link place-based environmental management with sustainable development and revitalization. The program funds projects that improve the environment, build sustainable futures for communities, help local economies and encourage partnerships among community groups, businesses, government and others. It looks for projects yielding the greatest environmental and economic benefits, and leverage the most community investment and resources.

Actual Use: The Sustainable Development Grant Program solicits project proposals for grants of up to $250,000. Proposals are received from public entities, agencies, institutions and organizations (such as State and local governments, and federally recognized tribes and regional entities), and non- profit private agencies, institutions and organizations.

The Program obligated $5 million in grants in Fiscal Year 1997. Projects funded have ranged from better forest management practices in New Hampshire to a network of 26 community supported organic farms in the Mid-Atlantic region to a mid-city green projects building materials exchange in Louisiana to a smart wood certification program in Washington

Potential Use: The program could potentially fund the demonstration of a wide variety of environmentally and economically sustainable projects in all environmental media and program areas. These projects could help identify those practices which show priories of being truly sustainable and those which are not and should be avoided EPA estimates that the program will have grant obligations in Fiscal Years 1998 and 1999 of $5 million and $9.3 million, respectively.

Advantages: Funding authorities are broad and the program supports an unusually wide range of creative and innovative approaches, and provides support to segments of the private sector. Project support represents seed Funding and successful grantees leverage substantial additional public and private resources. Environmental incentives are very high and built into the program.

Limitations: The program requires a nonfederal match of 20 percent of a project's total budget and federal assistance may not exceed $250,000.

Reference for Further Information: U.S. EPA, Office of Air and Radiation, 401 M Street, SW, Washington, D.C. 20460, Telephone Number: 202-260-2441, Contact: Pamela Hurt.

ENVIRONMENTAL PROTECTION AGENCY (EPA) UNDERGROUND STORAGE TANK TRUST FUND PROGRAM GRANTS

Description: EPA's Office of Solid Waste and Emergency Response oversees two grant programs dealing with underground storage tanks. The State Underground Storage Tanks (UST) Program provides project grants to assist state governments in the development and implementation of underground storage tank programs, so as to build their capacity to operate their programs in lieu of the federal program. A high priority is to encourage owners and operators to upgrade or replace their tanks well in advance of the deadline. Owners and operators of UST systems have until December 22, 1998, to upgrade, replace or close substandard systems. The Leaking Underground Storage Tank (UST) Trust Fund Program provides project grants (cooperative agreements) to support state corrective action and enforcement programs that address releases from underground storage tanks containing petroleum. Funds are used to provide resources for the oversight and cleanup of petroleum releases from underground storage tanks where owners and operators are unknown, unwilling or unable to take corrective actions themselves. States may also oversee responsible party cleanups A ten percent state cost share is required.

Actual Use: The average LUST grant is $1.5 million and the range is from $300,000 to $4.3 million. All 50 states and six territories have cooperative agreements with EPA to conduct cleanups and provide oversight of responsible party cleanups. Some states, such as New York, provide additional funds to support their cleanup efforts. Funding for the grants (cooperative agreements) was approximately $50.3 million in Fiscal Year 1997. Funding estimates for Fiscal Years 1998 and 1999 are $55.25 million and $57.7 million, respectively.

Potential Use: The program can be used not only to solve the immediate problem of leaking underground petroleum storage tanks, but also to raise public awareness of the pollution threat to groundwater.

Advantages: Federal funds make it feasible for states and territories to conduct programs dealing with the environmental threat of leaking underground petroleum storage tanks. The program has been effective, reflecting the specific benefits of cleanup projects and the flexibility afforded the states to consider affordability issues and implement various financing arrangements.

Limitations: The programs are nearing a critical juncture which could lead to premature reductions in effort. The deadline for upgrading or replacing substandard systems is late December, 1998, but some small operators may not yet be in compliance due to financial difficulties.

Reference for Further Information: Contact Environmental Protection Agency, Office of Underground Storage Tanks, Implementation Division, 401 M Street, SW, Washington, DC 20460; Mail Code: 5403G, Telephone: 703-603-7175, Fax: 703-603-9163, Internet **www.epa.gov/**.

ENVIRONMENTAL PROTECTION AGENCY (EPA)
WETLANDS PROTECTION DEVELOPMENT GRANTS

Description: Environmental Protection Agency (13PA) regional offices administer project grants to State or tribal agencies, interstate/inter-tribal agencies, and local governments in developing new or enhancing existing wetlands protection programs. Grants are intended to encourage wetlands protection program development or to enhance/augment existing effective programs. Project proposals must clearly demonstrate a direct link to increasing a state's, tribe's, or local government's ability to protect its wetlands resources. The required minimum match is twenty-five percent of the total project costs. While projects funded should support the initial development of a wetlands protection program or the enhancement/refinement of an existing program, current priorities are Wetland/Watershed Protection Approach Demonstration Projects and River Corridor and Wetland Restoration Projects.

Actual Use: Each state has received at least one grant. In Fiscal Year (FY) 1997, grant obligations totaled $15 million and grant awards ranged from $1500 to $489,000. Grant obligations are estimated to remain at $15 million for both FY 1999 and FY 2000. Funds have been used to support development of wetland water quality standards which can be used as a primary tool in water quality certification decisions. Funding has been focused on wetlands/watershed protection, approach demonstrations and river corridor and wetlands reservations projects.

Potential Use: Grants can be used to support redesign of wetland and watershed protection programs that need to be changed to reflect evolving demographic and ecological realities.

Advantages: Design or improvement of wetlands protection programs can be made financially possible by these federal grants.

Limitations: Grant funds cannot be used for operational support of wetlands protection programs. The lack of operational support funds is a serious impediment to State involvement in wetlands protection.

Reference for Further Information: U.S. EPA, Office of Wetlands, Oceans and Watersheds, Wetlands Division, 401 M Street, SW, Washington, DC 20460, Mail Code: 4502F, Telephone: 800-)832-7828 or 202-260-1917, Fax:202-260-2356, Internet: **http://www.epa.gov/OWOW/wetlands/ partners.html.**

ENVIRONMENTAL TECHNOLOGY INITIATIVE (ETI)

Description: ETI is an interagency effort led by the U.S. Environmental Protection Agency (EPA) supporting partnerships and projects that promote improved public health and environmental protection by advancing the development and use of innovative environmental technologies. The Initiative promotes innovative technologies that prevent pollution, control and treat air and water pollution, remediate contaminated soil and groundwater, assess and monitor exposure levels and mange environmental protection information.

Actual Use: ETI has provided funding support in excess of $100 million for more than 250 partnerships and projects throughout the United States advancing the development and use of innovative environmental technologies. Many of the partners participating in ETI projects are investing three to four dollars for every dollar invested.

Potential Use: As the costs and an difficulties of meeting environmental challenges grow, the need for new and better environmental technologies will grow. The potential prospects for the environmental technology industry are truly staggering. The United States' environmental technology industry is already a high-wage, high growth industry. More than a million Americans are employed in over 50,000 companies nation-wide. Our market for environmental technology is the largest in the world and global markets are expected to grow by hundreds of billions of dollars in the coming years.

Advantages: Use of the innovative environmental technologies being developed and promoted by ETI partnerships and projects can cut regulatory compliance costs, reduce public health risks, gain superior environmental results, make companies more efficient and competitive, and improve community environmental services. Private sector equity, environmental incentives, and leveraging possibilities are all high.

Limitations: Before innovative environmental technologies can achieve regulatory acceptance, technology developers must decipher and meet a disjointed system of verification requirements in each State where a potential market exists. Once regulatory acceptance is achieved, the innovative technologies must then prove themselves and gain acceptance for actual field use.

Reference for Further Information: U.S. EPA; Office of Policy, Planning, and Evaluation, Policy and Technology Innovations Division, 401 M Street SW, Washington, DC 20460, Mail Code: 2127, ETI Infoline: 202-260-2686, Internet site: **http://www.epa.gov/oppe/eti**.

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FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD MITIGATION ASSISTANCE

Description: The Federal Emergency Management Agency (FEMA) provides planning grants to assist communities with development of flood mitigation plans and project grants for implementation of planned measures to reduce flood losses. State agencies, participating National Flood Insurance Program (NFIP) communities, and qualified local organizations are eligible. Planning grants support assessment of long-term risk of flood damage to homes and other structures insurable under the NFIP and identification of actions needed to reduce risk of flood losses. Communities must have Flood Mitigation Plans to be eligible for project grants. Implementation project grants may support measures such as dry flood-proofing, elevation, relocation, acquisition, or demolition of insured structures, erosion control and drainage improvements, and beach nourishment activities such as planting of dune grass. They can be used for minor, localized structural projects, such as erosion control and drainage improvements, that are not fundable by state or other federal programs.

Actual Use: The Flood Mitigation Assistance program obligated about $17 million in grants in Fiscal Year 1997, 50 risk assessments and mitigation plans were principal activities. FEMA estimates that grant obligations will be $20 million in Fiscal Years 1998 and 1999, respectively. The program's accomplishments, including examples of the types of projects funded, are contained in a Biennial Report to the Congress. This report can be obtained from FEMA upon request.

Potential Use: This program has the potential to help support coastal watershed protection and dune preservation activities.

Advantages: The Flood Mitigation Assistance program can in specific circumstances fill funding gaps left by other federal and State programs. FEMA may fund up to seventy-five percent of the cost of eligible activities. Each State and territory receives a guaranteed base funding for Planning ($10,000) and Projects ($100,000).

Limitations: Communities that have been suspended from the National Flood Insurance Program are not eligible. This is a relatively small program. A twenty-five percent non federal match is required.

Reference for Further Information: U.S. Federal Emergency Management Agency (FEMA), Mitigation Directorate, 500 C Street, SW, Washington, DC 20472, Telephone: 202-6464621, Internet: **www.fema.gov/home/MIT/fmasst.htm** FEMA Regional Offices in Boston, MA, New York, NY, Philadelphia, PA, Atlanta, GA, Chicago, IL, Denton, IX, Kansas City, MO, Denver, CO, San Francisco, CA, and Bothell, WA (check with FEMA Headquarters for appropriate contracts and numbers).

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) HAZARD MITIGATION GRANTS

Description: The Federal Emergency Management Agency (FEMA) provides State and local governments project grants to implement measures that will permanently reduce or eliminate future damages and losses from natural hazards. A State Administrative Plan and State 409 Plan, which describe projects, are required for FEMA to identity a need for funding assistance. The State solicits, reviews, prioritizes and selects applications, then forwards them with project narratives, descriptions and fact sheets to FEMA for review. FEMA can fund up to seventy-five percent of eligible project costs and the State or project applicants must provide the nonfederal share. State agencies, local governments, public entities, private non-profit organizations, Native American Tribes, and Alaskan Native villages are eligible for subgrants from the States. Funds may be used for the acquisition of real property.

Actual Use: FEMA funded 51 projects in Fiscal Year 1997 and 45 in Fiscal Year 1998. Drainage improvement and vegetation management projects are among those the types of environmentally-related activities that have been funded.

Potential Use: Real property can be required for treatments which will meet environmental objectives while mitigating natural hazards.

Advantages: The federal share can be up to seventy-five percent of total eligible costs, making otherwise unaffordable projects feasible.

Limitations: The program is based on fifteen percent of all other public and individual disaster grants. Projects must be in Presidentially declared disaster areas and applicants must work through the state agency that is responsible for setting priorities for funding. The State or project applicant must provide a twenty-five percent match. The nonfederal match, however, can be a combination of cash, in-kind services, or materials.

Reference for Further Information: U.S. Federal Emergency Management Agency (FEMA), Mitigation Directorate, Program Implementation Division, 500 C Street, SW, Washington, DC 20472, Telephone: 202-646-4621, FEMA Regional Offices in Boston, MA, New York, NY, Philadelphia, PA, Atlanta, GA, Chicago, IL, Denton, TX, Kansas City, MO, Denver, CO, San Francisco, CA, Bothell, WA, Internet: **www.fema.gov/mit/hmgp.htm**.

FOUNDATION AND CORPORATE GIVING

Description: Foundation and corporate giving are an important source of funding for activities in education, health and human services, civic and community affairs, and culture and the arts. They are also a significant and growing source of funding for environmental projects. Most such funding is in the form of grants for well-defined projects (i.e., time, cost, and deliverables) that meet the immediate priorities of the funding source, and are not funded by governments.

Actual Use: More than 7,500 major foundations in the United States with assets totaling about $170 billion make annual donations exceeding $10 billion. Corporations alone support 2,300 philanthropic programs in the form of foundations or as direct-giving programs. In 1995, 703 foundations made environmental gifts totaling more than $425 million.

The Global Futures Foundation is a nonprofit environmental foundation that supports integrated programs leading to source reduction, pollution prevention, low-cost market development and incentive driven regulatory structures which reduce economic and environmental costs. Patagonia, Inc. is a clothing firm that devotes 1% of sales to its environmental grants program and gave more than $1.1 million in 1995-6 to over 200 projects for preserving and restoring the environment.

Potential Use: Foundation and corporate giving could fund innovative environmental projects in many areas, and total support could reach more than a billion dollars. Grants typically go for research, education, and demonstration projects, but also could be used to fund projects involving planning, monitoring, and technology.

Advantages: These grants are not directly dependent on tax dollars and grant conditions may be less burdensome. Innovation is encouraged and equity provided since grantees are not supported by governments. Grantees are forced to leverage other resources or become self-sustaining.

Limitations: Funding levels may be highly variable, competition for resources is very intense and awards are usually directed to innovative projects. Environmental impacts may be limited if projects are too small and esoteric. Since funding is typically for very short, defined periods of time, it is a real challenge for grantees to succeed or become independent.

Reference for Further Information: The Foundation Directory features the nation's largest foundation funders. The National Directory of Corporate Giving profiles over 2,300 corporate philanthropic programs. These books are available from the Foundation Center, 79 Fifth Avenue, New York, NY 10003-3076, Telephone: 212-6204320. See also Environmental Data Resources, Inc., Environmental Grantmaking Foundations, 1995 Directory, Rochester, NY, 1996.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)
COMMUNITY DEVELOPMENT BLOCK GRANTS (CDBG)
ECONOMIC DEVELOPMENT INITIATIVE GRANTS

Description: The CDBG Economic Development Initiative (EDI) awards project grants to help local governments eligible under HUD's Section 108 Loan Guarantee Program carry out economic development projects. The grants must enhance the security of loans guaranteed under the Section 108 Program or improve the viability of projects financed under the Section 108 Program.

Actual Use: Fiscal Year 1996 assistance ranged from $975,000 to $3.5 million, with an average grant of $1.8 million. For Fiscal Year 1998, EDA estimates $38 million in funding for 50-75 standard EDI projects and $25 million for funding for up to 25 brownfields projects. In Fiscal Year 1999, $ 400 million in EDI funds will be allocated to the proposed Community Empowerment Fund and $50 million in funds will be allocated for up to 50 brownfields projects.

Projects funded include a wide range of economic development activities including commercial, industrial and economic development revolving loan funds. Eligible activities include acquisition of real property; rehabilitation of publicly-owned real property, housing rehabilitation, economic development activities, acquisition, construction reconstruction, or installation of public facilities, and, in the colonias, public works and other site improvements. Brownfields EDI grants will result in a similar range of activities for qualified Brownfield sites.

Potential Use: Depending on interpretation of Section 108 criteria, grants might finance or leverage loans funding facilities in water, wastewater, solid waste, recycling, waste-to-energy, and small business air quality improvements.

Advantages: Equity and leveraging opportunities are high and built into the program. Some very specific environmental projects have been completed in low-income areas.

Limitations: EDI grant funds only be used in conjunction with projects and activities assisted under the Section 108 loan Program. Principal beneficiaries of the grants must be low and moderate income persons. Many non-environmental projects are funded and payment is on a cost-incurred basis.

Reference for Further Information: The U.S. Department of Housing and Urban Development (HUD) publication, Programs of HUD, contains a description of this CDBG program. Information on it can also be found in the Catalog of Federal Domestic Assistance and its Internet site at http:llaspe.os.dhhs.govlcfdalidepthud.htm -which has links to these HUD grants.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD) COMMUNITY DEVELOPMENT BLOCK GRANTS (CDBG) ENTITLEMENT GRANTS

Description: The CDBG Entitlement Grants Program seeks to develop viable urban communities by providing decent housing and a suitable living environment, and by expanding economic opportunities. It supports activities that benefit low-to moderate income citizens in cities in Metropolitan Statistical Areas (MSAs) designated by OMB as a central city of the MSA and other cities over 50,000 in MSAs and qualified urban counties of at least 200,000 (excluding entitlement cities located in such counties). Federal formula grants based on population, income, housing, and growth lag are awarded to eligible entities. Specific activities that can be carried out include acquisition of real property, relocation and demolition, rehabilitation of residential and nonresidential structures, and the provision of public facilities and improvements, such as water and wastewater treatment facilities.

Actual Use: HUD obligated more than $3 billion in entitlement grants in fiscal year (FY) 1997 and plans to obligate approximately that much in both FYs 1998 and 1999. Nine hundred and eighty-six local governments were eligible to receive these grants in FY 1998. Grantees must certify that at least seventy percent of grant funds received are spent for activities that principally benefit low- and moderate-income persons. Water and wastewater treatment facilities and brownfields-related activities are among the types of eligible projects that have been funded by these important grants.

Potential Use: Depending on interpretation of grant criteria, these CDBG grants might be used to increasingly finance brownfields cleanup and redevelopment activities, as well as air pollution and solid waste facilities.

Advantages: This grant program is HUD's major program and has been relatively stable.

Limitations: These grants assist a limited number of relatively large communities with distressed areas. To apply, communities must develop and submit a number of detailed documents including a Consolidated Plan, annual action plan and certifications. Post award requirements include annual performance reports, audits, and detailed records maintenance. Many non-environmental projects are funded, competition is fierce, and assistance is provided on a reimbursement basis.

Reference for Further Information: The U.S. Department of Housing and Urban Development (HUD) publication, *Programs of HUD*, contains a description of this CDBG program. Information on it can also be found in the *Catalog of Federal Domestic Assistance* and its Internet site at **http://aspe.os.dhhs.gov/cfda/idepthud.htm** - which has links to these HUD grants.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD) COMMUNITY DEVELOPMENT BLOCK GRANTS (CDBG) SMALL CITIES PROGRAM NONE~TLEMENT GRANTS

Description: These grants support decent housing, a suitable living environment, and expanded economic opportunities for low and moderate income persons. They fund activities in nonentitlement areas (cities with 50,000 or less people and counties with less than 200,000 people that do not receive entitlement grants) in New York and Hawaii. Eligible activities include the acquisition, rehabilitation or construction of public works facilities and improvements, clearance, housing rehabilitation, code enforcement, home ownership assistance, relocation payments, economic development, existing urban renewal projects, and certain public services.

Actual Use: HUD obligated just over $60 million for these grants in fiscal year (FY) 1997 and plans to obligate like amounts in FYs 1998 and 1999. Water and wastewater Systems are among the projects funded by this assistance. State fund allocations are determined by formula taking into account population, income levels, per room housing density; age of housing, and other factors.

Potential Use: Depending on HUD interpretation of grant criteria, these grants might be used to finance air pollution control, solid waste, recycling, and waste-to-energy facilities, as well as a range of brownfields cleanup and redevelopment activities.

Advantages: Environmental justice and equity concerns in terms of addressing ability-to-pay are good. Leveraging possibilities with State revolving loans and rural utility water and wastewater funding and/or pre-financing are high.

Limitations: Priority is given to grants that benefit low and moderate income persons or aid in the elimination of slums or blight. At least seventy percent of each grant made must benefit low and moderate income persons. For metropolitan areas, low and moderate income is a level equal to or less than HUD's Section 8 low income limit. For non-metropolitan areas, low and moderate income is defined as eighty percent of the median income for those areas in the State.

Reference for Further Information: The U.S. Department of Housing and Urban Development (HUD) publication, *Programs of HUD,* contains a description of this CDBG program. Information on it can also be found in the *Catalog of Federal Domestic Assistance* and its Internet site **at http://aspe.os.dhhs.gov/cfda/idepthud.htm** - which has links to these HUD grants.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD) COMMUNITY DEVELOPMENT BLOCK GRANTS (CDBG) STATES' GRANTS PROGRAM NONENTITLEMENT GRANTS

Description: These grants help provide communities with decent housing, a suitable living environment and expanded economic opportunities. They finance activities in nonentitlement areas (cities with 50,000 or less people and counties with less than 200,000 people which do not receive entitlement grants) that benefit low to moderate income citizens. Puerto Rico and all States except New York and Hawaii receive funds to administer these grants to localities. Each State develops its own program and funding priorities. Fundable activities include buying real property, relocation and demolition, rehabilitation of residential and nonresidential structures, and providing public facilities and improvements such as water and wastewater treatment facilities.

Actual Use: HUD obligated more than $1.2 billion in nonentitlement grants in fiscal year (FY) 1997 and plans to obligate about as much in both FYs 1998 and 1999. Grantees must ensure that seventy percent of grant funds benefit low- and moderate-income persons. Water and wastewater treatment systems are among the projects eligible for assistance. State allocations are set by formula using population, income levels, per room housing density; age of housing, and other factors.

Potential Use: Depending on each State's interpretation of grant criteria, CDGB entitlement grants might also be used to finance air pollution control, solid waste, recycling, and waste-to-energy facilities, as well as a range of brownfields cleanup and redevelopment activities.

Advantages: The program is equitable from an affordability perspective. Leveraging can be high, as communities can combine State revolving loans, as well as rural utility grants and loans, for water and wastewater systems.

Limitations: Grants are limited to low and moderate income communities experiencing distress. For metropolitan areas, low and moderate income is a level equal to or less than HUD's Section 8 low income limit. For non-metropolitan areas, it is defined as eighty percent of the median income for those areas in the State. A State may only use up to $100,000 plus two percent of its grant to administer the program and must match each federal dollar over $100,000 used for administration with a dollar of its own.

Reference for Further Information: The U.S. Department of Housing and Urban Development (HUD) Fact Sheet, State Community Development Block Grant Program, describes the program. HUD, Office of Block Grant Assistance, Small Cities Division, 415 7~ Street, SW, Washington, DC 20410, Telephone: 202-708-1322. The HUD publication, *Programs of HUD,* also has a description of this CDBG program. Information on it can also be found in the *Catalog of Federal Domestic Assistance* and its Internet site at **http://aspe.os.dhhs.gov/cfda/idepthud.htm.**

DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE NORTH AMERICAN WETLANDS CONSERVATION ACT GRANTS

Description: The North American Wetlands Conservation Act Grant Programs promote long term conservation of wetland ecosystems and the waterfowl and other migratory birds, fish and wildlife that depend upon such habitat. It provides project grants on a matching basis for acquisition, enhancement and restoration of wetlands and associated habitat. The programs are meant to encourage voluntary public-private partnerships to conserve wetland ecosystems by creating an institutional infrastructure and providing a source of funding. The funding cap for Standard Grants is $1 million, while the cap for Small Grants is $50,000. The nine-member North American Wetlands Conservation Council, created by the North American Wetlands Conservation Act of 1989, reviews the merits of wetlands conservation proposals submitted for funding. The Council considers the extent to which the project fulfills the purpose of the Act, the North American Waterfowl Management Plan, or the Canadian-Mexican-U.S. Tripartite Agreement, as well as its consistency with the National Wetlands Priority Conservation Plan developed under the Emergency Wetlands Resources Act of 1986. While anyone can apply for a grant at anytime, the Council goes through the proposal selection process three times a year. It then makes recommendations to the Migratory Bird Conservation Commission for consideration of funding.

Actual Use: In March 1998, nineteen U.S. projects in fifteen states were approved for about $10.2 million in federal funding, to be matched by almost $24.5 million from partners. For example, $655,000 was approved for the Teton River Valley Ecosystem Project in Idaho.

Potential Use: The programs can fund acquisition of real property interests such as conservation easements, fee simple title, and wildlife management agreements.

Advantages: The programs take a non-regulatory approach encouraging voluntary partnerships to develop and implement wetland conservation projects to benefit wetland dependent wildlife.

Limitations: The current funding authorization expires at the end of fiscal 1998; however, reauthorization appears likely.

Reference for Further Information: For a copy of the *1998 Grant Application Instructions,* contact the U.S. Department of the Interior, Fish and Wildlife Service, North American Wetlands Conservation Council Coordinator, North American Waterfowl and Wetlands Office, 4401 North Fairfax Drive, Room 110, Arlington, VA 22203, Telephone: 703-358-1784, E-mail: r9arw_nawwo@mail.fws.gov, Internet: **www.fws.gov/.**

STATE GRANT PROGRAMS

Description: Almost all States have environmentally-related grant programs for eligible local governmental units, and sometimes the private sector. Since the source and type of grant varies considerably from state-to-state, localities should obtain copies of State grant catalogs for specific information. State grants fall into several categories: (1) annually appropriated grant monies; (2)federally mandated grants; and (3) grants arising from referendum bond acts, which historically have been the largest source of State grant monies.

Actual Use: Annually appropriated States grants historically have been small, and typically provide funds for programs (as opposed to construction) for which there has been no federal funding, e.g., water and wastewater operator training, drinking water and air pollution, and nonpoint source control. Federally mandated grants include the twenty percent match required for the SRF, and other environmental requirements such as facility operator certification, monitoring and testing, and small business clean air audits. By far the largest State grants arise from environmental bond acts passed by referendum, which historically have been the main source of funding for environmental infrastructure, parks and conservation, and solid and hazardous waste. Recent years have seen a surge in large State referendum bond acts. For example, New York's 1996 $1.75 billion bond act included money for drinking water grants, watersheds, small business (water and air) and brownfields grants. California passed a $994 million bond act financing drinking water grants, New Jersey a $340 million bond act which included incentive matching grants for localities and nonprofits, Massachusetts a $399 bond act which included watershed and farmland protection grants, and Florida a $300 million bond act which included habitat protection grants.

Potential Use: States have become increasingly creative in leveraging grants, and providing assistance to non-traditional clients such as nonprofits and small businesses. Many States now provide matching incentive grants to localities for local fundraising and to nonprofit organizations, such as in New Jersey and New York. Minnesota and Maryland provide dollar-for-dollar matching grants for private contributions for wildlife and wetlands protection, including private mitigation.

Advantages: State grants can be directed to pressing compliance needs and small communities, thus reducing costs and enhancing equity. State grants may be more flexible and entail less red tape than federal assistance, and can be further leveraged.

Limitation: Historically, State grants have not been large or predictable. Funding tends to come and go, and monies are available on a first-come-first-serve basis, favoring projects ready to proceed. Many restrictions still apply, such as on grants to non-profits and individuals. Grants, compared to loans, may result in more costly and slower projects, since the money is regarded as "free".

Reference for Further Information: Contact State Budget Offices for further information.

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STATE REVOLVING FUND (SRF) DRINKING WATER PRINCIPAL SUBSIDIES

Description: The 1996 Amendments to the Safe Drinking Water Act (SDWA), which established the Drinking Water State Revolving Loan Fund program (DWSRF) capitalized by federal grants and State matching grants, provides for loan subsidies in the form of "forgiveness of principal" to communities defined as disadvantaged. A principal subsidy is the same as grant. The SDWA provisions from creation of revolving loan finds permits states to use up to 30% of the federal capitalization grants for principal subsidies. States must established affordability criteria which guide the circumstances when a "disadvantaged" community may received a principal subsidy. Affordability criteria typically are based on the target service charge compared to median household income. Principal subsidies are not permitted under the Clean Water SRFs.

Actual Use: Most States plan to use the principal subsidy authority under the DWSRF. Principal subsidies are available to private public purpose drinking water projects as well as publicly-owned projects. States with many small communities and low median household incomes may reach the 30% limit set by the Act. However, in many States the loan demand is so large that principal subsidies will be a smaller percentage than this limit. In New York, principal subsidies come from environmental bond act monies instead of SRF funds, and may provide up to 75% of project funding.

Potential Use: Principal subsidies may allow drinking water projects to proceed which otherwise wold be delayed or not undertaken. They also may be combined with SDWA provisions allowing a 30-year loan instead of the 20 year limit on most SRF loans. SRFs can set aside a set amount of monies for investment purposes to assist in subsidizing loans. For a $100,000 principal subsidy, an SRF could invest $71,430 a year at 7%, yielding $5,000 a year for 20 years to pay for the subsidy.

Advantages: SRF grants make projects more affordable for smaller communities and may be the crucial factor is whether such a community proceeds or not. Hence, accessibility as well as equity are enhanced. SRFs can leverage their subsidy potential through sound investments. Based on a states affordability levels, projects entitled to principal subsidies can be prequalified for assistance, thus easing administrative burdens and uncertainties.

Limitations: Principal subsidies reduce the leveraging potential of loanable funds, as well as their revolving nature. Thus, States must be very careful not to undercut the long term solvency of SRF funds by providing too many grants as opposed to loans. Accessibility to loans for other communities declines by the amount of principal subsidies offered.

Reference for Further Information: Localities should consult their State DWSRF officials to determined principal subsidies policies and affordability criteria. State Intended Use Plans published annually will describe principal subsidy benefit recipients.

DEPARTMENT OF TRANSPORTATION TRANSPORTATION EQUITY ACT FOR THE 21st CENTURY (TEA-21)

Description: The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 set new standards for environmental sensitivity. The Transportation Equity Act for the 21st Century (ThA-2 1) signed June 9, 1998, reauthorized, modified and extended ISTEA largely continuing the improved relationship between transportation and the environment. ISTEA made wetlands mitigation efforts eligible under both the National Highway System and Surface Transportation Program. Eligible activities included mitigation banking, wetland preservation and restoration efforts, and State and regional wetland planning. TEA-2 1 retains wetland mitigation project eligibility and adds natural habitat. It allows up to 20% of reconstruction, resurfacing, rehabilitation or restoration project costs for environmental restoration and pollution abatement, including retrofit or construction of stormwater treatment systems to address environmental problems caused or contributed to by transportation facilities. Other eligible activities, including purchase of scenic easements, scenic beautification and landscaping, preservation of abandoned railway corridors, and mitigation to address water pollution due to highway runoff, are reauthorized with 40% more money.

The Congestion Mitigation and Air Quality Improvement Program continues with $9.1 billion authorized. A new Clean Fuels Program is authorized at $1.2 billion. The Congestion Pricing Pilot Program becomes the Value Pricing Pilot Program and the number of project States grows from 5 to 15, with funding of $8 million/year. A new $100 million National Wetlands Restoration Pilot Program to offset wetlands degradation caused by highway construction before 12/27/77, is authorized. A 5-year, $120 million program is authorized to research relationships between transportation, community preservation and the environment, and the role of the private sector.

Actual Use: The new authorities tend to build on experience under ISTEA.
Potential Use: Contingent upon regulations implementing changes made by the reauthorization, state transportation agencies will be able to undertake a variety of measures to combat air pollution, restore and preserve wetlands, and otherwise mitigate environmental impacts.

Advantages: Inclusion of support for environmental measures diminishes counterproductive tensions between transportation infrastructure development and environmental protection.

Limitations: If the legislation's potential is to be realized, transportation agencies must be willing to take advantage of the environmental authorities conveyed.

Reference for Further Information: U.S. Department of Transportation, The Federal Highway Administration, 400 7th Street, SW, Washington, DC 20590; Telephone: 202-366-5004, Internet: **www.dot.gov/.**

April 1999 EFAB/EFC Guidebook 2C45

URL: http://www.epa.gov/efinpage/guidbk98/gbk2c.htm

Federal and State Programs for Water Quality

Environmental Finance Center

Stream Corridor restoration projects in Pennsylvania can use the following programs for funding assistance.

Contact the EFC by email for more information about any of the following programs.
Phone: 301-405-6383
Fax: 301-314-9581
Return to the Environmental Finance Center or see matrices for Maryland or Virginia
Also see the accompanying Pennsylvania Resources of additional technical and funding assistance!

Note: Other links within the matrix will take you to that agency's pages.

When printing this page, try setting your printer to landscape mode in order to get all the columns. If you would like us to send you a full fact sheet, please send us a check for $1, made payable to CEPP (Coastal and Environmental Policy Program), and remember to tell us which state you'd like.

Stream Corridor Protection Funding Options - PENNSYLVANIA

	Eligibility			Program Funding Areas				What's Offered			Users
Program name	indi-viduals	public agencies	other orgs	capital	planning	edu-cation	mainten-ance				
Conservation Reserve Program (CRP)	•							50/50% cost share and payments	NRCS 717-237-2204 or DCNR Bureau of Forestry 717-787-2703	ag,rb,w	farmers
Reforestation Tax Credit	•			• (reforestation)				10% tax credit	DCNR Bureau of Forestry 717-787-4777	rb	private
Stewardship Incentive Program (SIP)	•			•	•			cost share up to 75%	DCNR Bureau of Forestry 717-787-2105	ag,er,rb,w	private forests
Wetlands								grants for wetland	DEP Bureau of		

Replacement Program - DEP	•			•	•			construction and plant materials	Water Quality Protection 717-787-6827	rb,w	individuals
Environmental Quality Incentives Program (EQIP)	•			•	•		•	cost share and incentives	NRCS 717-237-2204 or local RC&D - see back	er,rb	ag or livestock producers
Wetlands Reserve Program (WRP)	•			•	•		•	easement cost share and incentives	NRCS 717-237-2204 or local RC&D - see back	w	private land
Wildlife Habitat Incentives Program (WHIP)	•			•	•		•	cost share up to 75%	NRCS 717-237-2204 or local RC&D - see back	ag,rb,w	private land
Woodland Incentive Program (WIP)	•			•	•		•	cost share 50% for forest practices	DCNR Bureau of Forestry 717-787-2106	rb	private forest
State Revolving Loan Fund - Water Quality (SRF)	•	•		•	•		•	low interest loans	PENNVEST 717-787-8138	er,np	local govts
Stream Improvement Program - DEP	•	•			•			planning & design assistance	Bureau of Waterways Engineering 717-787-3411	np,er	local govt, land owners
Partners for Fish & Wildlife - USFWS	•	•		•	•			grants to $10,000 to restore habitat	USFWS 814-234-4090, David Putnam	w,rb	private landowners
Advance Funding Program - PENNVEST	•	•	•		•			low interest loans & limited grants	PENNVEST 717-787-8137	er,np,rb,w	govt, public, private orgs
Water Quality											

Cooperative Agreements - CWA (Clean Water Act) section 104(b)(3) - EPA	•	•	•	•	•	•		grants -point source pollution	watershed issues: 202-260-1718; stormwater issues: 202-260-6053	np	state/local govt, orgs, individuals
Community Development Block Grants (CDBG)		•		•			•	formula grant	Bureau of Housing and Developm't 717-720-7045	np	local "central cities"
Stormwater Project Loans Or see PENNVEST		•		•			•	low interest loans	PENNVEST 717-787-8137	ag,er,np,rb,w	govt. agencies
Flood Protection Program - DEP		•		•	•			grants	Bureau of Waterways Engineering 717-787-3411	er,np,rb	local govts
Coastal Zone Management Program - Pennsylvania		•		•	•	•		matching grants	Bureau of Watershed Conservation 717-787-5259	ag,er,np,rb,w	state/local govts, univ
Construction Loan Program - PENNVEST		•		•	•		•	low interest loans, supplemental grants	PENNVEST 717-787-8137	np	local govt & agencies
County Water Supply Plan/Wellhead Protection Grants		•		•	•		•	grants	Bur. of Water Supply Managem't 717-787-0122	er,rb,w	counties
Community Grant Program - DCNR		•		•	•		•	50% cost share; 100% for small towns	Bureau of Rec & Conservation 717-783-2658	er,rb,w	municipalities (for parks)
Small Watershed Program -								grants to to	NRCS		

(Public Law 566)		•			•	•	•	65%, and loans	717-237-2215, Jeff Mahood	np	state/local govt
Stormwater Management Program DEP								grants to 75% & technical assistance	Bureau of Watershed Conservation 717-772-4048	ag,er,np,rb,w	counties, municipalities
State Planning Assistance Grant (SPAG) Program		•			•			50% local match required	Dept of Comm & Econ. Dev't 717-720-7346	ag,er,np,rb,w	counties and municipalities
Small Communities Planning Assistance Program								grants	Dept of Comm. & Econ. Dev't 717-720-7346	ag,er,np,rb,w	small local govts
Watershed Restoration & Assistance Program (WRAP)		•	•	•	•	•		grants to $50,000, and small seed grants	DCNR Division of Watershed Support 717-787-5259	ag,er,np,rb,w	org's and public agencies
Community Based Restoration Projects - NOAA								matching funds to local aquatic restoration efforts	NOAA Restoration Center 301-713-0174, Chris Doley	er,rb,w	local govts, nonprofit orgs, watershed groups
Chesapeake Bay Trust Grants						•		mostly < $5000	Chesapeake Bay Trust 410-974-2941	ag,er,np,rb,w	local govt, orgs, nonprof
Rivers Conservation Grant Program - DCNR								up to 50% cost-share, max $50,000	DCNR Bureau of Rec & Cons 717-783-2658	er,rb,w	local govt & organizations
Sustainable Development Challenge Grant (SDCG)				•				up to $250,000. 20% local match req.	EPA SDCG Program 202-260-6812, Pam Hurt	er,np,rb,w	local govt & organizations
[illegible]									Chesapeake Bay Program 800-968-7229		

Chesapeake Bay Program Subcommittee Grants			•	•	•	•	•	1:1 nonfederal match	for subcommittees or DEP 717-787-5267	ag,er,np,rb,w	state/local govt, nonprofit, university
Nonpoint Source Pollution Grants - DEP		•	•	•	•	•	•	grants for planning and nonpoint source pollution control	DEP Bureau of Watershed Conservation, Division of Watershed Support 717-787-5259	ag,er,np,rb,w	state/local govt, cons dist, univ, watershed orgs
North American Wetlands Conservation Act (NAWCA)		•	•	•	•	•	•	50% nonfederal match required	NAWCA coordinator, USFWS 703-358-1784	w	local govt, other orgs
Environmental Education Grants - EPA Region 3		•	•			•		grants to nonprofits, to 75% of costs	EPA regional office 215-566-5527, Larry Brown	ag,er,np,rb,w	state/local govt, univ, nonprofit orgs
Community Forestry Program - DCNR		•	•	• (trees)	•		•	match grants gov-50%, orgs-90%	DCNR Forestry 717-783-0385, Norman Lacasse	er, rb, np	municipalities, orgs
Land Trust Grants			•	•				up to 50% of cost	Bureau of Rec & Conservation 717-783-2658	ag,er,np,rb,w	land trusts, etc.
Environmental Education Grants - Pennsylvania DEP			•			•		grant up to $10,000	DEP Office of Policy & Comm 717-772-1828	ag,er,np,rb,w	schools, nonprofits, orgs
						*project examples: ag = agricultural, er = erosion, np = nonpoint source pollution, rb = riparian forest buffers, w = wetlands					

Environmental Finance Center, University System of Maryland 301-405-6383

Email: efc@mdsg.umces.edu - Web: http://www.mdsg.umces.edu/MDSG/EFC

These Federal and State programs may be supplemented by local or regional fund-generating or pollution prevention intiatives. Examples of innovative funding ideas to improve water quality are described in "Financing Alternatives for Maryland's Tributary Strategies," a 120-page report available for $5 from the EFC. View a summary with funding categories.

Also, see creative financing techniques for preserving highly valued lands, such as stream buffers, on our web site. This fact sheet briefly describes mechanisms that communities can use to encourage land preservation.

And, view other resources for projects in Pennsylvania, including foundations, agencies and nonprofit organizations.

Other Pennsylvania Links

Pennsylvania Local Government Help Center
Pennsylvania State Agency links
Penn DCNR Grants and Assistance Programs
DEP Regional Offices
Pennsylvania Forest District Contacts
Pennsylvania Environmental Council
Stormwater Management in Pennsylvania
Department of Community and Economic Development community programs
Bureau of Farmland Protection

Return to the *top of the page*

[EFC Home] [Pennsylvania resources]
[stream corridor restoration financing] [Other fact sheets]
[E-finance links]

Prepared by:
Environmental Finance Center
University System of Maryland
0112 Skinner Hall
College Park, MD 20742
Home page: http://www.mdsg.umces.edu/EFC/

Last Updated on 3/99
By EFC web-ster

NRCS WATERSHED AND RIVER BASIN PLANNING AND INSTALLATION
Public Law 83-566 (P. L. 566)

Technical and financial assistance is provided in cooperation with local sponsoring organizations, state, and other public agencies to voluntarily plan and install watershed-based projects on private lands. The program empowers local people or decision makers, builds partnerships and requires local and state funding contributions. The purposes of watershed projects include watershed protection, flood prevention, water quality improvements, soil erosion reduction, rural, municipal and industrial water supply, irrigation water management, sedimentation control, fish and wildlife habitat enhancement and create and restore wetlands and wetland functions.

Watershed plans involving an estimated Federal contribution in excess of $5,000,000 for construction, or construction of any single structure having a capacity in excess of 2,500 acre-feet, require Congressional committee approval. Other plans are approved administratively. After approval, technical and financial assistance can be provided for installation of works of improvement specified in the plans.

Project sponsors are provided assistance in installing planned land treatment measures when plans are approved. Surveys and investigations are made and detailed designs, specifications, and engineering cost estimates are prepared for construction of structural measures. Areas where sponsors need to obtain land rights, easements, and rights-of-way are delineated. Technical assistance is also furnished to landowners and operators to accelerated planning and application of needed conservation on their individual units. There are presently over 1600 projects in operation.

United States
Environmental Protection
Agency

Region 3
3WP12
Philadelphia, PA

EPA-903-K-97-003
September 1997

EPA

A Citizen's Handbook to Address Contaminated Coal Mine Drainage

Potential Funding Sources for Mine Drainage Abatement

Organization	Contact	Phone No.	Comments
FEDERAL GOVERNMENT			
U.S. Army Corps of Engineers Baltimore District	James Johnson	(410) 962-4900	Section 1135: applies to watershed projects damaging Corps property or if Corps projects are having a negative effect that would result in AMD formation. The project area has to be on public lands.
Philadelphia District	Robert Callegari	(215) 656-6540	
Buffalo District	Phillip Berkeley	(716) 879-4145	
Detroit District	David Dulong	(313) 226-6766	
Huntington District	Jim Everman	(304) 529-5636	Section 206: Aquatic Ecosystem Restoration Program. This program has not yet been funded.
Louisville District	Jeff Klekner	(502) 582-5658	
Nashville District	Tom Waters	(615) 736-5646	Planning assistance to states for watershed cleanups.
Pittsburgh District	Jack Goga	(412) 644-6817	
Mobile District	Roger Simmons	(205) 690-2777	Stream Bank Erosion Program.
U.S. Department of Agriculture Natural Resources Conservation Service Lexington, KY	David G. Sawyer	(606) 224-7350	*PL 566:* Small watershed program *PL534:* Flood prevention program. *Resource Conservation and Development Program:* provides technical assistance to help identify problems and locate funding. *Wildlife Habitat Incentives Program:* Under the Farm Bill.
Columbus, OH	Patrick K. Wolf	(614) 469-6962	
Harrisburg, PA	Janet L. Oertly	(717) 782-2202	
Morgantown, WV	William Hartman	(304) 291-4153	

Organization	Contact	Phone No.	Comments
U.S. Department of Energy (DOE) Morgantown Energy Center Morgantown, WV	Robert Bedick	(304) 285-4505	Availability of funds will depend on Congressional budget authorizations and proposed organizational changes.
FE-232 Office of Coal Combustion Control Systems	Douglas Uthus	(301) 903-0479	Projects of this kind are funded by the appropriate DOE Field Center.
Advanced Research and Environmental Technology	Neil H. Coats Jer Yu Shang	(301) 903-6229 (301) 903-2795	Advanced Research and Environmental Technology (Env) $2.5 Million FY96.
Coal Preparation	Randy Penington	(301) 903-3485	R&D project funding.
Environmental Science & Technology Div.	Bob Kleinman	(412) 892-6555	Provides technical assistance.
U.S. Environmental Protection Agency U.S. EPA Region III			
Environmental Justice (EJ)	Reginald Harris	(215) 566-2988	Provide financial assistance to eligible community groups. Organizations must be incorporated to receive funds.
Section 319	Hank Zygmunt	(215) 566-5750	Provides financial support for projects which demonstrate water quality improvement from non-point source pollution.
Source Watershed Protection Program			Provides financial support for projects which potentially impact drinking water supplies
Environmental Justice through Pollution Prevention (EJP2)	Jeff Burke	(215) 566-2761	To use pollution prevention resources for addressing environmental problems in low income, high minority areas.
Sustainable Development Challenge (SDC)	Mindy Lemoine/ Theresa Martella	(215) 566-2736	Provide community funding for establishing partnerships to encourage environmentally and economically sustainable business practices.
Environmental Education (EE)	Nan L. Ides	(215) 566-5546	Provide financial support for projects which design, demonstrate, disseminate environmental education practices, methods, or techniques.
Appalachian Regional Commission	Karen Holloway	(202) 884-7754	

Organization	Contact	Phone No.	Comments
U.S. Department of Interior Office of Surface Mining			
Clean Streams Initiative	James Taitt	(412) 937-2106	Provides funding for stream cleanups impacted by AMD from abandoned coal mines.
Abandoned Mine Land Program (AML)			Established by Title IV of SMCRA. Under this program, fees collected from coal operators go to the Abandoned Mine Reclamation Fund (AMRF). Most AMRF monies are potentially available for contaminated CMD cleanup.
Pittsburgh, PA	James Taitt	(412) 937-2106	AMD Program Coordinator.
Harrisburg, PA	Dave Hamilton	(717) 782-2285	PA ACSI Coordinator.
Maryland	Pete Hartman	(301) 724-4860	MD ACSI Coordinator.
Charleston, WV	Rick Buckley	(304) 347-7162	WV ACSI Coordinator.
Columbus, OH	Max Luehrs	(614) 866-0578	OH ACSI Coordinator.
Big Stone Gap, VA	Ronnie Vicars	(540) 523-0024	VA ACSI Coordinator.
Lexington, KY	Dave Beam	(606) 233-2896	KY ACSI Coordinator.
Knoxville, TN	Willis Gainer	(423) 545-4103	TN ACSI Coordinator.
STATE PROGRAMS			
Abandoned Mine Lands Program	Your state office		
Special Reclamation Fund	Your state office		
Acid Mine Drainage Abatement and Treatment Fund - 10% Set Aside.	Your state office		
State Revolving Fund	Your state office		
State Nonpoint Source Programs	Your state office		
State Division of Natural Resources	Your state office		
Civil Penalties	Your state office		
State's Development Office	Your state office		
Federal and State Appropriations	Your state office		
Governor's Discretionary Funds	Your state office		

Organization	Contact	Phone No.	Comments
State of Maryland			
State of Maryland	Suzanne Arcella *State Coordinator*	(401) 631-3584	RFPs for Maryland 319 Funds come out in April each year. The Maryland Mining Program can compete for funds.
Maryland Department of Environment *Water Management Administration*	J.L. Hearn *Director*	(410) 631-3567	MDE has an established tradition of supporting projects with funding in which they have an interest.
Maryland Bureau of Mines (BOM)	Connie Lyons John Carey	(301) 689-6764 (301) 689-6764	Source of additional contacts.
Maryland Geological Survey	James Reger Ken Schwartz Emery Cleaves	(410) 554-5523 (301) 689-6104 (410) 554-5504	Potential source of contribution; source of additional contacts.
State of Pennsylvania			
Mineral Resources Management Bureau of Abandoned Mine Reclamation	Ernie Giovennetti *Director*	(717) 783-2267	Source of potential funding; additional contacts; information.
State of Virginia			
Department of Mines, Minerals, & Energy Division of Mined Land Reclamation	Bob Herron *Coordinator*	(540) 523-8100	Source of potential funding; additional contacts; information.
State of West Virginia			
Stream Mitigation Fund	Ken Politan	(304) 759-0510	
Section 319	Lyle Bennett		
RESEARCH ORGANIZATIONS / ENDOWMENTS / TRUSTS			
Heinz Endowments	Andy McElwaine	(412) 281-5777	The Heinz Endowments holds two meetings per year (Spring and Fall) to allocate funds from two separate Heinz endowments. The Howard Heinz Endowment is solely for projects inside the State of Pennsylvania. The Vira Heinz Endowment occasionally considers projects outside of Pennsylvania and does fund AMD projects.

Organization	Contact	Phone No.	Comments
ENVIRONMENTAL ORGANIZATIONS			
Clean Water Action	David Zwick	(202) 895-0420	In-kind technical/scientific consultation; In-kind research support; networking.
American Rivers	Rebecca Wadders	(202) 547-6900	In-kind research support; media support; networking.
Friends of the Earth		(202) 783-7400	In-kind research support; media support; networking.
Friends of the River	Betsy Reifsnider	(415) 771-0400	Funds river preservation and restoration projects through Friends of the River Foundation; media support; networking.
Izaak Walton League of America		(703) 548-0150	In-kind research support; media support; networking.
National Water Resources Association	Tom F. Donnelly	(703) 524-1544	Bestows awards; networking.
River Network		(202) 364-2550	In-kind research support; media support; networking.
Sierra Club	Carl Pope	(415) 977-5500	Bestows awards; networking; media support.
Society for Ecological Restoration	William Jordan	(608) 262-9547	In-kind technical/scientific consultation; networking.
Thorne Ecological Institute	Steve Eandi	(303) 499-3647	In-kind technical/scientific consultation; networking.

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF ENVIRONMENTAL PROTECTION

TEN PERCENT SET-ASIDE PROGRAM FOR ACID MINE DRAINAGE ABATEMENT

Acid mine drainage (AMD), an old and extensive problem in Pennsylvania, is the largest non-point source water pollution problem in the state today. Approximately 2,500 miles of streams have been degraded by acid mine drainage. Abandoned coal mines, located in 45 of Pennsylvania's 67 counties, are the predominant source of acid mine drainage. It has been estimated that Pennsylvania's acid mine drainage problem would require in excess of $5 billion in capital costs to fix.

The first major legislation that addressed acid mine drainage was the Clean Streams Law of 1965. In 1967, Pennsylvania created the Land and Water Conservation and Reclamation Fund and designated

120 million dollars of the fund for prevention, control and elimination of mine drainage pollution. These monies were used to conduct a number of studies of AMD polluted watersheds and to address many AMD problems with varying degrees of success. In 1990, Pennsylvania was authorized to establish a new fund known as the Ten Percent Set Aside Fund, to be used for acid mine drainage abatement. This fact sheet provides answers to frequently asked questions about the Ten Percent Set Aside Program.

What is the Ten Percent Set-Aside AMD abatement program?

The Federal Surface Mining Control and Reclamation Act (P.L. 95-87), of August 3, 1977, known as SMCRA, established a Title IV Grants Program providing monies to eligible states for abatement of abandoned mine problems. These problems were required to be addressed in a priority manner with varying degrees of health, safety and general welfare hazards comprising the first two priorities. Acid mine drainage abatement was defined as a Priority 3 problem and could not be addressed in Pennsylvania due to the enormous inventory of higher priority problems.

In 1990, Congress amended SMCRA to include a provision allowing states to establish an acid mine drainage abatement and treatment program in an amount up to 10% of their annual abandoned mine reclamation (Title IV) grant. Pennsylvania amended its reclamation plan and received approval from the Federal Office of Surface Mining (OSM) to establish a separate, interest-bearing AMD abatement and treatment fund. The fund and program are managed by the Bureau of Abandoned Mine Reclamation in the Department of Environmental Protection (DEP).

Monies from the fund may be used to abate and treat acid mine drainage in qualified hydrologic units affected by past coal mining practices at eligible sites. Eligible sites are defined as those where mining ceased prior to August 3, 1977 and where no continuing reclamation responsibility can be determined. Those sites with Priority 1 or 2 hazards where mining occurred between August 4, 1977 and July 30, 1982 also are eligible.

Qualified hydrologic units are defined as watersheds in which the water quality has been significantly affected by acid mine drainage from coal mining practices in a manner which adversely impacts biological resources. The sites must meet all other eligibility criteria of the Surface Mining Control and Reclamation Act.

How are potential sites submitted for consideration?

Interested parties may obtain an AMD Site Submission Form by calling or writing the Bureau of Abandoned Mine Reclamation, P.O Box 149, Ebensburg, PA 15931, Telephone No. (814) 472-1800. The applicant should provide the water quality and quantity data requested on the form (if available) and provide a map indicating the location of the AMD discharge. The applicant then sends the completed form, water data and map to the address indicated on the AMD Project Form.

The Department is aware of a number of local watershed organizations currently working closely with their County Conservation Districts to remediate mine drainage impacts on selected streams. While any abandoned mine site may receive consideration, the Department is particularly interested in forming partnerships with organized groups engaged in actively addressing these problems.

What minimum guidelines must a potential site meet to be qualified?

1. Mining must have been completed or abandoned prior to August 3, 1977 (or July 30, 1982 if high priority problems exist on the sites).
2. The Landowner(s) must be in agreement with the proposed project.
3. The discharge should be capable of being abated or treated using passive treatment technologies.
4. The proposed project must have a high probability of improving the biological resources of the receiving stream.

What other factors are considered when evaluating a site?

- The length of the receiving stream to be beneficially affected
- The cost and feasibility of the proposed abatement or treatment
- The water quality upstream of the proposed site
- The potential for improved use of public lands
- The potential for improved fishing and other water oriented recreation
- The potential for improved raw water quality for a public water supply
- The potential for forming partnerships with organized groups active in improving the watershed

How are projects selected for funding?

1. DEP reviews AMD Project Forms, the data submitted with the forms and any information that may exist in DEP files.
2. DEP reviews the sites, collects water samples, makes flow determinations and contacts the property owners.
3. If sufficient information exists, DEP proposes a solution and prepares a cost estimate for sites meeting program eligibility guidelines.
4. If insufficient information exists, arrangements are made to collect additional samples and flow data for eligible sites.
5. Information and data collected for each site are then presented to an internal review committee to be reviewed.
6. The internal review committee will then determine which sites may need more data, which sites are eligible for funding, and how those sites will be ranked. In ranking, the committee will consider local input, including Conservation Districts and watershed organizations.
7. DEP then proceeds to prepare abatement plans in conjunction with the Natural Resource Conservation Service and submits these plans to the federal grants agency for funding approval.

Who designs and constructs projects?

- DEP's Bureau of Abandoned Mine Reclamation or professional consultants under contract with the Bureau of Abandoned Mine Reclamation design the projects.
- The projects then are constructed by private contractors through Pennsylvania's public bidding process.

How can local agencies, watershed associations and individuals participate in the program?

- They can submit potential sites for consideration.
- They can assist in data collection such as water sampling and flow monitoring.
- They can assist in landowner contacts.
- They can assist in monitoring and maintaining constructed facilities.
- They can provide local sponsorship.
- They can seek other sources of funding which can be used in combination with Ten Percent Set-Aside funds to achieve more remediation.

For additional information contact:

Bureau of Abandoned Mine Reclamation

P.O. Box 149

Ebensburg, PA 15931

(814) 472-1800

Commonwealth of Pennsylvania
Tom Ridge, Governor

Department of Environmental Protection
James M. Seif, Secretary

5400-FS-DEP1672 Rev. 2/96
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"WORKING" DRAFT

PENNSYLVANIA'S NONPOINT SOURCE (NPS) MANAGEMENT PROGRAM

1998 UPDATE

Commonwealth of Pennsylvania
Department of Environmental Protection
Bureau of Watershed Conservation
Division of Watershed Support
Nonpoint Source Management Section

Tom Ridge, Governor
Commonwealth of Pennsylvania

James Seif, Secretary
Department of Environmental Protection

3940-BK-DEP2275

B. Funding

1. **PA'S NPS Financial Management and Status Reporting**

Pennsylvania's Section 319 Program uses the Commonwealth's Integrated Central System (ICS) to manage all funds including the matching funds. The ICS provides information systems in the areas of accounting, budget preparation, payroll/personnel, and purchasing. It also provides for the interchange of common information among the systems. The ICS Accounting System consists of five subsystems relating to revenue and receipts, general ledger, budget control, commitment and expenditure control, and special(grant and project) accounting. The Grant Accounting Subsystem identifies and reports transactions related to federal grants. In addition to ICS, the Nonpoint Grants Database tracks the budgets off all contracts receiving 319 funds. Financial Status Reports (FSRs) are sent to EPA by the Commonwealth of Pennsylvania's Public Protection and Recreation Comptroller annually.

Pennsylvania Department of Environmental Protection also prepares annual grant workplans which identify specific projects to reduce nonpoint source pollution along with a schedule for their implementation over a two year period. In addition to watershed implementation projects, watershed assessments and statewide education projects, the grant workplan describes the specific activities to be carried out by the PADEP under its base operating program during the same time period. Progress in satisfying the milestones stated in the annual grant workplan is evaluated every six months and reported in PADEP's periodic status report to EPA.

2. **Pennsylvania's NPS Grants Tracking And Reporting System (GRTS)**

Pennsylvania was part of the pilot program to develop a computerized system, the Section 319 Grant Reporting and Tracking System, for use by states and EPA in managing and reporting data on Section 319 grants. Information on all of the individual 319 funded projects is currently input using the new Lotus Nbtes.

3. **Use of the Clean Water State Revolving Fund (CWSRF) for Nonpoint Source Management**

Responsibility for implementation of the CWSRF in Pennsylvania is shared between the Pennsylvania Infrastructure Investment Authority (PENNVEST) and the Department of Environmental Protection (DEP). As the CWSRF capitalization grant recipient, PENNVEST is responsible for financial management of the Fund. DEP provides technical support to PENNVEST, which includes developing the project priority rating system, conducting technical and environmental reviews of projects and providing project ratings to PENNVEST.

Each year, PENNVEST provides between $90 and $100 million in CWSRF and state loan funds, and a limited amount of state grant funds, to traditional sewage collection and treatment projects. Funding for stormwater system improvements is also provided using only state funds.

PENNVEST'S Loan Program for Stormwater Projects

Act 16 of 1988 was amended to authorize the Pennsylvania Infrastructure Investment Authority (PENNVEST) to provide low interest loans to construct, improve or rehabilitate public stormwater facilities. Construction of projects consisting of new storm drains, detention basins, or storm sewer rehabilitation may be funded by these PENNVEST loans. Facilities eligible for this funding are: (1) new or updated storm sewer systems to reduce stormwater flooding or to separate stormwater from sanitary sewers, (2) detention basins to control stormwater runoff, and (3) stormwater facilities to implement best management practices that reduce nonpoint source pollution.

As of September 3,1998, there were a total of forty-four approved loans with a cumulative loan amount of approximately $24.5 million. Construction of approximately twenty-five of these projects was completed by the end of 1997. For the 1997 calendar year, PENNVEST approved stormwater facility loans of $4.6 million for 7 projects.

PENNVEST'S Loan Program for Onlot Disposal Systems

Individual Onlot Sewage Disposal Systems Program provides lot interest loans to homeowners with an interest rate of one percent and a term of up to 15 years. Loans are for a minimum of $1,500 to a maximum of $15,000. Owners of individual onlot sewage disposal systems are eligible if the owner occupies the single family residential housing unit served by the system and if the owner's family income does not exceed 150 percent of the statewide median household income, adjusted for inflation. For 1997, the family income limit is $52,913.

This program is a cooperative effort among PENNVEST, the Pennsylvania Housing Finance Agency (PHFA), the Department of Environmental Protection (DEP), and local financial institutions to provide funding to address the public health and environmental needs which result from malfunctioning onlot systems in areas where public collection and treatment facilities are not practical in the immediate future. Eligible costs include all testing, design, permits, and construction costs associated with the repair, rehabilitation, improvement, expansion or replacement of an existing individual onlot sewage disposal system.

Title VI of the federal Clean Water Act authorizes the use of CWSRF funds to address nonpoint source problems through implementation of a management program under Section 319 of the Act.

While many states have elected to utilize CWSRF funds for a variety of such purposes, Pennsylvania has so far elected to do so on a fairly limited extent through implementation of its On-Lot Sewage Disposal System Loan Program for the Individual Homeowner.

This program was initiated in 1994 and, as of late 1997, has offered low interest loans totaling $2.8 million to 194 homeowners. The loans are used to repair or replace malfunctioning on-lot sewage disposal systems, eliminating related ground water and stream contamination problems.

Both PENNVEST and DEP recognize that the federal government is interested in seeing more varied and widespread use of CWSRF funds to address nonpoint source problems. Prior to making a significant shift in this direction, there are several important factors to be considered, including:

- Short and long term impacts on the financial integrity and stability of the CWSRF;
- Identification and prioritization of watersheds impacted by point and nonpoint sources (and determining their relative significance);
- Identification of other nonpoint source funding programs and the demand for additional funding;
- Development of an integrated priority rating system to assist in making project funding decisions;

- Identification of loan recipients and associated mechanisms for awarding and managing loans for nonpoint source projects;
- Demonstration(s) of how the CWSRF can be used for nonpoint source projects;
- Making appropriate revisions to Pennsylvania's CWSRF Intended Use Plan.
- Pennsylvania's use of CWSRF funding for nonpoint source problems will ultimately be reflected in future revisions to this Nonpoint Source Management Program and the CWSRF Intended Use Plan.

4. **Agriculture Linked Investment Program**

The Agriculture Linked Investment Act (Act 90, amended 1998) provides a low-interest loan program as an incentive to encourage the adoption of agricultural best management practices required in an approved nutrient management plan written under the Nutrient Management Act of 1993 (Act 6). The Agriculture Linked Investment Program (Agri-Link Program) provides $25 million in Treasury Department funds for low-interest loans to farm owners or operators participating in the Nutrient Management Act program. Farmers with approved Act 6 nutrient management plans are eligible for loans to a maximum of $75,000 over a seven-year loan period.

Farmers may apply with a participating lender (commercial bank, community bank, or Farm Credit Service) who will determine the eligibility of each applicant. The Treasury Department will provide Agri-Link Program funds to the eligible farmer through the participating lender. The State Conservation Commission will buy down the interest rates on loans provided through the program, resulting in interest rate to the farmer at below market rates. Targeted interest rates to the farmer may range from three (3) to five (5) percent. Information on the Agri-Link Program will be available through the State Conservation Commission, local conservation districts and participating lenders. Program funding will be available October 1998.

5. The following pages contain a listing of 319 funded projects by grant year and category for FY99 through FY90. For more information on 319 projects see Section I.
6. USDA's Environmental Quality Incentive Program (EQIP) grants for 1998 and 1997 are listed by watershed. For more information on EQIP refer to Section I.B. Agriculture.

Rural Abandoned Mine Program (RAMP)

Contact: USDA, Natural Resources Conservation Service

RAMP is authorized by Section 406 of the Surface Mining Control and Reclamation Act (SMCRA) of 1977 as amended by the "Abandoned Mine Reclamation Act of 1991" as subtitled under the Budget Reconciliation Act (PL-101-508). It is authorized for the purpose of reclaiming the soil and water resources of rural lands adversely affected by past coal mining practices. There were approximately 1.1 million acres of abandoned coal-mined land needing reclamation in 1977. The U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), formally the Soil Conservation Service (SCS) administers the program, and funding is provided from money deposited in the Abandoned Mine Reclamation Fund. The program provides technical and financial assistance to land users who voluntarily enter into 5- to 10-year contracts for reclamation of up to 320 acres of eligible abandoned coal-mined lands and waters. The land user with NRCS technical assistance involved prepares a reclamation plan.

All active coal mining operators pay into the Abandoned Mine Reclamation fund at a rate of 35 cents per ton of coal produced from surface mining and 15 cents per ton of coal produced by underground mining. The fees are deposited in the interest-bearing fund, which is used to pay reclamation costs of AML projects. Expenditures from the fund are authorized through the regular congressional budgetary and appropriation's process.

Source: http://nrcs.usda.gov/NRCSProg.html

Note: The RAMP program was not funded in 1998/99, but may receive funding in the future.

ENVIRONMENTAL PROTECTION REGULATORY AUTHORITY

Following are excerpts from the Clarion River Basin Study, Pennsylvania Rivers Conservation Program (August 1997), identifying state and federal regulations for environmental protection.

STATE REGULATORY AUTHORITIES

Clean Streams Law Clean Water Act

Authority: Clean Streams Law, Clean Water Act, Act of June 22, 1937, P.L. 1987, as amended, 25 PA Code, Chapter 25, National Pollutant Discharge Elimination System; Chapter 93, Water Quality Standards, Chapter 102, Erosion Control.

Function: Provides regulations to control discharges of sewage or industrial waste into streams and lakes. Exclusively enforced by DEP, Bureau of Water Quality. Use regulated through a permit system.

Dam Safety and Encroachments Act

Authority: Dam Safety and Encroachments Act, the Act of November 26, 1978, P.L. 1375, No. 325 as amended, 25 PA Code, Chapter 105.

Purpose: Provide for the comprehensive regulation and supervision of dams, reservoirs, water obstructions and encroachments in the Commonwealth in order to protect the health, safety, welfare, and property of the people.

Endangered and Threatened Species - Fish, Amphibians, Reptiles, and Aquatic Organisms

Authority: Title 30 Chapter 75, Fish and Boat Code, revised February 9, 1991, PA Fish Commission.

Purpose: Protect Fish, Amphibians, Reptiles and Aquatic Organism of special concern.

Endangered and Threatened Species - Plant Species

Authority: Conservation of Pennsylvania Native Wild Plant, Title 25 Chapter 82, January 1, 1988, DEP.

Provision: Protect native wild plant species of special concern.

Endangered and Threatened Species - Wild Birds and Mammals

Authority: Title 34 Chapter 133, Game and Wildlife Code, revised December 1, 1990, PA Game Commission.

Provision: Protect wild birds and mammals species of special concern.

Fish and Boat Code

Regulatory Authority: Commonwealth of Pennsylvania, Fish and Boat Act 1980-175, Title 30, PA. Consolidated Statues.

Purpose: To provide direction and guidance to the Commission in executing its mission of providing fishing and boating opportunities through the protection and management of aquatic resources.

Floodplain Management Act

Authority: Floodplain Management Act (Act 166) October 4, 1978, P.L., No. Regulations, 16 PA Code 38, 1 et. seq.

Provision: Encourage the proper management of floodplain areas.

High Quality and Exceptional Value Waters

Authority: Clean Streams Law - P.L. 1987, 25 PA Code Chapters 93 and 95, (93.3, 93.9, 95.1)

Provision: High quality waters shall be maintained and protected at their existing quality ore-enhanced-unless proposed new, additional or increased discharge of pollutants is justified as a result of necessary economic or social development which is of significant public value and the proposed discharge, alone or in combination with other anticipate discharges, will not violate applicable water quality standards. Exceptional Value waters shall be maintained and protected, at a minimum, at their existing quality.

Historic Preservation Act

Authority: Act of 37 PA C.S. Sec. 500 et. seq.

Provision: The conservation of Pennsylvania's historic and natural heritage and the preservation of public records, historic documents and objectives of historic interest, and the identification, restoration and preservation of architecturally and historically significant sites and structures are duties vested primarily in the PA Historical and Museum Commission.

Oil and Gas Development

Authority: The Oil and Gas Act; the Oil and Gas Conservation Law; the Clean Streams Law; Solid Waste Management Act, the Dam Safety and Encroachment Act; the Coal and Gas Resources Coordination Act; the Administrative Code; and 25 PA Code Chapters 78, 79, 91, 92, 93, 95, 97, 101, 102, and 105.

Purpose: The Oil and Gas Act is the basic law governing oil and gas wells.

Pennsylvania Sewage Facilities Act

Authority: Pennsylvania Sewage Facilities Act of January 1966 P.L. (1965) 1531, as amended, Regulations 25 PA Code, 71.1 et. seq.

Provision: Requires individuals to obtain a sewage permit for on-lot sewage disposal systems. Generally administered by either township or county. Sewage permits are normally required prior to obtaining building permit.

Solid Waste Management

Authority: The Solid Waste Management Act - Act 97 of 1980 and the residual and municipal waste regulations promulgated there under.

Provision: To regulate the ongoing generation, transportation, treatment, storage, and disposal of residual, municipal and hazardous waste.

Storm Water Management

Authority: Pennsylvania Storm Water Management Act of October 1978 (No. 167, P.L. 864) 32 P.S. 680 et.seq.

Purpose: Planning and Management of Storm water to address increased rates and volumes of runoff due to land development including Forest Management activities.

Surface Mining Conservation and Reclamation Act

Authority: Pennsylvania Surface Mining Conservation and Reclamation Act of May 31, 1945 (P.L. 1198), amended May 26, 1996.

Purpose: To regulate surface mining of coal resources in PA; permits are required for coal surface mining activities.

Water Rights Act

Authority: Water Rights Act of June 24, 1939, 32 P.S. Sections 631-641.

Provision: The Act provides for the permitting of surface water withdrawals by public supply agencies vested with the power, authority, right of franchise to sell water to the public. A water allocation permits is issued by the Department.

FEDERAL REGULATORY AGENCIES

Section 404 of the Clean Water Act

Authority: Section 404 of the Clean Water Act, enacted by Congress in 1972.

Provision: This gives the Corps of Engineers jurisdiction over "all waters of the United States," this includes water of the basin, its tributaries, adjacent and isolated wetland area.

Federal Endangered Species Act

Authority: Act of December 28, 1973, P.L. 93-205, 87 Stat. 884 as amended, 16 U.S.C. 50 CFR Part 17.

Provision: Gives federal protection to threatened and endangered species.

Federal Wilderness Act

Authority: Act of September 3, 1964, P.L. 88-577.

Provision: Protects certain public lands which have been designated as a component of the "National Wilderness Preservation System."

G. I&file

PA FISH AND BOAT COMMISSION
COMMENTS AND RECOMMENDATIONS
March 24, 1999

WATER: Casselman River (819F) Sections 01, 02, and 04 Somerset County

EXAMINED: October 1998

BY: Gary Smith and Rick Lorson

Bureau Director Action: [signature] Date: 3-29-99

Division Chief Action: Richard A. Snyder Date: 3-24-99

WW Unit Leader Action: Robert M Jerantas Date: 3/31/99

CW Unit Leader Action: R. Thomas Greene Date: 3/24/99

AREA COMMENTS:

The Casselman River enters Pennsylvania from Maryland near Lease Hill, which is 2.1 km west of SR 0219. It flows northeast to Meyersdale, PA, turns northwest to Rockwood, PA, then flows southwest to its mouth on the Youghiogheny River at Confluence, PA. The Casselman River has been severely degraded by acid mine drainage since the early 1900s. Water quality and aquatic life were slowly recovering from pollution until an increase of acid mine drainages from the Coal Run/Shaw Mines Complex (Coal Run, Weir 11, and Shaw Mines Run) killed all aquatic life in the Casselman River from Boynton to the Youghiogheny River in 1993.

The purpose of this survey was to: 1) assess water quality and the occurrence and abundance of Casselman River's fish populations, 2) to compare the 1998 survey results to previous surveys, 3) use data to update the fish management strategies for Casselman River, 4) collect and enumerate all fish species for Index of Biotic Integrity (IBI) metrics as an aid in monitoring future water quality changes in the Casselman River, and 5) determine the extent of water quality and aquatic life improvement since the fish kill of 1993.

At the seven sites in Sections 01, 02, and 04, the pH level ranged from 6.9 to 8.5 and total alkalinity ranged from 16 to 32 mg/l. A total of 25 species of fish were collected at seven sites on the Casselman River. Final IBI metric ranking of the seven sites surveyed in the Casselman River indicated that Site 0102 in Section 01 was the best site followed by Site 0404 and Site 0401 in Section 04. Site 0203 (below Shaw Mines Run) and Site 0201 (below Coal Run) were the most degraded and second-most degraded sites surveyed in 1998 based on IBI fish community metrics, respectively. These rankings corresponded well to the known pollution sources of the Casselman River in Pennsylvania.

The fish communities in Sections 02 and 04 of the Casselman River have recovered dramatically from the 1993 fish kill and are better than in 1983.

Fish species composition at Site 0204 and 0401 in 1998 have changed completely from 1983. However, the 1998 survey from Sections 01, 02, and 04 provides evidence of continued AMD pollution from Coal Run and Shaw Mines Run. The 1998 data can be used to determine the effects of any future fish kills on the Casselman River. Work must continue to eliminate and reduce pollution sources in the Casselman River watershed. Pollution abatement can potentially lead to the increase of Casselman River fish populations and ultimately provide more recreational angling days.

AREA RECOMMENDATIONS:

1) Mine drainage in the Casselman River watershed is a major problem. Efforts at reduction in the watershed have benefitted water quality and fish populations. This work should continue. A copy of this report should be sent to:

   a) Steve Kepler, Fisheries Biologist, Pennsylvania Fish and Boat Commission, Division of Environmental Services, 450 Robinson Lane, Bellefonte, PA 16823.

   b) Scott Horrell, District Mining Manager, Pennsylvania Department of Environmental Protection, Bureau of Mining and Reclamation, Ebensburg District Mining Office, 437 South Center Street, P.O. Box 625, Ebensburg, PA 15931.

   c) Bud Baker, Pennsylvania Department of Environmental Protection, Bureau of Mining and Reclamation, 5th Floor, Rachel Carson Office Building, 400 Market Street, Harrisburg, PA 17105.

   d) Tom Proch, Aquatic Biologist, Pennsylvania Department of Environmental Protection, 400 Water Front Drive, Pittsburgh, PA 15222.

   e) Dave Steele, Somerset County Conservation District, 1590 North Center Avenue, Suite 103, Somerset, PA 15501

   f) Mark Killar, Western Pennsylvania Coalition for Abandoned Mine Reclamation, Donohoe Center, RD#12 Box 202B, Greensburg, PA 15601.

   g) Len Lichvar, Southern Alleghenies Conservancy, 702 West Pitt Street, Fairlawn Court, Suite #7, Bedford, PA 15522.

2) Casselman River, Section 01, should continue to be managed with planting of catchable trout. Stocking rate and frequency should be determined by classification for Approved Trout Waters.

3) A limited recreational fishery currently exists in Section 04 of the Casselman River. Fingerling trout should continue to be stocked in Section 04. Smallmouth bass fingerlings, which were stocked in 1998 should be stocked in 1999 to restore that population and fishery.

4) Longnose sucker, a PA endangered species, were found at the Garrett, PA site. The Casselman River drainage is the only one in Pennsylvania where longnose sucker were found to inhabit. Efforts must continue to maintain and improve water quality to avoid longnose sucker from becoming extirpated in Pennsylvania.

5) When a follow-up survey is conducted on Casselman River, the same sampling protocol as in 1998 should be followed, so that IBI metric values can be compared to the 1998 values.

CWU COMMENTS:

The Casselman River (819F), Sections 01, 02 and 04, were examined during October 1998 as part of an effort to assess water quality and the overall status of the fish community. This survey was conducted using the IBI (Index of Biotic Integrity) fish sampling methodology to aid in documenting any improvements that may have occurred in the Casselman River fishery following chronic degradation from Mine Acid discharge and a severe event in May of 1993.

Section 01

Section 01 can be characterized as a large, freestone stream. This segment was not effected by the Mine Acid discharge in May of 1993. Historically, Section 01 has been managed with the planting of PFBC catchable trout. The 1998 examination recorded the presence of 16 fish species, including, sparse populations of wild brook trout, smallmouth bass and brown trout of hatchery origin.

Section 02

This segment can be characterized as a large, freestone stream that was heavily impacted by Mine Acid discharge in May of 1993. The 1998 inventory (conducted at four sites) indicated that both water quality and the fish community had improved dramatically from previous conditions. Overall, a total of 21 fish species were sampled in 1998 including, smallmouth bass, greenside darter, johnny darter, hatchery brown trout and longnose sucker, a Pennsylvania listed endangered species. In comparison, only 11 fish species were captured during the previous fisheries inventory effort in 1983.

Section 04

Section 04 can be characterized as a large, freestone stream. This segment was also impacted by Mine Acid discharge in 1993. The 1998 examination (conducted at two sites) recorded the presence of 13 fish species, including smallmouth bass, one wild brook trout and brown trout of hatchery origin. Improvements in water quality and the fish community were also noted in Section 04 during the 1998 inventory.

Overall, the IBI sampling methodology appears to provide a good tool for measuring the recovery of fish communities that have suffered from past environmental insult.

CWU RECOMMENDATIONS:

1. Callelman River (819F), Section 01, should continue to be managed with the planting of PFBC catchable trout. Stocking rate and frequency should be determined by classification according to program guidelines.

2. Casselman River (819F), Section 02, should be managed as a biomass Class D water under the Natural Yield option. Conventional statewide regulations should apply.

3. Casselman River (819F), Section 04, should be managed with the planting of fingerling brown and rainbow trout. Conventional statewide regulations should apply.

4. A copy of this report should be forwarded to Nongame and Endangered Species Unit Leader Shiels, due to the recorded presence of longnose sucker (a Pennsylvania listed endangered species) at Site RM 29.39.

WWU COMMENTS & RECOMMENDATIONS:

The four (4) sections of the Casselman River examined in 1998 in this report can each be characterized as productive warmwater stream sections (total alkalinity ≥ 20 mg/l). Despite this characterization densities of sport fish such as smallmouth bass, rock bass, and other sunfishes appear relatively lo compared to other Pennsylvania warmwater streams such as Laurel Hill Creek or Bald Eagle Creek. Also sizes of fish captured were relatively small, perhaps characteristic of a young population resulting from recent recolonization or reduced growth associated with loss of aquatic forage organisms following the 1993 fish kill. Despite improvements in water quality documented in this report, Area personnel note that past and current pollution levels continue to limit fish populations in the Casselman River particularly in Sections 2 and 4 and likewise limit recreational fishing opportunities. I concur with the recommendation to stock smallmouth bass fingerlings in Section 04 in 1999 as well as 2000 to assist in restoration of this indigenous sport fish.

This work made possible by funding from the Sport Fish Restoration Act Project F-57-R Fisheries Management.

PENNSYLVANIA FISH AND BOAT COMMISSION
BUREAU OF FISHERIES
FISHERIES MANAGEMENT DIVISION
Fisheries Management Area 8

Casselman River (819F) Management Report
Sections 01, 02, & 04

Prepared by
Gary Smith and Rick Lorson

Date Sampled: October 1998 Date Prepared: February 1999

Introduction

The Casselman River enters Pennsylvania from Maryland near Lease Hill, which is 2.1 km west of SR 0219. It flows northeast to Meyersdale, PA, turns northwest to Rockwood, PA, then flows southwest to its mouth on the Youghiogheny River at Confluence, PA. Total length in Pennsylvania is 77 km. Land uses in the 1,528 km^2 watershed consist mainly of agriculture and mining. Acid mine drainage affects most of the Casselman River. The Department of Environmental Protection (DEP) Chapter 93 designation for Casselman River is Warm Water Fishes (WWF) (Pennsylvania Department of Environmental Protection 1998).

In May 1993, an increase of acid mine drainage from the Coal Run/Shaw Mines Complex (Coal Run, Weir 11, and Shaw Mines Run) killed all aquatic life in the Casselman River from Boynton to the Youghiogheny River. The initial cause of this kill was considered to be the result of heavy rainfall and snow melt runoff during fall and winter of 1992 and 1993. This runoff then infiltrated the Shaw Mines Complex deep mines. The result was a greatly increased mine pool and discharge of acidic water to the Casselman River in Spring 1993. Subsequent to this, it was discovered that from 1991 to February 1996, Action Mining Company was channeling untreated acidic discharges through illegal underground pipes into Coal Run. There has been disagreement on whether the illegal discharges had a significant contribution to the cause of the fish kill. After the 1993 fish kill, Action Mining Company remined shallow coal seams in the Shaw Mine complex to reduce the mine pool. The reduction of the mine pool resulted in a decrease in the Weir 11 discharge. Anoxic limestone drains and limestone ditches are in use at the Coal Run/Shaw Mines Complex. Required treatment of illegal acid mine discharges, some remining to include mine pool reduction, and minor remediation projects of the Coal Run/Shaw Mines Complex have been the factors in improved water quality (Lorson et al. 1998).

The Casselman River is divided into four management sections (Table 1). Section 01 of the Casselman River begins at the PA-MD state line (River Mile [RM] 47.40) and extends 9.4 km to the mouth of Coal Run 300 m downstream of the SR 2014 bridge in Boynton, PA (RM 41.70) (Figure 1). Section 01 is an approved trout water and is currently managed with one preseason and one inseason plant of brown trout *(Salmo trutta)* and brook trout *(Salvelinus fontinalis)*. At the downstream boundary, the first large source of mine drainage enters the Casselman River via Coal Run.

Casselman River, Section 02, starts at the mouth of Coal Run 300 m downstream of the SR 2014 bridge in Boynton, PA, (RM 41.70) and extends 31.1 km to the mouth of Coxes Creek at Rockwood, PA (RM 22.20) (Figures 1 and 2). The primary sources of acid mine drainage within Section 02 are Coal Run, Weir 11, Shaw Mines Run, and Buffalo Creek at Garrett, PA. The section also receives sewage discharges from Meyersdale, PA, and Garrett, PA, and agricultural runoff from the area between Boynton, PA, and Garrett, PA.

Section 03 of the Casselman River begins at the mouth of Coxes Creek at Rockwood, PA, (RM 22.20) and extends 9.8 km to a point 1 km upstream of the SR 3011 bridge at Markleton, PA (RM 16.10) (Figure 2).

Casselman River, Section 04, starts at a point 1 km upstream of the SR 3011 bridge at Markleton, PA, (RM 16.10) and extends 25.8 km to its mouth on the Youghiogheny River (RM 0.00) (Figure 3). Fingerling trout plants had occurred in Section 04 from 1991 to 1993 prior to the mine drainage fish kill of May 1993. Fingerling trout management was restored to Section 04 subsequent to October 1997 water quality sampling. Smallmouth bass *(Micropterus dolomieu)* fingerlings, which were stocked in 1998, are planned to be stocked in 1999 to restore that population and fishery.

The Pennsylvania Fish and Boat Commission (PFBC) conducted a complete survey of Section 01 in 1979 (Boyer et al. 1979) and 1990 (Shervinskie and Lorson 1993). Water quality data were also collected at Section 01 in 1991 and 1997 (Lorson et al. 1998). Casselman River, Sections 02-04, were surveyed in 1983 (Weirich et al. 1984). Water quality data were also collected at Sections 02-04 in 1991 and 1997 and at Section 02 in 1995 (Lorson et al. 1998).

The purpose of this survey was to: 1) assess water quality and the occurrence and abundance of Casselman River's fish populations, 2) to compare the 1998 survey results to previous surveys, 3) use data to update the fish management strategies for Casselman River, 4) collect and enumerate all fish species for Index of Biotic Integrity (IBI) metrics as an aid in monitoring future water quality changes in the Casselman River, and 5) determine the extent of water quality and aquatic life improvement since the fish kill of 1993. DEP Bureau of Mining and Reclamation and PFBC Division of Environmental Services assisted with the survey.

Methods

One site in Section 01 was surveyed in 1998 to characterize the section. Site 0102 was located 420 m downstream of T-805 bridge at RM 43.67 near Salisbury, PA (Figure 1). Site 0102 was at the same location as Boyer et al. (1979) and Shervinskie and Lorson (1993).

Four sites in Section 02 were sampled in 1998 to represent the section (Figure 2). Site 0201 was located 100 m downstream of T-502 bridge near Boynton, PA, at RM 40.90. Site 0202 was located at the SR 2028 bridge upstream of the Shaw Mines discharge at RM 36.48. Site 0203 was located at the T-385 bridge, which is downstream of the Shaw Mines discharge at RM 32.58. The last survey site in Section 02, Site 0204, was 200 m downstream of the SR 2037 bridge in Garrett, PA, at RM 29.39. All sites in Section 02 were at the same location as Weirich et al. (1984).

Two sites in Section 04 were sampled in 1998 to characterize the section. Site 0401 was located at the SR 3011 bridge in Markleton, PA, at RM 13.66 (Figures 2 and 3). Site 0404 was 100 m upstream of the SR 0523 bridge in Harnedsville, PA, at RM 3.41 (Figure 3). Both sites in Section 04 were at the same location as Weirich et al. (1984).

Data from Sections 01, 02, and 04 were collected for physical, chemical, fish occurrence and abundance. Additional water quality analysis and aquatic marcoinvertebrates analysis were conducted by DEP Bureau of Mining and Reclamation. Fish sampling was accomplished with two Coffelt model BP-1C backpack electrofishers operated at 100-150 volts AC and 125-150 watts. Each site was 200 meters long with the two backpacks operating side by side for a total effort that ranged between 36 to 65 minutes. Two netters per backpack were used at each site to collect all fish. The assessment was conducted from October 13-15, 1998 according to *Procedures for Stream and River Inventory Information Input* (Marcinko et al. 1986).

All fish species were collected and enumerated because the data were used to calculate Index of Biotic Integrity (IBI) metrics. The IBI is a composite index based on an array of ecological attributes of fish communities in regards to: species richness, indicator taxa, trophic guilds, fish abundance, and the incidence of hybridization, disease, and anomalies. The original IBI contained 12 metrics and was developed by Karr (1981) for small, warmwater streams in the Midwest. Each metric received a score of five points if it had a value similar to that expected for a fish community characteristic of a system with little human influence; a score of one point if it had a value similar to that expected for a fish community that deviates strongly from the reference condition; and a score of three points if it deviated somewhat from reference expectations. An IBI score is computed by summing each metric score. An IBI score reflects the overall integrity of a stream compared to a non-impaired stream. Since Karr's original version was developed, others have built on the original's fundamentals, modifying it for other regions and different ecosystems (Mundahl and Simon 1998; Leonard and Orth 1986; Lyons 1992; Lyons et al. 1996). The new versions still had the multimetric structure, but differed from the original in the quantity, scoring, and in the use of new metrics.

Currently, Pennsylvania does not have a version of the IBI to evaluate streams in the state. However, a one year project in 1996/1997 by the PFBC initiated the process to develop IBI metrics that would be used for Pennsylvania streams (Smith et al. 1997). In 1998, PFBC's Division of Environmental Services received funding to continue to develop an IBI for Pennsylvania.

Given the status of the undeveloped Pennsylvania IBI, IBI metrics for this study were extracted from Karr (1981), Lyons (1992), Lyons et al. (1996), Ohio Environmental Protection Agency (1987), and Smith et al. (1997). The metrics used in this report were taken from warmwater IBIs and coldwater IBIs. Presently, a coolwater IBI has not been developed for any region of the United States. The Casselman River should be considered as a coolwater stream. The metrics selected for this study may not be the best suited metrics for a coolwater stream but are the best available metrics at this time. Life history and pollution tolerance designations for fish species collected in the Casselman River were taken from Smith et al. (1997) (Table 2). Halliwell et al. (1998) classified fish species in northeastern United States, excluding Pennsylvania. Pollution tolerance designations for some fish species differ between Smith et al. (1997) and Halliwell et al. (1998). Until further discussion among PA fisheries biologists occur, pollution tolerance designations from Smith et al. (1997) are deemed appropriate.

Each metric was computed from the data, but a score was not assigned to each metric because reference conditions from Pennsylvania streams and scoring criteria are not available. Therefore, an IBI score was not computed for the survey sites. Each metric was ranked from 1 to 7 based upon the metric value at the seven survey sites. A rank of 1 was assigned to the metric if the metric value represented the best stream condition among the seven sites. Lower rankings were given to metrics as the metric value represented worsening stream conditions among the seven sites. Metric rankings were summed to provide a total ranking for the seven sites surveyed in 1998. Hatchery trout were excluded from the metrics. The occurrence of hatchery trout does not necessarily indicate long term, site-specific environmental conditions. Halliwell et al. (1998), Lyons et al. (1996), and Simon and Lyons (1995) have recommended the exclusion of stocked fish.

The IBI rankings will provide: (1) comparisons among the seven sites surveyed in 1998 and (2) a tool to measure the degree of change for future fish population changes to the Casselman River.

Results

SECTION 01

Site 0102 (RM 43.67)

The canopy was open and consisted of trees along the bank. The stream banks were moderately eroded. Rubble and silt were the dominant substrates at the site. The pH level increased from 7.5 standard units (SU) in 1997 to 8.5 SU in 1998 (Table 3). Total alkalinity decreased from 41 mg/l in 1997 to 32 mg/l in 1998.

Sixteen species of fish were collected in 1998 compared to 16 species in 1979 and 9 species in 1990 (Table 4). Northern hog sucker *(Hypentelium nigricans)* and golden shiner *(Notemigonus crysoleucas)* were present in 1998 but not in 1979 or 1990. Hatchery rainbow trout *(Oncorhychus mykiss)*, brown bullhead *(Ameiurus nebulosus)*, and stonecat *(Noturus flavus)* were present in 1979 and 1990 but not in 1998. In 1998, three brook trout in the 125 mm and 175 mm length groups, 11 smallmouth bass from 50 mm to 100 mm length groups, and 16 rock bass *(Ambloplites rupestris)* from 25 mm to 150 mm length groups were collected at Site 0102 (Table 5).

Site 0102 was the only site in 1998 that had common shiner *(Luxilus cornutus)* present (Table 18). Site 0102 had the highest number of northern hog sucker, rock bass, mottled sculpin *(Cottus bairdi)*, total fish species, and cyprinid species of the seven sites surveyed in 1998 (Table 19). Ten percent of the individuals at Site 0102 were stenothermal coldwater and coolwater species, which was the highest percentage of the seven sites. Total catch-per-unit-effort (CPUE) and CPUE excluding tolerant species at Site 0102 were the highest from the seven sites in 1998. The trophic composition of the fish community was primarily insectivores.

SECTION 02

Site 0201 (RM 40.90)

Water quality had improved since 1995. The pH of 7.0 SU and alkalinity of 24 mg/l in 1998 were similar to the levels in 1997 but much higher than levels prior to 1997 (Table 3). In 1983, 1991, and 1995, pH ranged from 4.7 to 5.6 SU and alkalinity ranged from 0 to 2 mg/l. Stream banks were moderately eroded and silt was the predominant substrate type. Wild celery *(Vallisneria americana)* was very abundant at Site 0201.

Eleven species of fish were collected in 1998 compared to two species in 1983 (Table 6). Pumpkinseed *(Lepomis gibbosus)* was the only species collected in 1983 but not in 1998. Seven species collected at Site 0102 in 1998 were absent from Site 0201. Four smallmouth bass in the 50 mm and 100 mm length groups and eight rock bass from 25 mm to 125 mm length groups were collected at Site 0201 in 1998 (Table 7). In 1983, only one 50 mm rock bass and one 150 mm pumpkinseed were collected in a 600 m site.

Site 0201 was the only site in 1998 that had yellow bullhead *(Ameiurus natalis)* present (Table 18). Site 0201 had the highest number of johnny darters *(Etheostoma nigrum)* of the seven sites surveyed in 1998. Two percent of the individuals at Site 0201 were stenothermal coldwater and coolwater species, which was the second

lowest percentage of the seven sites (Table 19). The trophic composition of the fish community was primarily insectivores.

<u>Site 0202 (RM 36.48)</u>

Water quality had improved since 1995. The pH of 7.1 SU, alkalinity of 20 mg/l, and hardness of 141 mg/l in 1998 were similar to the levels in 1997 but were dramatically better than levels prior to 1997 (Table 3). In 1983, 1991, and 1995, pH ranged from 3.1 to 5.1 SU, alkalinity was 0 mg/l, and hardness was 800 mg/l or greater. Habitat consisted of one slow velocity pool with no riffles present in the 200 m site. Stream banks were lightly eroded, and silt covered the stream bed.

Twelve fish species were collected in 1998 (Table 8). Site 0202 was not electrofished in 1983 because of poor water quality and poor habitat. Pumpkinseed dominated the total catch at Site 0202, and Site 0202 had the highest number of pumpkinseed and sunfish species of the seven sites (Tables 18 and 19). Site 0202 was the only site where bluegill *(Lepomis macrochirus)* was collected. Site 0202 had the lowest number of intolerant species of the seven sites. Five smallmouth bass in the 25 mm and 50 mm length groups and one rock bass in the 50 mm length group were also collected (Table 9). Stenothermal coldwater and coolwater species were absent from Site 0202 (Table 19). Seventy-eight percent of the individuals collected were insectivores.

<u>Site 0203 (RM 32.58)</u>

Similar to Sites 0201 and 0202, Site 0203 water quality had improved since 1995 (Table 3). The pH and alkalinity levels in 1998 at 6.9 SU and 16 mg/l were similar to the 1997 levels. These levels were much higher than the pH range of 3.9 to 5.9 SU and alkalinity range of 0 to 1 mg/l in 1995 and 1983, respectively. Boulder and silt were the major substrate types with more silt upstream of Blue Lick Creek. The mouth of Blue Lick Creek entered the Casselman River at the middle of Site 0203.

Ten fish species were collected at Site 0203 in 1998 compared to eight species in 1983 (Table 10). Hatchery brown trout, brown bullhead, greenside darter *(Etheostoma blennioides)*, johnny darter, and mottled sculpin were present in 1998 but not in 1983. The hatchery brown trout was in the 400 mm length group (Table 11). Three fish species (rock bass, bluegill, and golden shiner) that were captured in 1983 were absent in 1998.

Site 0203 was the furthest site downstream that bluntnose minnow *(Pimephales notatus)* and creek chub *(Semotilus atromaculatus)* were collected and the furthest site upstream that greenside darter were collected (Table 18). Site 0203 had the lowest percentage of individuals that were insectivores (24%), the lowest CPUE excluding tolerant species, and the second lowest number of intolerant species (Table 19). Seventy-nine percent of individuals collected were tolerant species, which was the highest of the seven sites.

Site 0204 (RM 29.39)

Habitat at Site 0204 was different than at the upstream sites due to a much higher gradient and water velocity. Boulder was the main substrate type at Site 0204. The water quality trend at the other sites in Section 02 continued at Site 0204 (Table 3). The pH (7.2 SU) and alkalinity (21 mg/l) levels in 1998 were similar to 1997 and higher than in previous years. Hardness decreased from 516 mg/l in 1997 to 212 mg/l in 1998.

The fish community at Site 0204 had changed dramatically since the last survey in 1983. Twelve fish species were collected in 1998 compared to six in 1983 (Table 12). White sucker *(Catostomus commersoni)* was the only species collected in 1983 and 1998. In 1998, six smallmouth bass from 100 mm to 175 mm length groups and one rock bass in the 200 mm length group were collected at Site 0204 (Table 13).

Site 0204 was the only site that longnose sucker *(Catostomus catostomus)*, a PA endangered species, was collected and the furthest site downstream that johnny darters were collected (Table 18). Thirty-nine percent of the individuals were generalist/omnivores, which was the second highest percentage of the seven sites (Table 19).

SECTION 04

Site 0401 (RM 13.66)

Habitat at Site 0401 was similar to Site 0204 with high stream gradient and boulders. The stream banks were covered with shrubs and were lightly eroded. The pH level decreased from 8.2 SU in 1997 to 7.3 SU in 1998 (Table 3). Alkalinity also decreased from 35 mg/l in 1997 to 30 mg/l in 1998. The pH and alkalinity levels in 1998 were higher than the levels in 1983 (6.7 SU and 4 mg/l).

Seven species of fish were collected in 1998 compared to eight species in 1983 (Table 14). The fish communities in 1983 and 1998 were completely different; no fish species was collected in both years. One 250 mm wild brook trout, four hatchery brown trout in the 175 mm and 200 mm length groups, and 11 smallmouth bass from 100 mm to 200 mm length groups were captured at Site 0401 in 1998 (Table 15).

Site 0401 had the lowest number of species and lowest CPUE of the seven sites (Table 19). Zero percent of the individuals were tolerant species. One hundred percent of the individuals were insectivores and 50% of the individuals were piscivores, which were the highest percentages of the seven sites (Table 19). Some fish species, such as smallmouth bass and brook trout, are both insectivores and piscivores.

<u>Site 0404 (RM 3.41)</u>

In 1998, pH (7.2 SU) and alkalinity (26 mg/l) at Site 0404 were lower than in 1997 but higher than 1983, which was similar to the trend at Site 0401 (Table 3). Trees provided no shading to the 48 m wide site. The substrate consisted of boulders and rubble.

The number of fish species doubled from five in 1983 to 11 in 1998 (Table 16). Bluntnose minnow, creek chub, and johnny darter were collected in 1983 but not in 1998. One 200 mm hatchery brown trout and 13 smallmouth bass from 50 mm to 175 mm length groups were captured in 1998 (Table 17). Smallmouth bass were not collected in 1983.

Site 0404 had the highest total number of darters and smallmouth bass and the second highest CPUE and CPUE excluding tolerant species (Tables 18 and 19). Site 0404 was the only site where fantail darters (*Etheostoma flabellare*) were collected. Ninety percent of the individuals were insectivores, which was the second highest percentage of the seven sites.

Discussion

To assess the overall health of the fish communities throughout the Casselman River, IBI metrics were computed for each site and ranked relative to other sites in the Casselman River. Most applications of the IBI have been used on warmwater streams. The Casselman River can be characterized as a coolwater stream, because it contains warmwater (e.g., brown bullhead), coolwater (e.g., smallmouth bass), and coldwater (e.g., mottled sculpin) species throughout its entire length. Some of the metrics, such as number of sunfish species, used in this study may not be suitable. However, until further testing of IBI metrics for Pennsylvania streams is completed, these metrics will be used to examine the fish communities in the Casselman River during 1998. If metrics need to be modified in the future, the 1998 data could still be used to recalculate the modified metrics.

Laurel Hill Creek, a tributary of the Casselman River, is a high quality stream that contains low and high gradient sections similar to the Casselman River. Laurel Hill Creek was used to compare Casselman River fish communities to fish communities characteristic of a system with considerably less human influence. October 1992 survey data from Laurel Hill Creek were used to calculate only species richness metrics, because the Laurel Hill Creek 1992 survey contained only presence/absence data on non-game fish (Table 21). Comparisons of species richness metrics, based on stream gradient, can be made between Laurel Hill Creek and Casselman River. Low gradient sites on the Casselman River are Sites 0102, 0201, 0202, and 0203. High gradient sites on the Casselman River are Sites 0204, 0401, and 0404.

In warmwater streams, the number of fish species (or species richness) decrease with most types of degradation. Section 01 had the highest number of species. The number of species decreased in Section 02, which includes negative influences from Coal Run, Weir 11, and Shaw Mines Run. Species richness in Section 04 was slightly lower than at Section 02. The lower number of species in Section 04 may be due to the change in habitat from low gradient in Section 02 to high gradient in Section 04. Two low gradient sites on Laurel Hill Creek contained 19 and 15 species (Table 21). Site 0102 in Section 01, Casselman River had 15 species of fish, which is similar to the low gradient reference sites of Laurel Hill Creek. The low gradient sites within the Coal Run/Shaw Mines Complex (Casselman River Sites 0201, 0202, and 0203) had lower number of species than the low gradient reference sites of Laurel Hill Creek. The Laurel Hill Creek high gradient site had 11 fish species, which is similar to Site 0204 (12 species) and Site 0404 (10 species) of the Casselman River. Casselman River Site 0401 had only six species. The number of species at Casselman River Sites 0201, 0202, 0203, and 0401 indicate impairment when compared to the number of species at Laurel Hill Creek reference sites.

The number of intolerant species ranged between 2 and 5 for the seven sites in the Casselman River. The lowest number of intolerant species (2, 3, and 4 per site) was found at Casselman River Sites 0201, 0202, and 0203 (Coal Run/Shaw Mines Complex). The low and high gradient reference sites at Laurel Hill Creek had five to six intolerant species present. This suggests a degree of impairment at the Coal Run/Shaw Mines Complex.

Darters are small benthic species that tend to be intolerant of many types of environmental degradations and are mainly insectivores. The seven Casselman River sites had one or two darter species present. The two Laurel Hill Creek low gradient reference sites had three darter species present and the Laurel Hill Creek high gradient reference site had one darter species present (Table 21). Based on the Laurel Hill Creek low gradient sites, the low gradient sites on the Casselman River, without degradation, should have one or two more darter species.

The number of cyprinid species was highest at Site 0102 in Section 01 with seven species present. The other six sites on the Casselman River had one to four cyprinid species. The Laurel Hill Creek low and high gradient reference sites had between six and eight cyprinid species. The fish communities in Sections 02 and 04 should contain more cyprinid species than was found during the 1998 survey if stream health was better.

The fish communities at six out of seven sites were predominately (≥ 50%) composed of insectivores. Site 0203 (below Shaw Mines Run) had the lowest percentage of insectivores with only 24% of the sample population as insectivores and 76% as generalists/omnivores. A high quality warmwater stream in Wisconsin would have greater than 60% of individuals that are insectivores (Lyons 1992). Generalists/omnivores can feed on a variety of food items. A high percentage of generalists/omnivores, which are non-specialized trophic species, usually indicates a degraded system. This metric suggests Casselman River Site 0203 to be the most degraded site.

Final metric ranking of the seven sites surveyed in the Casselman River indicated that Site 0102 in Section 01 was the best site followed by Site 0404 and Site 0401 in Section 04 (Table 20 and Figure 4). Site 0203 (below Shaw Mines Run) and Site 0201 (below Coal Run) were the most degraded and second-most degraded sites surveyed in 1998 based on IBI fish community metrics, respectively.

These rankings corresponded well to the known pollution sources of the Casselman River in Pennsylvania.

The Casselman River has been severely degraded by acid mine drainage since the early 1900s. Water quality and aquatic life were slowly recovering from pollution until an increase of acid mine drainages from the Coal Run/Shaw Mines Complex (Coal Run, Weir 11, and Shaw Mines Run) killed all aquatic life in the Casselman River from Boynton to the Youghiogheny River in 1993. At the seven sites in Sections 01, 02, and 04, the pH level ranged from 6.9 to 8.5 and total alkalinity ranged from 16 to 32 mg/l. A total of 25 species of fish were collected at seven sites on the Casselman River. Water chemistry and fish communities in the Casselman River, Sections 02 and 04, have improved since 1983. The pH levels at the six sites in Sections 02 and 04 were greater than the levels in 1983 and 1995. Total alkalinity at all sites had increased at least 15 mg/l. Total number of fish species increased in Sections 02 and 04 from 1983 to 1998. In Section 01, total number of fish species in 1998 was similar to the number in 1979 but greater than the number in 1990.

In considering the lower six sites sampled and affected by AMD to varying degrees, trout were sampled at three out of six sites in 1998, rock bass at four out of six, and smallmouth bass at five of six sites sampled in 1998. A very limited recreational fishery exists currently based on numbers and sizes found, but if water quality conditions are sustained, population levels and fishing for these species will increase over the next few years.

The presence of a state endangered species, longnose sucker, at the Garrett, PA, site is also reason to heighten efforts to maintain and improve water quality parameters in the Casselman River. This drainage is the only one in Pennsylvania where longnose sucker were found to inhabit. Effort must continue to be expended to avoid these species from becoming extirpated in PA.

The fish communities in Sections 02 and 04 of the Casselman River have recovered dramatically from the 1993 fish kill and are better than in 1983. Fish species composition at Site 0204 and 0401 in 1998 have changed completely from 1983. However, the 1998 survey from Sections 01, 02, and 04 provides evidence of continued AMD pollution from Coal Run and Shaw Mines Run. The 1998 data can be used to determine the effects of any future fish kills on the Casselman River. Work must continue to eliminate and reduce pollution sources in the Casselman River watershed. Pollution abatement can potentially lead to the increase of Casselman River fish populations and ultimately provide more recreational angling days.

Management Recommendations

1) Mine drainage in the Casselman River watershed is a major problem. Efforts at reduction in the watershed have benefitted water quality and fish populations. This work should continue. A copy of this report should be sent to:

   a) Steve Kepler, Fisheries Biologist, Pennsylvania Fish and Boat Commission, Division of Environmental Services, 450 Robinson Lane, Bellefonte, PA 16823.

   b) Scott Horrell, District Mining Manager, Pennsylvania Department of Environmental Protection, Bureau of Mining and Reclamation, Ebensburg District Mining Office, 437 South Center Street, P.O. Box 625, Ebensburg, PA 15931.

   c) Bud Baker, Pennsylvania Department of Environmental Protection, Bureau of Mining and Reclamation, 5th Floor, Rachel Carson Office Building, 400 Market Street, Harrisburg, PA 17105.

   d) Tom Proch, Aquatic Biologist, Pennsylvania Department of Environmental Protection, 400 Water Front Drive, Pittsburgh, PA 15222.

   e) Dave Steele, Somerset County Conservation District, 1590 North Center Avenue, Suite 103, Somerset, PA 15501

   f) Mark Killar, Western Pennsylvania Coalition for Abandoned Mine Reclamation, Donohoe Center, RD#12 Box 202B, Greensburg, PA 15601.

   g) Len Lichvar, Southern Alleghenies Conservancy, 702 West Pitt Street, Fairlawn Court, Suite #7, Bedford, PA 15522.

2) Casselman River, Section 01, should continue to be managed with planting of catchable trout. Stocking rate and frequency should be determined by classification for Approved Trout Waters.

3) A limited recreational fishery currently exists in the Section 04 of the Casselman River. Fingerling trout should continue to be stocked in Section 04. Smallmouth bass fingerlings, which were stocked in 1998, should be stocked in 1999 to restore that population and fishery.

4) Longnose sucker, a PA endangered species, was found at the Garrett, PA site. The Casselman River drainage is the only one in Pennsylvania where longnose sucker were found to inhabit. Efforts must continue to maintain and improve water quality to avoid longnose sucker from becoming extirpated in Pennsylvania.

5) When a follow-up survey is conducted on Casselman River, the same sampling protocol as in 1998 should be followed, so that IBI metric values can be compared to the 1998 values.

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Table 1. Section catalog for Casselman River (819F), Somerset County; 1998.

Section No.	Section length (km)	Boundary limits	Management designation
01	9.4	UPS: PA-MD state line (RM 47.40) DNS: Mouth of Coal Run 300 m downstream of SR 2014 bridge in Boynton, PA (RM 41.70)	Catchable trout
02	31.1	UPS: Mouth of Coal Run 300 m downstream of SR 2014 bridge in Boynton, PA (RM 41.70) DNS: Mouth of Coxes Creek at Rockwood, PA (RM 22.20)	Natural Yield
03	9.8	UPS: Mouth of Coxes Creek at Rockwood, PA (RM 22.20) DNS: 1 km upstream of SR 3011 bridge at Markleton, PA (RM 16.10)	Natural Yield
04	25.8	UPS: 1 km upstream of SR 3011 bridge at Markleton, PA (RM 16.10) DNS: Mouth on Youghiogheny River (RM 0.00)	Fingerling trout

Table 2. Species occurrence and Index of Biotic Integrity (IBI) designations for the 25 fish species collected in Casselman River (819F), Somerset County; October 1998. I = insectivore, P = piscivore, O = omnivore, G = generalist feeder; t = tolerant, I = intolerant

	IBI group	Trophic group	Tolerance designation	Stenothermal coolwater & coldwater
Brook trout	salmonid	I/P	I	X
Brown trout	salmonid	I/P		X
Bluntnose minnow	cyprinid	O	t	
Blacknose dace	cyprinid	G	t	
Longnose dace	cyprinid	I		X
River chub	cyprinid	I	I	
Creek chub	cyprinid	G	t	
Central stoneroller	cyprinid	H		
Rosyface shiner	cyprinid	I	I	
Golden shiner	cyprinid	O	t	
Common shiner	cyprinid	I		
White sucker	sucker	O	t	
Northern hog sucker	sucker	I	I	
Longnose sucker	sucker	I		X
Brown bullhead	--	I	t	
Yellow bullhead	--	I	t	
Stonecat	--	I		
Rock bass	sunfish	I/P	I	
Pumpkinseed	sunfish	I		
Bluegill	sunfish	I		
Smallmouth bass	--	I/P		
Greenside darter	darter	I	I	
Fantail darter	darter	I		
Johnny darter	darter	I		
Mottled sculpin	sculpin	I	I	X

Table 3. Chemical characteristics of Casselman River (819F), Somerset County; June 1979, June and July 1983, June 1990, September 1991, September 1995, October 1997, and October 1998.

Site	Mo/Yr	pH	Alkalinity	Hardness	Conductivity
0101 - RM 47.10	6/79	7.2	18	48	170
(PA/MD State Line)	6/90	7.1	14	37	157
	10/97	7.4	40	77	322
0102 - RM 43.67	6/79	6.9	18	156	575
(at Salisbury)	6/90	7.0	13	40	142
	9/91	7.5	54	128	406
	10/97	7.5	41	86	330
	10/98	8.5	32	84	267
0201 - RM 40.90	6/83	5.6	2	160	265
(at Boynton)	9/91	4.7	0	216	734
	9/95	5.1	1	216	625
	10/97	6.8	26	140	474
	10/98	7.0	24	119	385
0202 - RM 36.48	6/83	5.1	0	800	315
(Above Shaw Mines Run)	9/91	3.1	0	INT	967
	9/95	3.9	0	INT	663
	10/97	7.0	22	142	471
	10/98	7.1	20	141	441
0203 - RM 32.58	7/83	5.9	1	200	450
(Below Shaw Mines Run)	9/95	3.9	0	264	776
	10/97	6.9	15	214	607
	10/98	6.9	16	206	587
0204 - RM 29.39	7/83	4.8	0	800	625
(at Garrett)	9/91	4.5	0	INT	960
	10/97	7.1	20	516	712
	10/98	7.2	21	212	602
0205 - RM 23.25	7/83	5.0	0	200	490
(at Rockwood)	9/91	4.7	0	INT	980
	10/97	6.9	18	504	720

Table 3. (continued)

Site	Mo/Yr	pH	Alkalinity	Hardness	Conductivity
0301 - RM 18.65	7/83	5.6	1	220	455
(at Casselman)	9/91	7.3	28	276	650
0401 - RM 13.66	7/83	6.7	4	160	440
(at Markleton)	9/91	7.5	24	254	651
	10/97	8.2	35	182	602
	10/98	7.3	30	226	706
0402 - RM 9.30	7/83	6.6	2	188	500
(at Fort Hill)	9/91	7.5	26	260	653
	10/97	8.0	31	166	547
0403 - RM 4.74	7/83	6.7	1	180	490
(above Harnedsville)	9/91	7.4	20	290	686
0404 - RM 3.41	7/83	6.7	1	196	480
(at Harnedsville)	10/97	8.2	32	209	555
	10/98	7.2	26	180	596
0405 - RM 0.17	7/83	6.8	2	170	INT
(near mouth)	9/91	7.6	20	268	639

Table 4. Species occurrence at Site 0102 (River Mile 43.67) for Section 01 of Casselman River (819F), Somerset County; June 1979, June 1990, and October 1998.

Common name	Scientific name	06/79	06/90	10/98
Rainbow trout - hatchery	*Oncorhychus mykiss*	X	X	
Brown trout - hatchery	*Salmo trutta*	X		X
Brook trout	*Salvelinus fontinalis*		X	X
Central stoneroller	*Campostoma anomalum*	X		X
Common shiner	*Luxilus cornutus*	X		X
Bluntnose minnow	*Pimephales notatus*	X		X
Blacknose dace	*Rhinichthys atratulus*	X	X	X
Creek chub	*Semotilus atromaculatus*	X		X
River chub	*Nocomis micropogon*	X	X	X
White sucker	*Catostomus commersoni*	X		X
Northern hog sucker	*Hypentelium nigricans*			X
Yellow bullhead	*Ameiurus natalis*	X		
Brown bullhead	*Ameiurus nebulosus*	X	X	
Stonecat	*Noturus flavus*	X	X	
Rock bass	*Ambloplites rupestris*	X	X	X
Pumpkinseed	*Lepomis gibbosus*	X		X
Smallmouth bass	*Micropterus dolomieu*		X	X
Johnny darter	*Etheostoma nigrum*	X		X
Mottled sculpin	*Cottus bairdi*	X	X	X
Golden shiner	*Notemigonus crysoleucas*			X
Species Total		16	9	16

Table 5. Length/frequency distribution for brook trout (ST), brown trout - hatchery (HBT), smallmouth bass (SMB), rock bass (RB), and pumpkinseed (PPS) at Site 0102 (River Mile 43.67) for Section 01 of Casselman River (819F), Somerset County; October 1998.

Length group (mm)	ST	HBT	SMB	RB	PPS
25				4	
50			5	5	
75			1	4	1
100			5		1
125	1				
150				3	
175	2				
200					
225		1			
250		1			
TOTAL	3	2	11	16	2

Table 6. Species occurrence at Site 0201 (River Mile 40.90) for Section 02 of Casselman River (819F), Somerset County; June 1983 and October 1998.

Common name	Scientific name	06/83	10/98
Bluntnose minnow	*Pimephales notatus*		X
Creek chub	*Semotilus atromaculatus*		X
River chub	*Nocomis micropogon*		X
White sucker	*Catostomus commersoni*		X
Northern hog sucker	*Hypentelium nigricans*		X
Yellow bullhead	*Ameiurus natalis*		X
Stonecat	*Noturus flavus*		X
Rock bass	*Ambloplites rupestris*	X	X
Pumpkinseed	*Lepomis gibbosus*	X	
Smallmouth bass	*Micropterus dolomieu*		X
Johnny darter	*Etheostoma nigrum*		X
Mottled sculpin	*Cottus bairdi*		X
Species Total		2	11

Table 7. Length/frequency distribution for smallmouth bass (SMB) and rock bass (RB) at Site 0201 (River Mile 40.90) for Section 02 of Casselman River (819F), Somerset County; October 1998.

Length group (mm)	SMB	RB
25		2
50	2	3
75		1
100	2	1
125		1
TOTAL	4	8

Table 8. Species occurrence at Site 0202 (River Mile 36.48) for Section 02 of Casselman River (819F), Somerset County; October 1998.

Common name	Scientific name	10/98
Bluntnose minnow	*Pimephales notatus*	X
Creek chub	*Semotilus atromaculatus*	X
White sucker	*Catostomus commersoni*	X
Northern hog sucker	*Hypentelium nigricans*	X
Brown bullhead	*Ameiurus nebulosus*	X
Rock bass	*Ambloplites rupestris*	X
Pumpkinseed	*Lepomis gibbosus*	X
Bluegill	*Lepomis macrochirus*	X
Smallmouth bass	*Micropterus dolomieu*	X
Johnny darter	*Etheostoma nigrum*	X
Central stoneroller	*Campostoma anomalum*	X
Golden shiner	*Notemigonus crysoleucas*	X
Species Total		12

Table 9. Length/frequency distribution for smallmouth bass (SMB), rock bass (RB), pumpkinseed (PPS), and bluegill (BG) at Site 0202 (River Mile 36.48) for Section 02 of Casselman River (819F), Somerset County; October 1998.

Length group (mm)	SMB	RB	PPS	BG
25	2			
50	3	1	6	
75			19	
100			3	1
125			2	
TOTAL	5	1	30	1

Table 10. Species occurrence at Site 0203 (River Mile 32.58) for Section 02 of Casselman River (819F), Somerset County; July 1983 and October 1998.

Common name	Scientific name	07/83	10/98
Brown trout - hatchery	*Salmo trutta*		X
Bluntnose minnow	*Pimephales notatus*	X	X
Creek chub	*Semotilus atromaculatus*	X	X
White sucker	*Catostomus commersoni*	X	X
Northern hog sucker	*Hypentelium nigricans*	X	X
Brown bullhead	*Ameiurus nebulosus*		X
Rock bass	*Ambloplites rupestris*	X	
Pumpkinseed	*Lepomis gibbosus*	X	X
Bluegill	*Lepomis macrochirus*	X	
Greenside darter	*Etheostoma blennioides*		X
Johnny darter	*Etheostoma nigrum*		X
Mottled sculpin	*Cottus bairdi*		X
Golden shiner	*Notemigonus crysoleucas*	X	
Species Total		8	10

Table 11. Length/frequency distribution for brown trout - hatchery (HBT) and pumpkinseed (PPS) at Site 0203 (River Mile 32.58) for Section 02 of Casselman River (819F), Somerset County; October 1998.

Length group (mm)	HBT	PPS
50		2
75		1
400	1	
TOTAL	1	3

Table 12. Species occurrence at Site 0204 (River Mile 29.39) for Section 02 of Casselman River (819F), Somerset County; July 1983 and October 1998.

Common name	Scientific name	07/83	10/98
Central stoneroller	*Campostoma anomalum*		X
Common shiner	*Luxilus cornutus*	X	
Rosyface shiner	*Notropis rubellus*		X
Blacknose dace	*Rhinichthys atratulus*	X	
Longnose dace	*Rhinichthys cataractae*		X
Creek chub	*Semotilus atromaculatus*	X	
River chub	*Nocomis micropogon*		X
White sucker	*Catostomus commersoni*	X	X
Northern hog sucker	*Hypentelium nigricans*		X
Longnose sucker	*Catostomus catostomus*		X
Brown bullhead	*Ameiurus nebulosus*		X
Rock bass	*Ambloplites rupestris*		X
Bluegill	*Lepomis macrochirus*	X	
Smallmouth bass	*Micropterus dolomieu*		X
Greenside darter	*Etheostoma blennioides*		X
Johnny darter	*Etheostoma nigrum*		X
Mottled sculpin	*Cottus bairdi*	X	
Species Total		6	12

Table 13. Length/frequency distribution for smallmouth bass (SMB) and rock bass (RB)at Site 0204 (River Mile 29.39) for Section 02 of Casselman River (819F), Somerset County; October 1998.

Length group (mm)	SMB	RB
100	1	
125	1	
150	2	
175	2	
200		1
TOTAL	6	1

Table 14. Species occurrence at Site 0401 (River Mile 13.66) for Section 04 of Casselman River (819F), Somerset County; July 1983 and October 1998.

Common name	Scientific name	07/83	10/98
Brook trout	*Salvelinus fontinalis*		X
Brown trout - hatchery	*Salmo trutta*		X
Rosyface shiner	*Notropis rubellus*	X	
Bluntnose minnow	*Pimephales notatus*	X	
Blacknose dace	*Rhinichthys atratulus*	X	
Creek chub	*Semotilus atromaculatus*	X	
River chub	*Nocomis micropogon*		X
White sucker	*Catostomus commersoni*	X	
Northern hog sucker	*Hypentelium nigricans*		X
Rock bass	*Ambloplites rupestris*		X
Bluegill	*Lepomis macrochirus*	X	
Smallmouth bass	*Micropterus dolomieu*		X
Greenside darter	*Etheostoma blennioides*		X
Johnny darter	*Etheostoma nigrum*	X	
Fantail darter	*Etheostoma flabellare*	X	
Species Total		8	7

Table 15. Length/frequency distribution for brook trout (ST), brown trout - hatchery (HBT), smallmouth bass (SMB), and rock bass (RB) at Site 0401 (River Mile 13.66) for Section 04 of Casselman River (819F), Somerset County; October 1998.

Length group (mm)	ST	HBT	SMB	RB
75				1
100			1	
125			8	1
150			1	1
175		1		
200		3	1	
225				
250	1			
TOTAL	1	4	11	3

Table 16. Species occurrence at Site 0404 (River Mile 3.41) for Section 04 of Casselman River (819F), Somerset County; July 1983 and October 1998.

Common name	Scientific name	07/83	10/98
Brown trout - hatchery	*Salmo trutta*		X
Central stoneroller	*Campostoma anomalum*		X
Rosyface shiner	*Notropis rubellus*	X	X
Bluntnose minnow	*Pimephales notatus*	X	
Longnose dace	*Rhinichthys cataractae*		X
Creek chub	*Semotilus atromaculatus*	X	
River chub	*Nocomis micropogon*	X	X
Northern hog sucker	*Hypentelium nigricans*		X
Smallmouth bass	*Micropterus dolomieu*		X
Stonecat	*Noturus flavus*		X
Greenside darter	*Etheostoma blennioides*		X
Johnny darter	*Etheostoma nigrum*	X	
Fantail darter	*Etheostoma flabellare*		X
Mottled sculpin	*Cottus bairdi*		X
Species Total		5	11

Table 17. Length/frequency distribution for brown trout - hatchery (HBT) and smallmouth bass (SMB) at Site 0404 (River Mile 3.41) for Section 04 of Casselman River (819F), Somerset County; October 1998.

Length group (mm)	HBT	SMB
50		1
75		4
100		
125		4
150		3
175		1
200	1	
TOTAL	1	13

Table 18. Fish abundance for the seven sites in Casselman River (819F), Somerset County; October 1998. For site descriptions, refer to the Methods section.

	0102	0201	0202	0203	0204	0401	0404
Brook trout	3					1	
Brown trout - hat.	2			1		4	1
Bluntnose minnow	58	4	2	13			
Blacknose dace	1						
Longnose dace					1		1
River chub	5	1			6	1	13
Creek chub	40	6	4	20			
Central stoneroller	97		6		1		14
Rosyface shiner					7		20
Golden shiner	7		1				
Common shiner	69						
White sucker	40	18	1	19	30		
Northern hog sucker	85	27	6	3	20	10	18
Longnose sucker					1		
Brown bullhead			1	2	1		
Yellow bullhead		2					
Stonecat		1					3
Rock bass	16	8	1		1	3	
Pumpkinseed	2		30	3			
Bluegill			1				
Smallmouth bass	11	4	5		6	11	13
Greenside darter				1	2	4	25
Fantail darter							26
Johnny darter	6	9	7	4	1		
Mottled sculpin	46	2		3			3
Total Effort (min)	65	36	38	42	54	54	58

Table 19. Index of Biotic Integrity (IBI) metrics for the seven sites in the Casselman River (819F), Somerset County; October 1998.

IBI Metrics	0102	0201	0202	0203	0204	0401	0404
Species Richness and Composition Metrics							
# of species (excl hatchery trt)	15	11	12	9	12	6	10
# of salmonid & sculpin sp	2	1	0	1	0	1	1
# of cyprinid sp	7	3	4	2	4	1	4
# of darter sp	1	1	1	2	2	1	2
# of sucker sp	2	2	2	2	3	1	1
# of sunfish sp	2	1	3	1	1	1	0
# of intolerant sp	5	4	2	3	5	5	5
% of individuals that are tolerant sp	30	37	14	79	40	0	0
% of individuals that are stenothermal coolwater & coldwater	10	2	0	4	3	3	3
Trophic Composition Metrics							
% of individuals that are generalists/omnivores	30	34	12	76	39	0	0
% of individuals that are insectivores	50	66	78	24	60	100	90
% of individuals that are piscivores	6	15	9	0	9	50	10
Abundance Metrics							
Catch-per-unit-effort (CPUE) (#/hr)	449	137	103	97	86	33	141
CPUE (#/hr), excluding tolerant sp	314	87	88	20	51	33	141

Table 20. Index of Biotic Integrity (IBI) metric rankings for the seven sites in the Casselman River (819F), Somerset County; October 1998 (Ranking: 1 = best to 7 = worst).

IBI Metrics	0102	0201	0202	0203	0204	0401	0404
Species Richness and Composition Metrics							
# of species (excl hatchery trt)	1	4	2	6	2	7	5
# of salmonid & sculpin sp	1	2	6	2	6	2	2
# of cyprinid sp	1	5	2	6	2	7	2
# of darter sp	4	4	4	1	1	4	1
# of sucker sp	2	2	2	2	1	6	6
# of sunfish sp	2	3	1	3	3	3	7
# of intolerant sp	1	5	7	6	1	1	1
% of individuals that are tolerant sp	4	5	3	7	6	1	1
% of individuals that are stenothermal coolwater & coldwater	1	6	7	2	3	3	3
Trophic Composition Metrics							
% of individuals that are generalists/omnivores	4	5	3	7	6	1	1
% of individuals that are insectivores	6	4	3	7	5	1	2
% of individuals that are piscivores	5	2	4	7	4	1	3
Abundance Metrics							
Catch-per-unit-effort (CPUE) (#/hr)	1	3	4	5	6	7	2
CPUE (#/hr), excluding tolerant sp	1	4	3	7	5	6	2
Total Score	34	54	51	68	51	50	38
Final Ranking	1	6	4	7	4	3	2

Table 21. Index of Biotic Integrity (IBI) species richness metrics for the seven sites in the Casselman River (819F), Somerset County; October 1998 and Laurel Hill Creek (819E), Somerset County; October 1992.

IBI Metrics	Casselman River - low gradient sites				Laurel Hill Ck - low gradient sites	
	0102	0201	0202	0203	0502	0503
# of species (excl hatchery trt)	15	11	12	9	19	15
# of salmonid & sculpin sp	2	1	0	1	0	1
# of cyprinid sp	7	3	4	2	8	6
# of darter sp	1	1	1	2	3	3
# of sucker sp	2	2	2	2	2	1
# of sunfish sp	2	1	3	1	3	2
# of intolerant sp	5	4	2	3	5	6

IBI Metrics	Casselman River - high gradient sites			Laurel Hill Ck - high gradient site
	0204	0401	0404	0404
# of species (excl hatchery trt)	12	6	10	11
# of salmonid & sculpin sp	0	1	1	0
# of cyprinid sp	4	1	4	6
# of darter sp	2	1	2	1
# of sucker sp	3	1	1	2
# of sunfish sp	1	1	0	1
# of intolerant sp	5	5	5	6

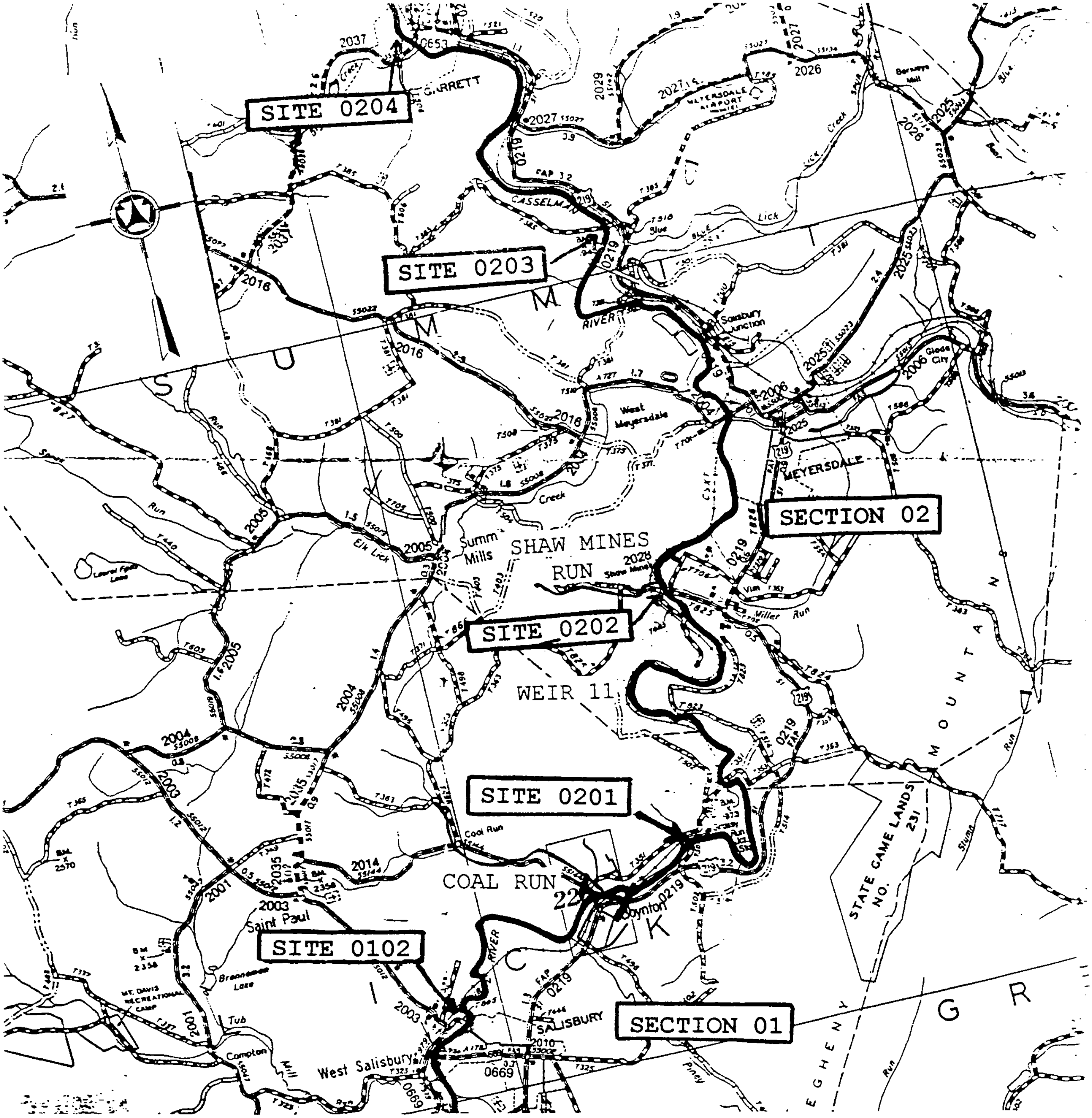
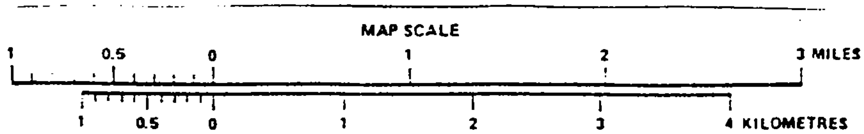


Figure 1. Site locations and lower section limit for Section 01 and upper section limit for Section 02 of Casselman River (819F), Somerset County; October 1998.



LEGEND

I = Section Limit

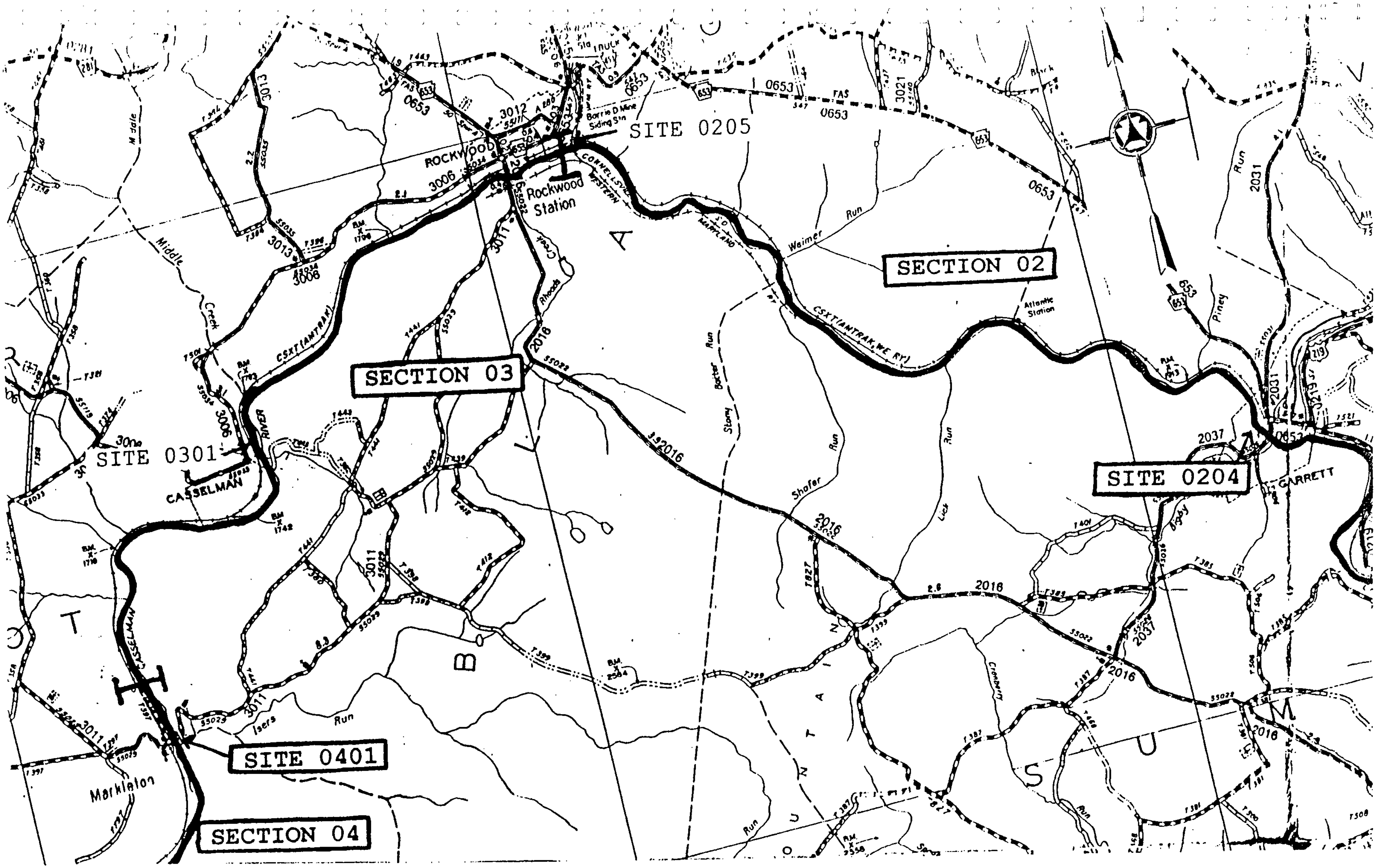


Figure 2. Site locations and lower section limit for Section 02 and upper and lower section limits for Section 03 of Casselman River (819F), Somerset County; October 1998.

LEGEND

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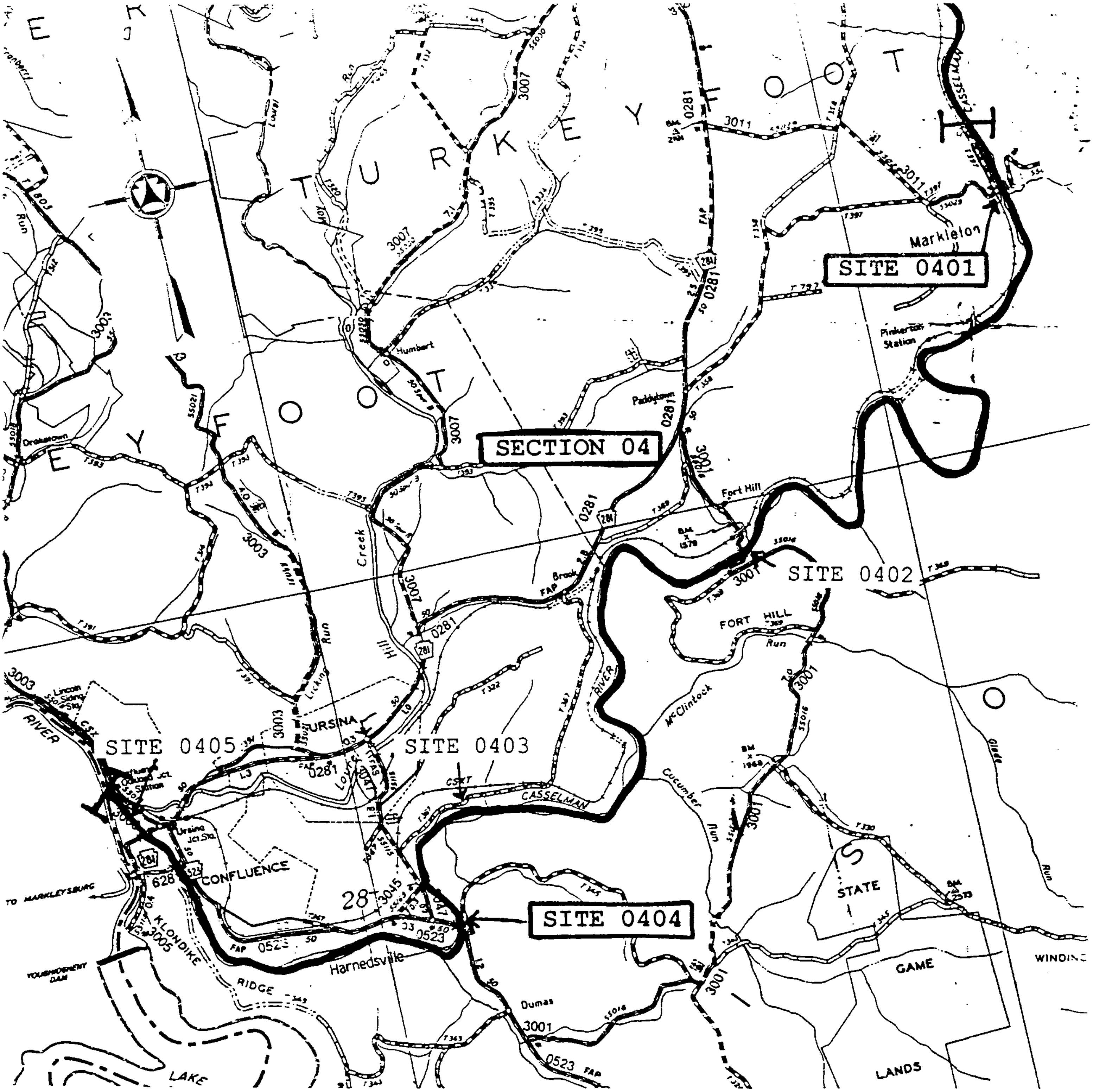
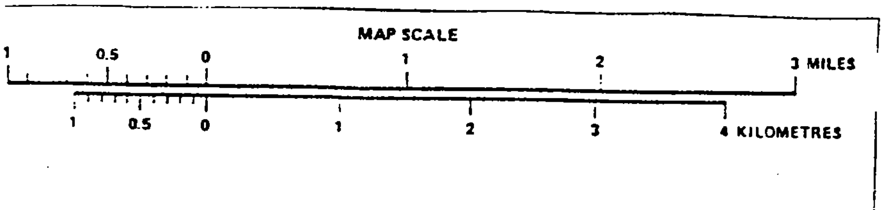


Figure 3. Site locations and lower section limit for Section 03 and upper and lower section limits for Section 04 of Casselman River (819F), Somerset County; October 1998.



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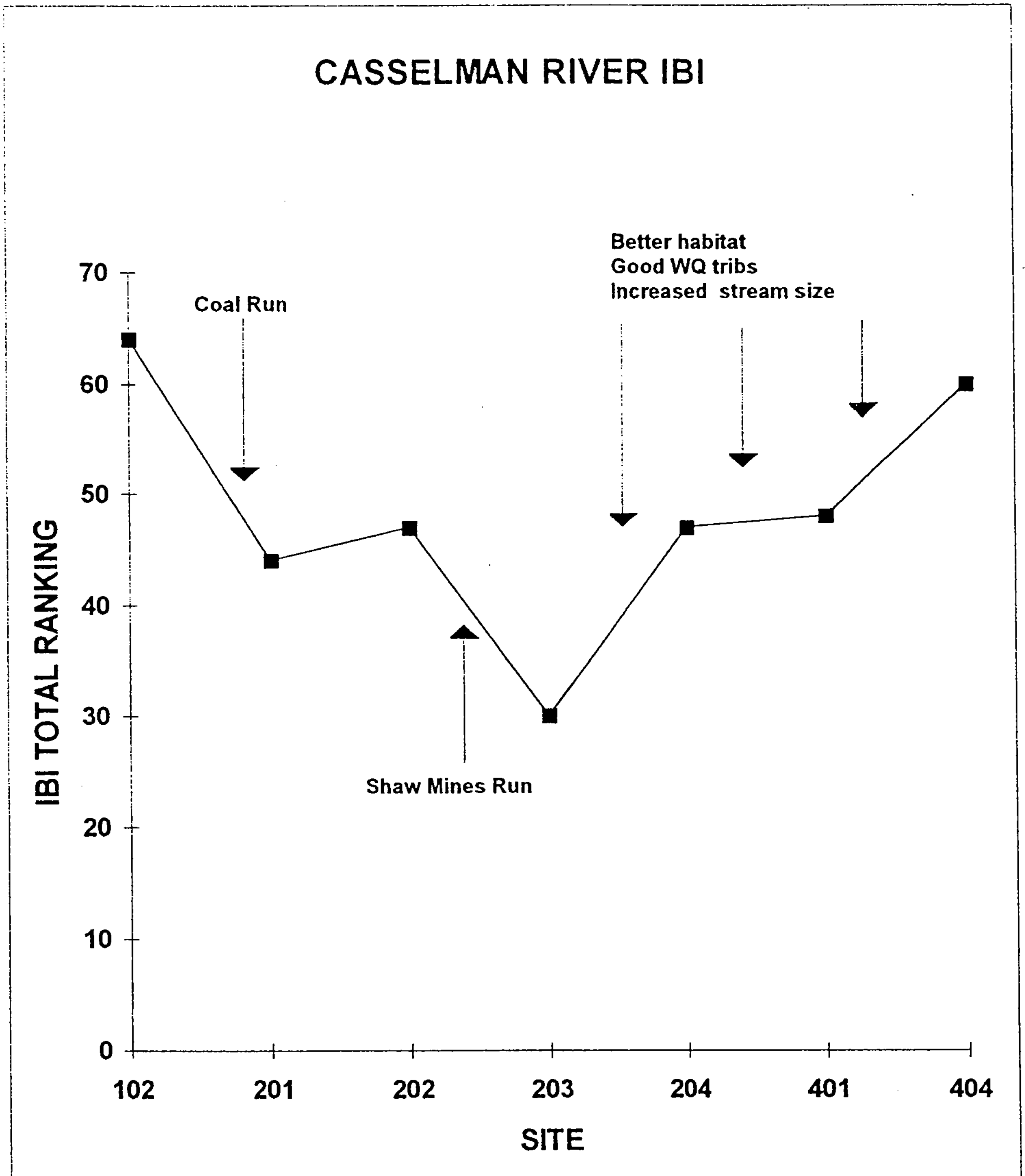

Figure 4. Index of Biotic Integrity (IBI) total rankings for seven sites in the Casselman River (819F), Somerset County; October 1998. Higher IBI total ranking indicates better stream health, which is the opposite of the ranking in the report.