

Hopewell Furnace National Historic Site

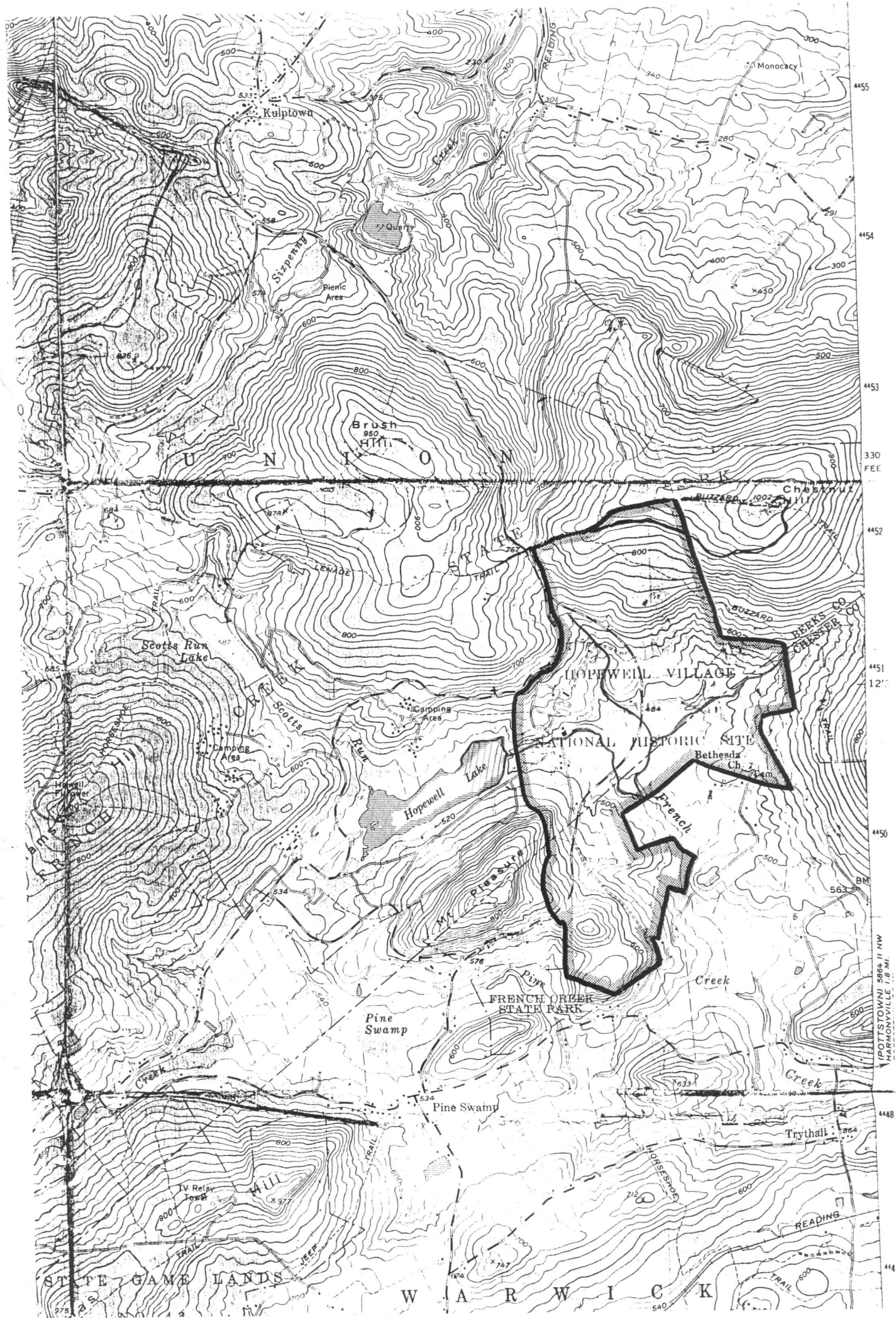
Water Resource Management Plan

Overview of Data - 3/16/92

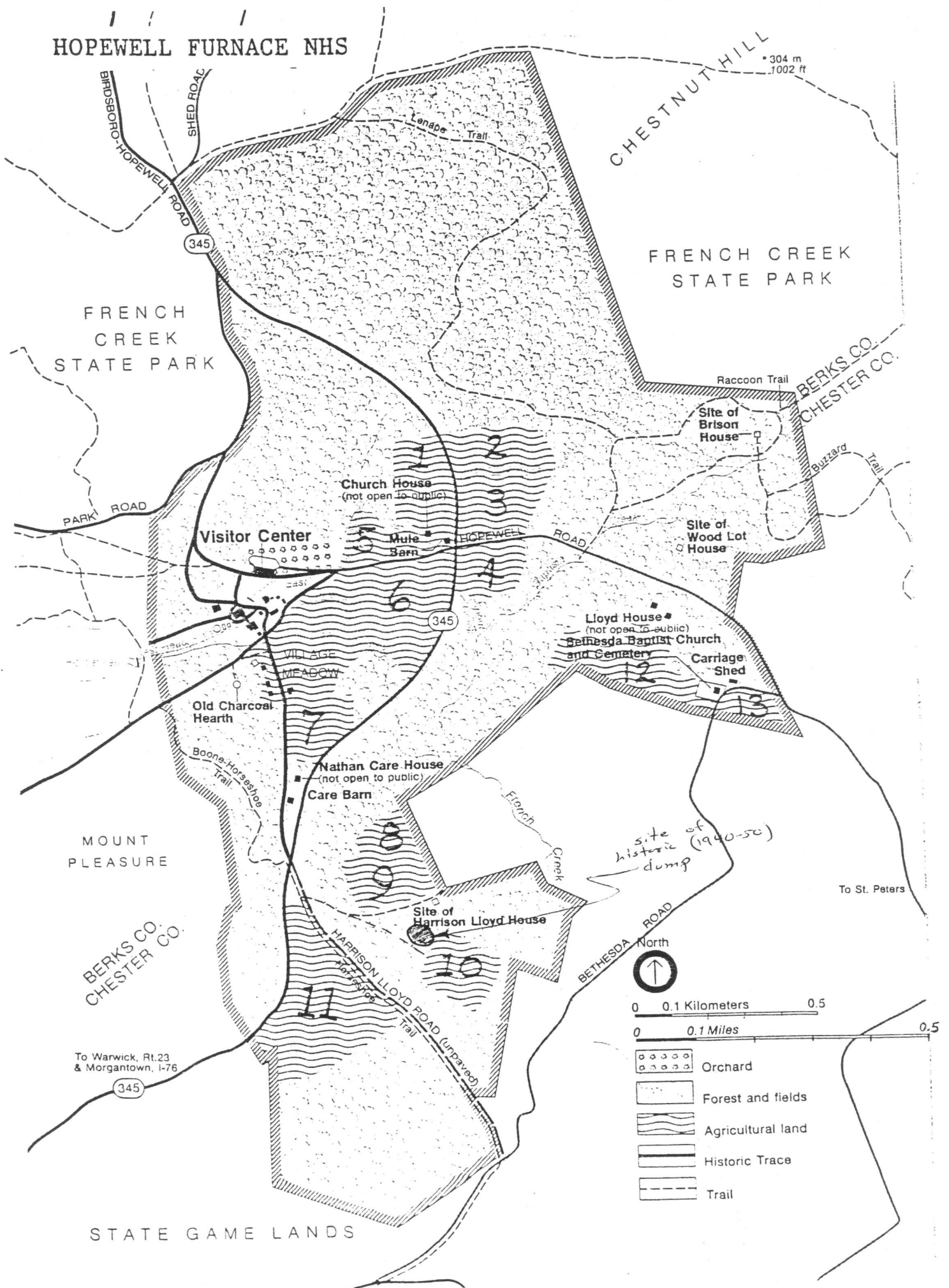
Principal Investigators

Dr. William E. Sharpe

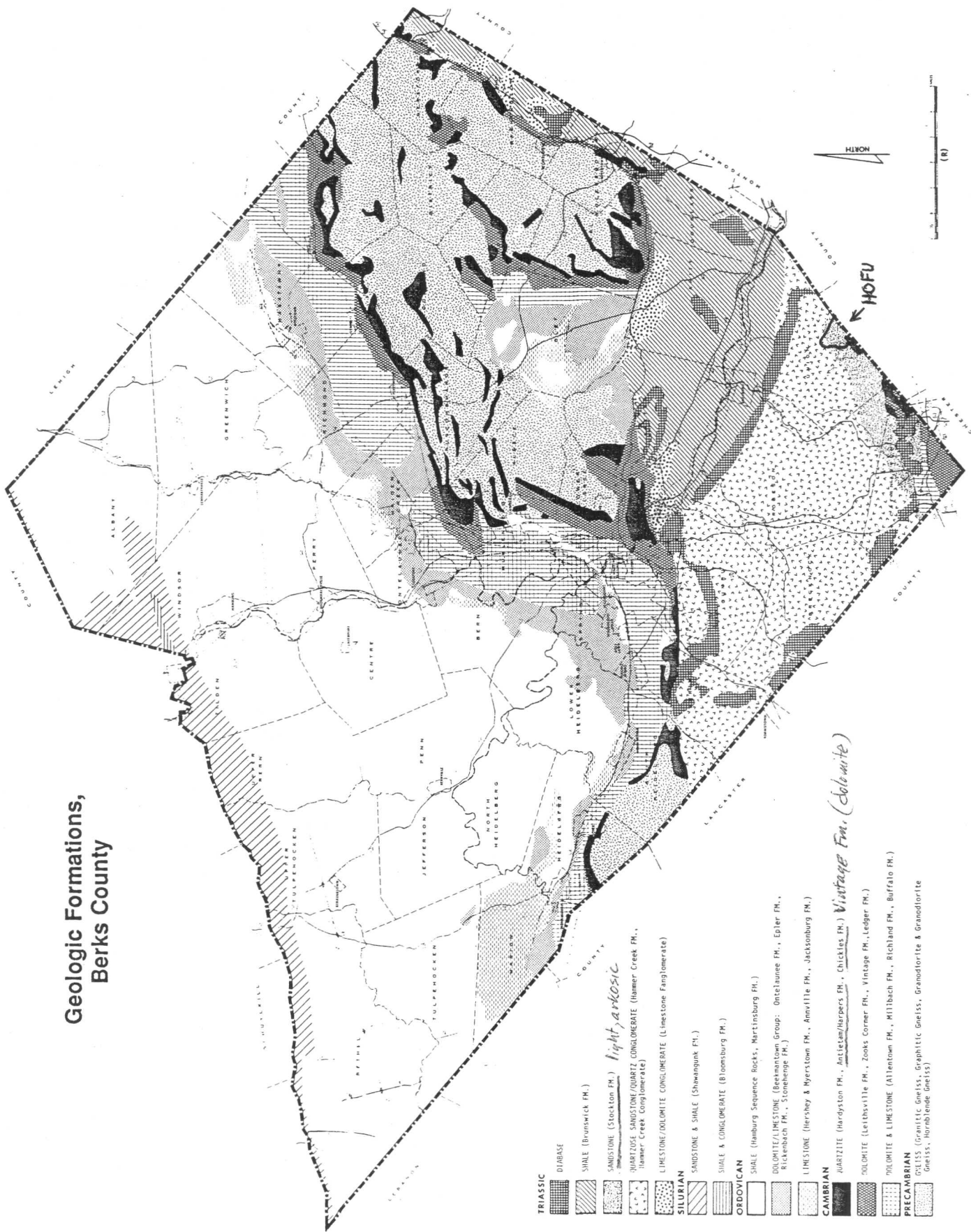
William H. Neff



HOPEWELL FURNACE NHS



Geologic Formations, Berks County



GROUNDWATER YIELD

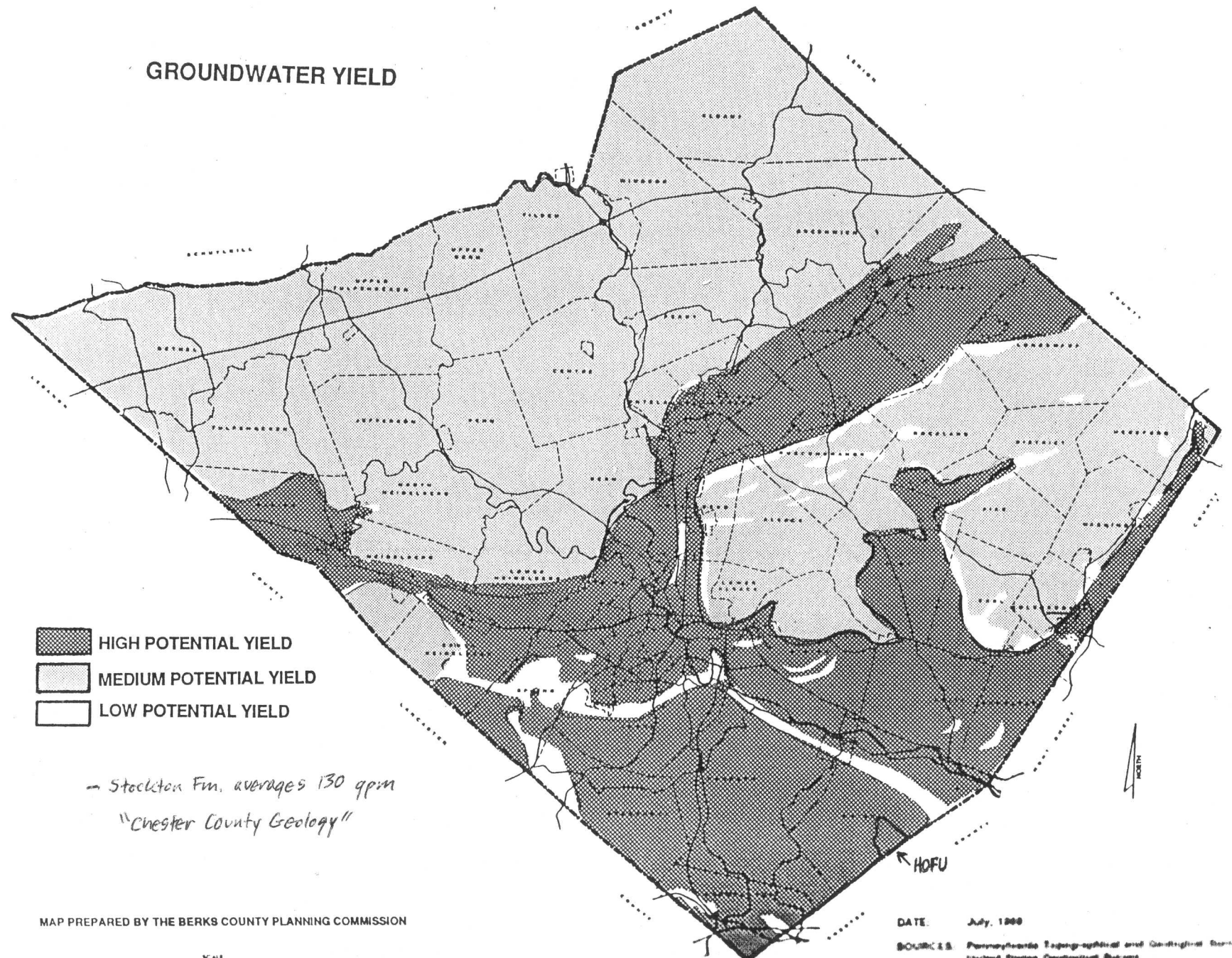


TABLE 2.—Summary of well data—Continued

Formation	Reported yield			Specific capacity			Well depth			Casing depth		
	Number of Wells	Range (gpm)	Median (gpm)	Number of Wells	Range (gpm per ft)	Median (gpm per ft)	Number of Wells	Range (feet)	Median (feet)	Number of Wells	Range (feet)	Median (feet)
Antietam Quartzite	0	.....	....	0	.....	..	0	.....	....	0	.....	..
Vintage Dolomite	2	3-665	334	0	.....	..	2	55-300	178	1	.....	208
Kinzers Formation	0	.....	....	0	.....	..	2	65-147	106	1	.....	4
Ledger Dolomite	5	7-150	25	0	.....	..	7	42-400	118	4	5-100	40
Elbrook Limestone	2	15-150	82	0	.....	..	2	85-200	142	2	50-100	75
Conestoga Limestone	9	7-175	20	2	.1- .4	.3	16	42-200	90	8	18-134	49
Gabbro	45	½-125	10	5	.2- 3.9	1.3	52	36-235	94	39	10-87	33
Serpentine	4	4-80	18	1	.....	.6	5	40-310	104	2	15-108	62
Pegmatite	0	.....	..	0	.....	..	1	.....	100	0	.....	..
Diabase	1	.....	½	0	.....	..	1	.....	255	1	.....	23

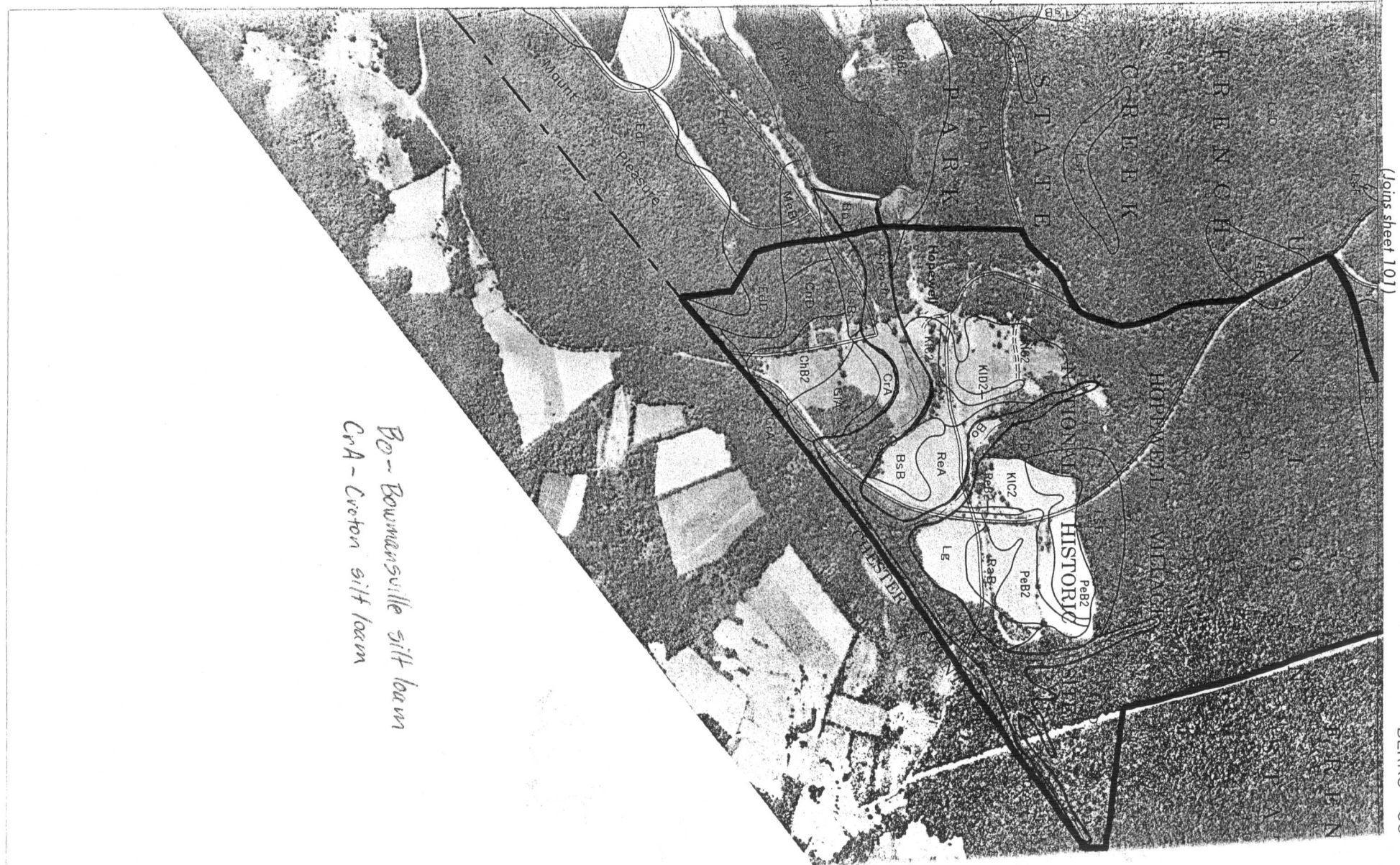
TABLE 3.—Summary of data on water-bearing zones

Formation	Table 3-A.—Ratio of number of water-bearing zones of specified depth range to number of wells penetrating this range								Table 3-B.—Percentage distribution of zones in wells.						
	Depth range, in feet								Zones per well						
	0-50	51-100	101-150	151-200	201-250	251-300	301-350	351-400	1	2	3	4	5	6	7
Baltimore Gneiss	38	35	4	5	0	0	2								
“Normal” phase	44	41	15	9	4	2	2		39	36	20	5			
Gabbro-intruded phase	27	33	2	1	0										
	33	32	13	5	1				43	27	27	3			
Graphitic phase	0	1	1												
	2	2	2						0	100					
Setters Formation	2	3	2												
	4	4	4						75	0	0	25			
Cockeysville Marble	0	0	1												
	1	1	1						100						
Wissahickon Formation															
Chlorite phase	12	13	8	1	0	0	0	0							
	20	20	16	7	3	3	2	2	55	25	15	5			
Muscovite phase	27	36	16	8	3	2	0	0							
	40	40	25	13	9	3	1	1	27.5	45	15	5	2.5	2.5	2.5

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the Pennsylvania State University, College of Agriculture and Agricultural Experiment Station, and the Pennsylvania Department of Agriculture, State Soil and Water Conservation Commission.

BERKS COUNTY, PENNSYLVANIA NO. 105

(Joins sheet 104)



(Joins sheet 107)

moist; medium acid (pH 6.0); clear, wavy boundary. 8 to 10 inches thick.

B1—9 to 17 inches, dark reddish-brown (2.5YR 3/4) silt loam; mottles of light red (2.5YR 6/6) and weak red (2.5YR 5/2); weak, fine, subangular blocky structure; friable when moist; medium acid (pH 5.8); clear, wavy boundary. 5 to 10 inches thick.

B2g—17 to 42 inches, gray (5YR 6/1) silt loam; many, fine to coarse, distinct, yellowish-red (5YR 5/6) mottles; moderate, medium to coarse, blocky structure; firm when moist, slightly sticky and slightly plastic when wet; very strongly acid (pH 4.6); clear, wavy boundary. 22 to 42 inches thick.

IIC1g—42 to 50 inches, gray (5YR 6/1) fine sandy loam; many, fine to coarse, distinct, yellowish-red (5YR 5/6) mottles; moderate, medium, prismatic structure; firm when moist, slightly sticky when wet; very strongly acid (pH 4.5); clear, wavy boundary. 6 to 8 inches thick.

IIC2—50 to 60 inches, coarse sand and sandstone pebbles.

Depth to mottling ranges from 0 to 10 inches; the depth is greatest where these soils grade to somewhat poorly drained soils. The color of the matrix in the IIC1g horizon ranges from weak red to gray, depending on the degree of saturation and on the color of the soils on the uplands of the watershed. In all areas the IIC1g horizon is intensively mottled. Below a depth of 30 inches, thin layers or lenses of both sandy clay and silt loam are common. Below a depth of 40 inches, many areas contain layers of sand and gravel, and in a few places they contain layers of silt clay loam or clay loam. Depth to bedrock ranges from 4 to 8 feet or more.

Bowmansville soils are the poorly drained members of the drainage sequence that includes the moderately well drained Rowland soils.

→ **Bowmansville silt loam (Bo).**—This is the only soil of the Bowmansville series mapped in Berks County. It has the profile described as typical for the series. Included in mapping were small areas of wet soils that have water ponded on the surface most of the time.

Surface runoff is slow or very slow on this nearly level Bowmansville soil. Erosion is not a hazard or is only a slight hazard.

Wetness and the frequency of flooding limit the use of this soil for farming, unless drainage is provided. Most of the acreage is in pasture, though a few areas are cultivated. Plants that tolerate wetness should be grown for pasture and for field crops. (Capability unit IIIw-2)

Brandywine Series

The Brandywine series consists of soils that are moderately deep, well drained, and gently sloping to hilly. These soils contain a large number of coarse fragments consisting of material that weathered from granitic gneiss. They are in the east-central and western parts of the county in the area known locally as the Reading Hills.

In a cultivated soil typical of the Brandywine series, the plow layer is very dark grayish-brown channery loam that is about 7 inches thick and is strongly acid in areas that have not received lime. The subsoil is yellowish-brown channery sandy loam about 11 inches thick. It is strongly acid and has subangular blocky structure. The substratum is at a depth of about 18 inches and consists of yellowish-brown, strongly acid very channery and very gravelly loam. Granitic gneiss is at a depth of 30 inches. A large number of coarse fragments are in the solum, and coarse fragments make up about 85 percent of the substratum.

The available moisture capacity is moderate to low.

Permeability is moderate. Root penetration is shallow to moderately deep.

Brandywine soils are generally suited to most of the farm crops commonly grown in the county. Nevertheless, most of the acreage is in trees. Small areas are in pasture or field crops.

Representative profile of Brandywine channery loam, 8 to 15 percent slopes, moderately eroded, in a field near Hill Church:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) channery loam; 30 percent of horizon is coarse fragments; weak, fine, granular structure; very friable when moist; strongly acid (pH 5.2); abrupt, wavy boundary. 5 to 8 inches thick.

B2—7 to 18 inches, yellowish-brown (10YR 5/4) channery sandy loam; 40 percent of horizon is coarse fragments; subangular blocky structure; very friable when moist; strongly acid (pH 5.2); gradual, wavy boundary. 8 to 12 inches thick.

C—18 to 30 inches, yellowish-brown (10YR 5/6) very channery very gravelly loam; 85 percent of horizon is coarse fragments; single grain; very friable when moist; very strongly acid (pH 5.0); clear, irregular boundary. 10 to 16 inches thick.

R—30 inches +, granitic gneiss.

Texture of the B2 horizon ranges from channery sandy loam to channery loam. The content of coarse fragments ranges from 35 to 90 percent in the B2 and C horizons, and it generally increases with depth. Depth to bedrock ranges from 20 to 40 inches.

Brandywine soils occur with the deep, well drained Chester, the moderately well drained Glenville, and the poorly drained Baile soils.

Brandywine channery loam, 3 to 8 percent slopes, moderately eroded (BrB2).—This soil generally has a thicker, somewhat finer textured profile than the one described as typical for the series. It is gently sloping.

Runoff is slow to medium, and the hazard of further erosion is slight. Permeability throughout the profile is moderate, and the available moisture capacity is moderate to low.

This soil is suitable for crops. The major limitations to farm use are the limited depth to bedrock, slopes, and low available moisture capacity. (Capability unit IIe-5)

Brandywine channery loam, 8 to 15 percent slopes, moderately eroded (BrC2).—This soil has the profile described as typical for the series. Included with it in mapping were small areas of severely eroded soils.

Surface runoff is medium to rapid, and the hazard of further erosion is moderate. Permeability throughout the profile is moderate, and the available moisture capacity is moderate to low.

This soil is fairly well suited to use for crops. The major limitations to use for crops are the limited depth to bedrock, the slopes, and the low available moisture capacity. (Capability unit IIIe-3)

Brandywine channery loam, 15 to 25 percent slopes, moderately eroded (BrD2).—In most places this soil has a slightly thinner profile than the one described as typical for the series, and it is also shallower over bedrock. Included in mapping were small areas of severely eroded soils.

Surface runoff is rapid or very rapid. The available moisture capacity is generally low.

The major limitations to use for farming are the moderately steep slopes, the low available moisture capacity, and bedrock near the surface. This soil is not well suited to cultivated crops. (Capability unit IVe-3)

In a cultivated soil typical of the Birdsboro series, the plow layer is dark yellowish-brown silt loam about 7 inches thick. The subsoil has blocky structure and is dark-brown to yellowish-red silt loam to a depth of 32 inches and is dark reddish brown below that depth. The substratum, between a depth of 46 and 90 inches, is dark-brown fine sandy loam underlain by dusky-red gravelly clay loam.

Surface runoff is slow or very slow, and the hazard of erosion is slight. Flooding seldom occurs. Water moves through the profile at a moderate rate, and the capacity for storing moisture for the use of plants is high.

Birdsboro soils are generally suited to the crops commonly grown in Berks County. Most of the acreage is farmed.

Representative profile of Birdsboro silt loam, 2 to 10 percent slopes, in a cultivated field southeast of Birdsboro:

- Ap—0 to 7 inches, dark yellowish-brown (10YR 4/4) silt loam; weak granular structure; very friable when moist; strongly acid (pH 5.5); abrupt, wavy boundary. 6 to 8 inches thick.
- B1—7 to 11 inches, dark-brown (10YR 3/3) silt loam; weak, fine, subangular blocky structure; friable when moist; strongly acid (pH 5.5); abrupt, wavy boundary. 2 to 4 inches thick.
- B21t—11 to 17 inches, yellowish-red (5YR 4/6) silt loam; weak, fine, blocky and subangular blocky structure; friable when moist, slightly sticky when wet; patches of clay films are on the peds and line the pores; medium acid (pH 6.0); clear, wavy boundary. 6 to 8 inches thick.
- B22t—17 to 27 inches, yellowish-red (5YR 4/6) light silty clay; weak, fine, blocky and subangular blocky structure; friable when moist, slightly sticky when wet; thick patches of clay films are on the peds and line the pores; slightly acid (pH 6.2); clear, wavy boundary. 8 to 12 inches thick.
- B23t—27 to 32 inches, yellowish-red (5YR 4/6) silt loam; weak, fine, blocky structure; friable when moist, slightly sticky and slightly plastic when wet; thick patches of clay films are on the peds and line the pores; slightly acid (pH 6.2); clear, wavy boundary. 4 to 7 inches thick.
- B3—32 to 46 inches, reddish-brown (5YR 4/4) silt loam; weak, fine, blocky structure; friable when moist; slightly acid (pH 6.2); gradual, wavy boundary. 12 to 16 inches thick.
- IIC1—46 to 54 inches, dark-brown (7.5YR 4/4) fine sandy loam; massive; friable when moist; medium acid (pH 5.8); abrupt, wavy boundary. 6 to 9 inches thick.
- IIIC2—54 to 90 inches, dusky-red (2.5YR 3/2) gravelly clay loam; massive; friable when moist; strongly acid (pH 5.4); upper part of layer contains lenses of gravel 3 inches thick.

The content of gravel and cobblestones varies considerably. Where red sediment from the Triassic uplands has been mixed with yellowish-brown or gray material from upstream, the color of the profile varies, to some extent, from that described as typical. The underlying material ranges from dark brown or dark reddish brown to dusky red in color and from silt loam to gravelly clay loam in texture. Reaction ranges from strongly acid to slightly acid in the upper part of the profile. Just below a depth of 32 inches, the soil material is typically slightly acid, but reaction in the lower part of the profile ranges from slightly acid to strongly acid to a depth of 90 inches.

Birdsboro soils are adjacent to deep, moderately well drained Raritan soils and to deep, poorly drained Lamington soils. Unlike the Raritan soils, which are mottled below a depth of 18 inches, and also unlike the Lamington soils, which are mottled within 18 inches of the surface, the Birdsboro soils are free of mottling.

Birdsboro silt loam, 2 to 10 percent slopes (B1B).—This soil has the profile described as typical for the series. It is on terraces along the Schuylkill River. The slopes are smooth and gentle.

Runoff is slow or very slow, and the hazard of further erosion is slight. This soil is suited to most of the crops commonly grown in the county. It has few limitations and is subject to few risks if used for purposes other than farming. (Capability unit IIE-1)

Birdsboro-Duffield silt loams, 3 to 10 percent slopes (BmB).—In the central part of the county along the Schuylkill River north of Reading, gently sloping Birdsboro and Duffield soils occur in such an intricate pattern, and require such similar management, that it was not practical to map the soils separately. In those places these soils have been mapped together as a complex. Both soils generally occur in each area shown on the map. The Birdsboro soils have a profile similar to the one described for the Birdsboro series, except that the profile normally has a more orange or more yellowish color and a finer texture. The Duffield soils have a profile similar to the one described for the Duffield series, except that the surface layer is more gravelly.

Runoff is slow to medium. In some places erosion is only slight, but most areas are moderately eroded. In fact, more than 9 inches of the original surface layer has been lost from the steepest areas of these soils near the river. The hazard of further erosion is slight to moderate. These soils have high available moisture capacity. They are generally well suited to the crops commonly grown in the county. (Capability unit IIE-1)

→Bowmansville Series

In the Bowmansville series are poorly drained soils that formed in alluvial sediment underlain by reddish conglomerate, sandstone, and shale. These soils are along Hay Creek and similar streams that drain the southern part of the county. They are in swales, low spots, or oxbows, where surface water and floodwaters remain for several days after heavy rains or floods. Flooding is most common in spring and fall. Each time it occurs, the water deposits fresh sediment. The profile of these soils is medium textured throughout, and the surface is free of stones.

In a cultivated soil typical of the Bowmansville series, the plow layer is reddish-brown silt loam about 9 inches thick. The upper part of the subsoil, between depths of 9 and 17 inches, is dark reddish-brown or reddish-brown, mottled silt loam that has weak subangular blocky structure. The lower part, extending to a depth of 42 inches, is gray, mottled silt loam that has angular blocky structure. The substratum, at a depth of about 42 inches, is gray, mottled fine sandy loam underlain by coarse sand and sandstone pebbles.

Most areas of Bowmansville soils are moderately fertile. These soils are so wet and so frequently flooded, however, that they are used mainly for pasture. Cultivated crops are grown, to some extent, where these soils have been drained.

Representative profile of Bowmansville silt loam in a pastured field 1 mile south of Geigertown:

- Ap—0 to 9 inches, reddish-brown (2.5YR 4/4) silt loam; weak, very fine, granular structure; very friable when

→ described as typical for the series. It receives a great deal of surface water or lies below seep lines. Included with this soil in mapping were some areas where little or no erosion has taken place, and other areas of soils that are steeper and that have a shallower profile than this soil.

Surface runoff is slow to medium, and the hazard of further erosion is slight. A high water table and the slowly permeable fragipan are the major limitations to farm use. This soil is not well suited to cultivated crops. (Capability unit IVw-1)

Dekalb Series

The Dekalb series consists of moderately deep, well-drained, loamy soils that have formed in material weathered from gray sandstone, quartzite, and conglomerate. These soils are gently sloping to steep. They are on the sides of Blue Mountain and on the higher ridges in the Reading Hills.

In a wooded soil typical of the Dekalb series, a mat of black organic matter about 1 inch thick covers the surface. The organic matter is underlain by a layer of dark-brown very stony sandy loam, also about 1 inch thick. Beneath this thin surface layer is a layer of yellowish-brown very stony sandy loam about 11 inches thick. The subsoil extends to a depth of about 30 inches and consists of yellowish-brown or light yellowish-brown channery sandy loam or very channery sandy loam that has subangular blocky structure. The substratum is pale-brown to light-gray very stony sandy loam. The solum contains many coarse fragments, and a large part of the substratum is fragments of sandstone and quartzite. Sandstone is at a depth of about 38 inches.

Dekalb soils have moderate to low available moisture capacity and low natural fertility. Most of the areas are stony.

Practically all of the acreage is in trees, and only small areas have been cleared and are farmed. In general, these soils are suitable mainly for trees or pasture. Pastures may be seeded in areas where the trees have been removed. In general, however, clearing the trees and removing the stones so that a new pasture can be established is not economically feasible.

Representative profile of Dekalb very stony sandy loam, 0 to 8 percent slopes, in a wooded area 2 miles north of Strausstown on Blue Mountain:

- O2—1 inch to 0, black (10YR 2/1) organic mat; strongly acid (pH 5.4); abrupt, wavy boundary. ¼ inch to 1 inch thick.
- A1—0 to 1 inch, dark-brown (10YR 3/3) very stony sandy loam; 30 percent of horizon is coarse fragments; weak, fine, granular structure; friable when moist; very strongly acid (pH 4.5); abrupt, smooth boundary. ½ inch to 2 inches thick.
- A2—1 to 12 inches, yellowish-brown (10YR 5/8) very stony sandy loam; 40 percent of horizon is coarse fragments; weak, fine, subangular blocky structure; friable when moist; very strongly acid (pH 4.5); clear, wavy boundary. 9 to 12 inches thick.
- B21—12 to 20 inches, yellowish-brown (10YR 5/6) and light yellowish-brown (10YR 6/4) channery sandy loam; 40 percent of horizon is sandstone fragments; weak, medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; very strongly acid (pH 4.7); clear, wavy boundary. 6 to 12 inches thick.

B22—20 to 30 inches, light yellowish-brown (10YR 6/4) very channery sandy loam; 70 percent of horizon is coarse fragments; weak, medium, subangular blocky structure; very friable when moist; very strongly acid (pH 4.7); some clay bridging; clear, wavy boundary. 6 to 11 inches thick.

C—30 to 38 inches, pale-brown (10YR 6/3) and light-gray (10YR 7/1) very stony sandy loam; massive; 90 percent of horizon is sandstone and quartzite fragments.

R—38 inches +, sandstone.

The texture of the B horizon ranges from channery sandy loam to loam. The thickness of the solum ranges from 20 to 35 inches. Reaction ranges from very strongly acid to extremely acid. The content of coarse fragments ranges from 30 percent, in the A1 horizon, to 90 percent, in the C horizon. Depth to bedrock ranges from 2 to 3½ feet.

Dekalb soils occur with deep, well drained Laidig; deep, moderately well drained Buchanan; and deep, poorly drained Andover soils. They also are near areas of Rubble land.

The Dekalb soils are not mapped separately in Berks County but are mapped in undifferentiated units with the Edgemont soils. They could have been mapped separately, for the Dekalb soils can be recognized within the mapped areas of the undifferentiated unit. The use and management of these very stony Dekalb and Edgemont soils were so similar, however, that it was not practical to separate the soils on the map.

Duffield Series

The Duffield series consists of deep, well-drained, nearly level to steep soils formed in material weathered from impure limestone. These soils are in the valley that extends from Womelsdorf, in the western part of the county, to Kutztown, in the eastern part. They are also in Oley Valley.

In a cultivated soil typical of the Duffield series, the plow layer is dark-brown silt loam about 8 inches thick. The upper part of the subsoil, extending to a depth of about 41 inches, is strong-brown silt loam to silty clay loam. The lower part is yellowish-brown silty clay loam to a depth of about 52 inches. Hard, gray limestone is generally at a depth of 52 inches.

Natural fertility and the available moisture capacity are high. Where little erosion has taken place, the surface layer is mellow and this soil is easily worked.

The main limitations of the Duffield soils are sinkholes and caverns. Where these occur, the areas around the sinkhole or cavern are subject to collapse or subsidence. In areas where the slopes are not too steep, and where erosion is only moderate or slight, these soils are well suited to crops. Most of the acreage has been cleared and is farmed intensively.

Representative profile of Duffield silt loam, 0 to 3 percent slopes, in a cultivated field one-half mile south of Tuckerton:

- Ap—0 to 8 inches, dark-brown (7.5YR 4/2) silt loam; weak, fine, granular structure; friable when moist; neutral (pH 7.0 where lime has been applied); abrupt, smooth boundary. 7 to 10 inches thick.
- B1—8 to 16 inches, strong-brown (7.5YR 5/6) silt loam; weak, fine, subangular blocky structure; friable when moist; neutral (pH 6.8); clear, wavy boundary. 6 to 8 inches thick.
- B21t—16 to 28 inches, strong-brown (7.5YR 5/6) silty clay loam; moderate, medium to fine, blocky structure; firm when moist, slightly sticky and slightly plastic when wet; thick, discontinuous clay films on ped surfaces; few fragments of weathered limestone; neutral (pH 6.8); gradual, wavy boundary.

of coarse fragments in the solum ranges from 10 to 40 percent and increases with depth. Depth to hard shale ranges from 3 to 8 feet.

Comly soils occur with the poorly drained Brinkerton; the deep, well-drained Bedington; the moderately deep, well-drained Berks; and the shallow, well-drained Weikert soils.

Comly silt loam, 0 to 3 percent slopes (CoA).—This soil is on broad flats and in small depressions. It has the profile described as typical for the series.

Surface runoff is slow or very slow, and there is little or no hazard of erosion. The slowly permeable fragipan and a seasonal high water table make this soil unsuitable for some plants, and they also limit the kinds of management practices that can be used. Drainage would make this soil easier to manage and more suitable for crops. (Capability unit IIw-1)

Comly silt loam, 3 to 8 percent slopes, moderately eroded (CoB2).—This soil is similar to the one for which a profile is described as typical for the series, except that it is gently sloping and has lost part of its original surface layer through erosion. Surface runoff is slow.

The slowly permeable fragipan and a seasonal high water table limit the kinds of plants that can be grown and also limit the kind of management practices that can be used. The hazard of further erosion is slight if this soil is properly managed. This soil is suited to general farming, but a system for disposing of excess water is needed. (Capability unit IIe-4)

Croton Series

The Croton series consists of soils that are deep and poorly drained. These soils have formed in material weathered from bedrock and in local colluvium derived from weathered red shale, sandstone, and conglomerate. They are in depressions, in nearly level areas, and in drainageways in the southern part of the county.

In a cultivated soil typical of the Croton series, the plow layer is dark reddish-brown silt loam about 8 inches thick. The upper part of the subsoil, extending to a depth of about 30 inches, is light brownish-gray, mottled, firm silt loam to silty clay loam. The lower part, between a depth of 30 and 40 inches, is a fragipan of weak-red, mottled, firm or very firm silt loam that has prismatic structure. At a depth of about 40 inches, the material in the subsoil grades to soft, red rock.

The well-developed fragipan in the subsoil of the Croton soils impedes the penetration of roots and slows the movement of water through the profile. The water table is high.

About half of the acreage of Croton soils is in trees. The rest generally is cultivated, though most of the steep areas are idle.

Representative profile of Croton silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1 mile west of Geigertown:

Ap—0 to 8 inches, dark reddish-brown (5YR 3/4) silt loam, moderate, medium, granular structure; friable when moist, slightly sticky when wet; neutral (pH 6.8 where lime has been applied); abrupt, wavy boundary. 6 to 8 inches thick.

B1g—8 to 15 inches, light brownish-gray (10YR 6/2) silt loam; common, fine, distinct, yellowish-red (5YR 5/6 and 4/6) mottles; weak, coarse, prismatic structure readily breaking to moderate, coarse, blocky struc-

ture; firm when moist, slightly sticky and plastic when wet; patches of clay films; neutral (pH 6.8); clear, wavy boundary. 5 to 9 inches thick.

B21tg—15 to 24 inches, light brownish-gray (10YR 6/2) silty clay loam; many, fine, distinct, yellowish-red (5YR 5/8 and 4/8) and grayish-brown (10YR 5/2) mottles; weak, coarse, prismatic structure breaking to moderate to strong, coarse, blocky structure; firm when moist, sticky and plastic when wet; silt flows and clay films on the larger surfaces; neutral (pH 6.6); gradual, wavy boundary. 7 to 12 inches thick.

B22tg—24 to 30 inches, light brownish-gray (10YR 6/2) silty clay loam; many, fine, prominent, strong-brown (7.5YR 5/8), red (2.5YR 4/8), and brown (7.5YR 5/2) mottles; moderate, coarse, prismatic structure breaking readily to moderate, coarse, blocky structure; firm when moist, sticky and plastic when wet; silt and clay films are thick on the larger surfaces; strongly acid (pH 5.4); clear, wavy boundary. 4 to 10 inches thick.

Bx1—30 to 34 inches, weak-red (2.5YR 4/2) silt loam; few, prominent, gray (10YR 5/1) and yellowish-red (5YR 5/8) mottles; moderate, very coarse, prismatic structure, but interiors of peds have moderate to strong, medium, platy structure; when moist, very firm in place but friable if displaced; when wet, slightly sticky and slightly plastic; silt and clay films on the larger surfaces; strongly acid (pH 5.2); clear, wavy boundary. 3 to 8 inches thick.

Bx2—34 to 40 inches +, weak-red (2.5YR 4/2) loam; few, fine, prominent, yellowish-red (5YR 5/8), strong-brown (7.5YR 5/6), light brownish-gray (10YR 6/2), and weak-red (10R 5/2) mottles; weak, very coarse, prismatic structure breaking to weak, coarse, blocky and weak, thick, platy structure; firm when moist, slightly sticky and nonplastic when wet; thick silt and clay films on the larger surfaces; strongly acid (pH 5.4).

Color of the Ap horizon ranges from dark grayish brown to dark reddish brown. Color of the B horizons ranges from light brownish gray or gray to weak red. The texture of the subsoil ranges from silty clay loam to gravelly loam. The structure of the subsoil ranges from weak, medium, subangular blocky to coarse blocky and coarse prismatic. Reaction of the surface layer ranges from strongly acid in areas that have not received lime, to neutral, in areas where a large amount of lime has been applied. The reaction of the subsoil ranges from neutral to very strongly acid. The content of coarse fragments ranges from only a few fragments to as much as 50 percent in the C horizon. Depth to bedrock ranges from 3 to 6 feet.

The Croton series is a member of the topographic sequence that includes the moderately well drained, deep, Readington; the well drained, moderately deep Penn; the well drained, shallow Klinesville; and the deep, well drained, sandy Lewisberry soils.

→ **Croton silt loam, 0 to 3 percent slopes (CrA).**—This soil is similar to the one for which a profile is described as typical for the series, except that it is nearly level and is not eroded or is only slightly eroded. Included with it in mapping were small areas that are ponded most of the time.

Surface runoff is slow or very slow, and erosion is not a hazard or is only a slight hazard. The well-developed, slowly permeable fragipan in the subsoil helps to maintain a seasonal high water table.

Wetness severely limits the kinds of crops that can be grown to those that can tolerate excess moisture. This soil is suited to crops of this type. Drainage is needed to remove the excess water on or in the soil and to make this soil easier to manage. (Capability unit IVw-1)

Croton silt loam, 3 to 8 percent slopes, moderately eroded (CrB2).—This gently sloping soil has the profile

400810 753038 0576

PENNSYLVANIA FISH COMMISSION

Stream Examination Report

Stream Name French Ck Sec. No. 05 Mgnt. Area 603D Cnty Ches

COMMENTS AND RECOMMENDATIONS (Punch written comments, end card with full word, within data group number cards sequentially right justified in col. 23-24.)

Card

Format: ☐ ☐ Dup. col. 3-18 ☐ ☐ Yr. ☐ ☐ ☐ ☐

Dup. col. 1-20 ☐ ☐ ☐ Stream inventory incomplete, only trout stocked area inventoried.
21

Dup. col. 1-20 ☐ ☐ ☐ Section Limits: from near the intersection of L.R. 15125 and L.R.
21 15071 upstream to 400 meters upstream of T-495 bridge at dam.

Dup. col. 1-20 ☐ ☐ ☐ Examiners: Marshall, Emery, Earle.
21

Dup. col. 1-20 ☐ ☐ ☐ Present Mgnt: along with Sec. 02, 03, 04, 06 and the lower 1.2 km
21 of the S. Br. stocked preseason with 11,000 BT-RT and 4 inseason

Dup. col. 1-20 ☐ ☐ ☐ stockings totaling 15,800 trout. Section 05 is currently under
21 fly-fishing-only regulations.

Dup. col. 1-20 ☐ ☐ ☐ Recommend: minimum of 50% of preseason stocking be brown trout and
21 minimum of 75% of inseason stocking be brown trout.

Dup. col. 1-20 ☐ ☐ ☐ Downstream Station Limits: at T-495 crossing.
21

Dup. col. 1-20 ☐ ☐ ☐ Habitat has been considerably enhanced by stream improvement program
21 conducted by the D^{am}e Juliana League.

Dup. col. 1-20 ☐ ☐ ☐ Excellent invertebrate diversity.
21

Dup. col. 1-20 ☐ ☐ ☐ Gear: Georator
21

Dup. col. 1-20 ☐ ☐ ☐ Many rainbow trout in poor condition, brown trout in better condition.
21

Dup. col. 1-20 ☐ ☐ ☐ Water temperature was 24°C in June indicating temperatures often exceed
21 levels favored by rainbow trout. Catch effort duty for non-trout species:

Dup. col. 1-20 ☐ ☐ ☐ for rockbass over 175mm - 8 per hr.
21

Dup. col. 1-20 ☐ ☐ ☐ for redbreast sunfish over 150mm - 8 per hr.
21

Dup. col. 1-20 ☐ ☐ ☐ for green sunfish over 150mm - 1 per hr.
21

Dup. col. 1-20 ☐ ☐ ☐ for smallmouth bass over 225mm - 4 per hr.
21

Dup. col. 1-20 ☐ ☐ ☐

Dup. col. 1-20 ☐ ☐ ☐

Dup. col. 1-20 ☐ ☐ ☐

COUNTY of BERKS
DISTRIBUTION REPORT FOR BAPTISM CREEK
TRIBUTARY TO FRENCH CREEK

DATE	SPECIES	HATCHERY	SIZE	NUMBER
1949 April 20	Fing. Brook	Huntsdale	3/4-1 1/4"	3000
1950 May 15	Fing. Brook	Pleasant Mt.	1 1/4-1-3/4"	1200
1951 May 4	Fing. Brook	Pl. Mt.	1 1/4 -1 3/4"	1200

Berks
~~CHESTER~~

SPOUT CREEK

Baptism
FRENCH CREEK

DATE	SPECIES	HATCHERY	SIZE	NUMBER
1950 May 15	Fing. Brook	Pl. Mount	1 1/4-1-3/4"	300
1951 May 4	Fing. Brook	Pl. Mount	1 1/4-1-3/4"	900

IV. Specific Issues of Concern

A. Historical Water Resource Issues

B. Present Issues

1. eutrophication within impoundments
2. contamination from domesticated animals
 - a. pathogenic organisms
 - b. excessive organics
 - c. turbidity
3. contamination from roads
 - a. chemicals
 - b. turbidity
4. land application of treated sewage
5. runoff from agricultural lands
6. best management practices
7. groundwater supply for drinking
8. other

C. Potential Issues

1. road expansion in HOFU area
2. developmental growth (Scott's Run)
3. spillway construction (PA-DER)
4. headrace construction
5. increased traffic in HOFU
6. other

Stream Name FRENCH CR Sec. No. 05 Mgt. Area 603 D County Ches

STATION LOCATION

Card
 Format: 04 Dup. col. 3-18 01 062476 400903 753742 08214 1
 Sta. No. Mo. Da. Yr. Latitude Longitude USGS Quad. C

DESCRIPTION (Do Not Punch)

T-495 crossing in Fly-fishing-only area

PHYSICAL DATA

Card
 Format: 05 Dup. col. 3-26 00403 00153 000617 0065 1510
 Length Width Area Grad. Geo.
 Flow Bnk. Frsn. Shade Bank Veg. Sub. Comp.
 High Norm Low Hvy Mod Lite None Dens Pntl Open Agri Gssd Shrb Tree Bdrk Bdr Rubl Grvl Sand Silt Clay C
 (Punch No. Circled) 103 1234 123 1234 1234567 1
 (59) (52) (53) (54) (55, 56) 79

CHEMICAL DATA

Card
 Format: 06 Dup. col. 3-26 1300 305 240 0140 073 029 028 50 2
 Time Air Temp. H.O. Temp. Spec. Cond. pH Tot. Alk. Tot. Hard. D.O. C
 27 31 34 37 41 44 47 50 79

* INVERTEBRATE DATA

Card
 Format: 07 Dup. col. 3-26 (Punch code number(s) checked, start with col. 27, end card with complete number, use same card format.) 1
 79

Ephemeroptera	Trichoptera	Diptera	030200 Hydracarina
☒ 010101 Ametropodidae	☐ 010401 Brachycentridae	☒ 010617 Simuliidae	Haploscierina
☒ 010102 Baetidae	☐ 010402 Calamoceratidae	☐ 010619 Syrphidae	☐ 110101 Spongillidae
☒ 010103 Baetiscidae	☒ 010403 Glossosomatidae	☐ 010620 Tabanidae	Hydroida
☒ 010105 Caenidae	☐ 010404 Goeridae	☒ 010623 Tipulidae	☐ 210101 Hydridae
☒ 010106 Ephemerellidae	☐ 010405 Helicopsychidae	Megaloptera	Tricladida
☒ 010107 Ephemeridae	☒ 010406 Hydropsychidae	☒ 010701 Corydalidae	☒ 310101 Planariidae
☒ 010108 Heptageniidae	☒ 010407 Hydroptilidae	☒ 010702 Sialidae	☐ 310102 Dendrocoelidae
☐ 010109 Leptophlebiidae	☐ 010408 Lepidostomatidae	Hemiptera	☐ 500000 PHYLUM NEMATODA
☐ 010110 Neophemeridae	☐ 010409 Leptoceridae	☐ 010802 Corixidae	☐ 810100 Plesiopora
☐ 010113 Potamanthidae	☐ 010410 Limnephilidae	☒ 010805 Gerridae	☒ 810200 Opisthopora
☒ 010114 Siphonuridae	☐ 010411 Molannidae	☐ 010811 Nepidae	☐ 820000 CLASS HIRUDINEA
☒ 010115 Tricorythidae	☒ 010412 Odontoceridae	☐ 010812 Notonectidae	☒ 910000 CLASS GASTROPODA
Plecoptera	☒ 010413 Philopotamidae	☒ 010816 Veliidae	☒ 920000 CLASS PELECYPODA
☐ 010201 Capniidae	☐ 010414 Phryganeidae	Neuroptera	☒ 010112 Polymictareidae
☐ 010202 Chloroperlidae	☒ 010415 Polycentropodidae	☐ 010901 Sisyridae	
☐ 010203 Leuctridae	☒ 010416 Psychomyiidae	Lepidoptera	
☐ 010204 Nemouridae	☒ 010417 Rhyacophilidae	☐ 011001 Noctuidae	
☐ 010205 Peltoperlidae	Odonata	☐ 011002 Pyralidae	
☐ 010206 Perlidae	☐ 010511 Aeshnidae	Decapoda	
☒ 010207 Perlodidae	☐ 010512 Cordulegastridae	☐ 020101 Astacidae	
☐ 010208 Pteronarcidae	☒ 010513 Gomphidae	☐ 020102 Cambaridae	
☐ 010209 Taeniopterygidae	☒ 010514 Libellulidae	Amphipoda	
Coleoptera	☒ 010515 Macromiidae	☐ 020201 Gammaridae	
☐ 010301 Amphizoidae	☐ 010521 Calopterygidae	☐ 020203 Talitridae	
☒ 010306 Dryopidae	☒ 010522 Coenagrionidae	Isopoda	
☐ 010307 Dytiscidae	☐ 010523 Lestidae	☐ 020301 Asellidae	
☒ 010308 Elmidae	Diptera		
☒ 010310 Gyrinidae	☒ 010602 Chironomidae		
☐ 010311 Haliplidae	☐ 010603 Culicidae		
☐ 010312 Helodidae	☐ 010605 Dixidae		
☐ 010316 Hydrophilidae	☐ 010607 Empididae		
☒ 010322 Psephenidae	☐ 010614 Rhagionidae		

TABLE II

Aquatic Macroinvertebrates of French Creek,
Department of Environmental Resources, July 20, 1983

TAXA		*ABUNDANCE
EPHEMEROPTERA (Mayflies)		
Baetidae	<u>Heterocloen</u>	A
Ephemerellidae	<u>Ephemerella</u>	R to C
Heptageniidae	<u>Epeorus</u>	C at the family level
	<u>Heptagenia</u>	
	<u>Stenonema</u>	
	<u>Tricorythodes</u>	
Tricorythidae		R
Siphonuridae	<u>Isonychia</u>	P
ODONATA (Dragonflies, Damselflies)		
Agridae	<u>Agrion</u>	R
PLECOPTERA (Stoneflies)		
Perlidae	<u>Acroneuria</u>	R to C at the family level
	<u>Altaneuria</u>	
	<u>Phasganophora</u>	
HEMIPTERA (True Bugs)		
Vellidae	<u>Rhagovelia</u>	P
TRICHOPTERA (Caddisflies)		
Glossosomatidae	<u>Glossossoma</u>	R
Hydropsychidae	<u>Cheumatopsyche</u>	A at the family level
	<u>Hydropsyche</u>	
	<u>Macronema</u>	
	<u>Leucotrichia</u>	
Hydroptilidae		R
Philopotamidae	<u>Chimarra</u>	R
COLEOPTERA (Beetles)		
Elmidae	<u>Stenelmis</u>	R
Psephenidae	<u>Psephenus</u>	R
DIPTERA (Flies, Midges)		
Chironomidae Tanypodinae		R
Simuliidae		A
AMPHIPODA (Scuds, Sideswimmers)		
Gammaridae		R
GASTROPODA (Snails, Limpets)		
Physidae	<u>Physa</u>	R to C

*Relative Abundances

A = Abundant

C = Common

P = Present

R = Rare

TABLE III

Fish Collections

Scientific Name	Common Name	*Occurrence
Salmonidae	Salmon and Trout	
<u>Salmo gairdneri</u>	Rainbow trout	PFC
<u>Salmo trutta</u>	Brown trout	PFC
Cyprinidae	Minnows	
<u>Cyprinus carpio</u>	Carp	PFC
<u>Carassius auratus</u>	Goldfish	PFC
<u>Exoglossum maxillingua</u>	Cutlips minnow	PFC, DER
<u>Pimephales notatus</u>	Bluntnose minnow	PFC
<u>Rhinichthys atratulus</u>	Blacknose dace	DER
<u>Semotilus atromaculatus</u>	Creek chub	DER
<u>Notemigonus crysoleucas</u>	Golden shiner	PFC
<u>Notropus hudsonius</u>	Spottail shiner	PFC, DER
Catostomidae	Suckers	
<u>Erimyzon sucetta</u>	Lake chub sucker	DER
<u>Catostomus commersoni</u>	White sucker	PFC
Ictaluridae	Catfish	
<u>Ictalurus punctatus</u>	Channel catfish	PFC
<u>Ictalurus catus</u>	White catfish	PFC
<u>Ictalurus natalus</u>	Yellow bullhead	PFC
<u>Ictalurus nebulosus</u>	Brown bullhead	PFC, DER
Anguillidae	Eels	
<u>Anguilla rostrata</u>	American eel	PFC, DER
Centrarchidae	Sunfish	
<u>Ambloplites rupestris</u>	Rock bass	PFC, DER
<u>Micropterus dolomieri</u>	Smallmouth bass	PFC, DER
<u>Micropterus salmoides</u>	Largemouth bass	PFC
<u>Lepomis gibbosus</u>	Pumkinseed	PFC, DER
<u>Lepomis auritus</u>	Redbreast sunfish	PFC, DER
<u>Lepomis cyanellus</u>	Green sunfish	PFC, DER
<u>Lepomis macrochirus</u>	Bluegill	PFC
Percidae	Perch	
<u>Etheostoma olmstedii</u>	Tessellated darter	PFC, DER

*PFC - Pennsylvania Fish Commission; July 18, 1983

DER - Department of Environmental Resources; July 20, 1983

PENNSYLVANIA FISH COMMISSION

Stream Examination Report

FISH DATA

Card

Format: 08 Dup. col. 3-26 (Punch cards numbers checked, start with col. 27, end card with complete number, 2 use same card format.) 79

- | | |
|--|--|
| ☒ 060301 <i>Salmo gairdneri</i> <i>Rainbow Trout</i> | ☐ 150101 <i>Fundulus diaphanus</i> |
| ☒ 060302 <i>Salmo trutta</i> <i>Brown Trout</i> | ☒ 230201 <i>Ambloplites rupestris</i> <i>Rock Bass</i> |
| ☐ 060401 <i>Salvelinus fontinalis</i> | ☒ 230401 <i>Lepomis auritus</i> <i>Redbreast Sunfish</i> |
| ☐ 100102 <i>Esox a. vermiculatus</i> | ☒ 230402 <i>Lepomis cyanellus</i> <i>Green Sunfish</i> |
| ☐ 100103 <i>Esox lucius</i> | ☐ 230403 <i>Lepomis gibbosus</i> |
| ☐ 100105 <i>Esox niger</i> | ☐ 230404 <i>Lepomis macrochirus</i> |
| ☐ 110101 <i>Campostoma anomalum</i> | ☐ 230405 <i>Lepomis megalotis</i> |
| ☐ 110201 <i>Carassius auratus</i> | ☒ 230501 <i>Micropterus dolomieu</i> <i>Smallmouth Bass</i> |
| ☐ 110501 <i>Cyprinus carpio</i> | ☐ 230502 <i>Micropterus salmoides</i> |
| ☐ 110601 <i>Ericymba buccata</i> | ☐ 230601 <i>Pomoxis annularis</i> |
| ☒ 110701 <i>Exoglossum maxillingua</i> <i>Cutlips Minnow</i> | ☐ 230602 <i>Pomoxis nigromaculatus</i> |
| ☐ 111101 <i>Notemigonus crysoleucas</i> | ☒ 240201 <i>Etheostoma olmsted</i> <i>Tessellated Darter</i> |
| ☐ 111202 <i>Notropis analostanus</i> | ☐ 240202 <i>Etheostoma blennioides</i> |
| ☐ 111204 <i>Notropis atherinoides</i> | ☐ 240203 <i>Etheostoma caeruleum</i> |
| ☐ 111207 <i>Notropis cornutus</i> | ☐ 240206 <i>Etheostoma flabellare</i> |
| ☒ 111211 <i>Notropis hudsonius</i> <i>Spottail Shiner</i> | ☐ 240209 <i>Etheostoma nigrum</i> |
| ☒ 111213 <i>Notropis proce</i> <i>Swallowtail Shiner</i> | ☐ 240211 <i>Etheostoma variatum</i> |
| ☐ 111214 <i>Notropis rubellus</i> | ☐ 240212 <i>Etheostoma zonale</i> |
| ☒ 111215 <i>Notropis spilopterus</i> <i>Spotfin Shiner</i> | ☐ 240301 <i>Perca flavescens</i> |
| ☐ 111218 <i>Notropis volucellus</i> | ☐ 240401 <i>Percina caprodes</i> |
| ☐ 111301 <i>Pimephales notatus</i> | ☐ 240405 <i>Percina maculata</i> |
| ☐ 111302 <i>Pimephales promelas</i> | ☐ 240406 <i>Percina peltata</i> |
| ☒ 111401 <i>Rhinichthyys atratulus</i> <i>Blacknose Dace</i> | ☐ 240502 <i>Stizostedion v. vitreum</i> |
| ☒ 111402 <i>Rhinichthyys cataractae</i> <i>Longnose Dace</i> | ☐ 260101 <i>Cottus bairdi</i> |
| ☐ 111501 <i>Semotilus atromaculatus</i> | ☐ 260102 <i>Cottus cognatus</i> |
| ☒ 111502 <i>Semotilus corporalis</i> <i>Fallfish</i> | |
| ☐ 111503 <i>Semotilus margarita</i> | |
| ☐ 111702 <i>Nocomis micropogon</i> | |
| ☒ 120201 <i>Catostomus commersoni</i> <i>White Sucker</i> | |
| ☐ 120301 <i>Erimyzon oblongus</i> | |
| ☐ 120401 <i>Hypentelium nigricans</i> | |
| ☐ 120603 <i>Moxostoma erythrum</i> | |
| ☐ 120604 <i>Moxostoma macrolepidotum</i> | |
| ☐ 130103 <i>Ictalurus natalis</i> | |
| ☐ 130104 <i>Ictalurus nebulosus</i> | |
| ☐ 130105 <i>Ictalurus punctatus</i> | |
| ☐ 130201 <i>Noturus flavus</i> | |
| ☐ 130203 <i>Noturus insignis</i> | |
| ☒ 140101 <i>Anguilla rostrata</i> <i>American Eel</i> | |

TABLE 2

Category	Where Considered
1.0 <i>Aquatic Life</i>	
● 1.1 Cold Water Fish	O
1.2 Warm Water Fish	X
1.3 Migratory Fish	O
1.4 Trout (Stocking Only)	O
2.0 <i>Water Supply</i>	
2.1 Domestic	X
2.2 Industrial	X
2.3 Livestock	X
2.4 Wildlife	X
2.5 Irrigation	X
3.0 <i>Recreation</i>	
3.1 Boating	O
3.2 Fishing	X
3.3 Water Contact Sports	X
3.4 Natural Area	X
3.5 Conservation Area	O
4.0 <i>Other</i>	
4.1 Power	X
4.2 Navigation	O
4.3 Treated Waste Assimilation	X

§93.4. General water quality criteria.

(a) Water shall not contain substances attributable to municipal, industrial or other waste discharges in concentration or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life.

(b) Specific substances to be controlled shall include, but shall not be limited to, floating debris, oil, scum and other floating materials, toxic substances and substances which produce color, tastes, odors or settle to form sludge deposits.

§93.5 Specific water quality criteria.

(a) Waters of this Commonwealth for which specific criteria have been established are listed in §93.6 of this Title (relating to designated water uses).

(b) References to specific criteria shall be keyed to the standard list of specific criteria set forth in subsection (c) of this section and to the groups of criteria set forth in subsection (d) of this section.

(c) The following Table 3 sets forth the standard list of specific water quality criteria:

TABLE 3		Criteria
Symbol	Item	
a	ph	
● a ₁		—Not less than 6.0 and not more than 8.5.
a ₂		—Not less than 6.5 and not more than 8.5.
a ₃		—Not less than 7.0 and not more than 9.0.
b	Dissolved Oxygen	
● b ₁		—Minimum daily average 6.0 mg/l; no value less than 5.0 mg/l.
b ₂		—Minimum daily average 5.0 mg/l; no value less than 4.0 mg/l.
b ₃		—Minimum daily average not less than 5.0 mg/l; during periods 4/1-6/15 and 9/16-12/31, not less than 6.5 mg/l as a seasonal average.
b ₄		—Minimum daily average not less than 3.5 mg/l; during periods 4/1-6/15 and 9/16-12/31, not less than 6.5 mg/l as a seasonal average.
b ₅		—For the period 2/15 to 7/31 of any year, no value less than 5.0 mg/l. For the remainder of the year, minimum daily average of 5.0 mg/l, no value less than 4.0 mg/l.
b ₆		—No value less than 7.0 mg/l.
b ₇		—For the epilimnion of lakes, ponds, and impoundments, minimum daily average of 5.0 mg/l, no value less than 4.0 mg/l.
● b ₈		—For lakes, ponds and impoundments only, no value less than 5.0 mg/l at any point.
b ₉		—Minimum daily average 7.0 mg/l, no value less than 6.0 mg/l.
c	Iron	
● c ₁		—Total iron not more than 1.5 mg/l.
c ₂		—Dissolved iron not more than 0.3 mg/l.

d Temperature

- d₁ —Not more than a 5° F rise above ambient* temperatures; not to be increased by heated waste discharges to temperatures in excess of 58° F; not to be changed by more than 2° F during any one hour period.
- d₂ —Not more than a 5° F rise above ambient temperature or a maximum of 87° F, whichever is less; not to be changed by more than 2° F during any one-hour period.
- d₃ —Not to exceed the following temperatures in the month indicated:

Month	Temperature, ° F
January	50
February	50
March	60
April	70
May	80
June	90
July	90
August	90
September	90
October	78
November	70
December	57
- d₆ —For the period 2/15 to 7/31 not more than 5° F rise above ambient temperature or a maximum of 74° F, whichever is less, not to be changed by more than 2° F during any one hour period; for the remainder of the year nor more than a 5° F rise above ambient temperature or a maximum of 87° F, whichever is less, not to be changed by more than 2° F during any one-hour period.
- d₇ —Not more than 5° F above the average daily temperature during the 1961-66 period which is shown below or a maximum of 86° F, whichever is less.

Average Daily Temperature
1961-1966

(Temperatures may be interpolated)

Date	Zones 01.040 and 01.050, Delaware Estuary, Head of tide to River Mile 108.4 (about 1 mile below Pennypack Creek)	Zone 01.030, Delaware Estuary, River Mile 108.4 (about 1 mile below Pennypack Creek) to Big Timber Creek	Zones 01.010 and 01.020, Delaware Estuary, From Big Timber Creek To Pennsylvania- Delaware State Line
	° F	° F	° F
January 1	37	41	42
February 1	35	35	36
March 1	38	38	40
April 1	46	46	47
May 1	58	58	58
June 1	71	71	72
July 1	79	79	80
August 1	81	81	81
September 1	78	79	78
September 15	76	77	76
October 1	70	70	70
November 1	59	61	60
December 1	46	50	50
December 15	40	45	45

- d₈ —Not more than 5° F rise above the ambient temperatures until stream temperatures reach 50° F, nor more than 2° F when temperatures are between 50° F and 58° F, nor shall such temperatures exceed 58° F, whichever is less, except in designated heat dissipation areas.
- d₉ —As a guideline the maximum length of heat dissipation areas shall not be longer than 3500 feet measured from the point where the waste discharge enters the stream. The width of heat dissipation areas shall not exceed two-thirds the surface width measured from shore to shore at any stage of tide or the width encompassing one-fourth the cross-sectional area of the stream, whichever is less. Within any one heat dissipation area only one shore shall be used in determining the limits of the area. Where waste discharges are close to each other, additional limitations may be prescribed to protect stream uses. Controlling temperatures shall be measured outside the heat dissipation area. The rate of temperature change in the heat dissipation area shall not cause mortality of the fish.
- d₁₀ —As a guideline the maximum length of heat dissipation areas shall not be longer than 3500 feet or twenty times the average stream width, whichever is less, measured from the point where the waste discharge enters the stream. Heat dissipation areas shall not exceed one-half the surface stream width or the width encompassing one-half of the entire cross sectional area of the stream, whichever is less. Within any one heat dissipation area, only one shore shall be used in determining the limits of the area. Where waste discharges are close to each other additional limitations may be prescribed to protect water uses. Controlling temperatures shall be measured outside the heat dissipation zone. The rate of temperature change in designated heat dissipation areas shall not cause mortality of the fish.
- d₁₁ —As a guideline the maximum length of heat dissipation areas shall not be longer than 1000 feet or twenty times the average width of the stream, whichever is less, measured from the points where the waste discharge enters the stream. Heat dissipation

*ambient temperature—The temperature of the water body upstream of a heated waste discharge or waste discharge complex. The ambient temperature sampling point should be unaffected by any sources of waste heat.

		areas shall not exceed one-half the surface stream width or the width encompassing one-half of the entire cross-sectional area of the stream, whichever is less. Within any one heat dissipation area, only one shore shall be used in determining the limits of the area. Where waste discharges are close to each other, additional limitations may be prescribed to protect water uses. Controlling temperatures shall be measured outside the heat dissipation zone. The rate of temperature change in designated heat dissipation areas shall not cause mortality of the fish.		
e	Dissolved Solids		g ₁	—Maximum monthly mean of 30 units, maximum of 150 units, unless exceeded by natural conditions.
	● e ₁	—Not more than 500 mg/l as a monthly average value; not more than 750 mg/l at any time.	h	Threshold Odor Number Not more than 24 at 60° C.
	e ₂	—Not more than 1,500 mg/l at any time.	i	Alkalinity —Not less than 20 mg/l. —Between 20 and 120 mg/l. —Between 20 and 100 mg/l.
	e ₃	—Not to exceed 133 percent of background or 500 mg/l, whichever is less.	j	MBAS (Methylene Blue Active Substance) j ₁ —Not more than 0.5 mg/l. j ₂ —Not more than 1.0 mg/l.
	e ₄	—Not to exceed 133 percent of background.	k	Total Manganese Not more than 1.0 mg/l.
f	Bacteria		l	Flouride Not more than 1.0 mg/l.
	● f ₁	—The fecal coliform density in five consecutive samples shall not exceed a geometric mean of 200 per 100 ml.	m	Cyanide Not more than .025 mg/l.
	f ₂	—(Coliforms/100 ml)—Not more than 5,000/100 ml as a monthly average value nor more than this number in more than 20% of the samples collected during any month, nor more than 20,000/100 ml in more than 5% of the sample.	n	Sulfate Not more than 250 mg/l or natural levels, whichever is greater.
	f ₃	—(Coliforms/100 ml)—Not more than 5,000/100 ml as a monthly geometric mean.	o	Chlorides o ₁ —Not more than 150 mg/l. o ₂ —Not more than 250 mg/l. o ₃ —Not more than 200 mg/l. o ₄ —Maximum 15-day mean 50 mg/l.
	f ₄	—(Fecal coliforms/100 ml)—Maximum geometric mean of 770/100 ml; samples shall be taken at a frequency and location to permit valid interpretation.	p	Phosphate (total soluble as PO ₄) p ₁ —Not more than 0.10 mg/l or natural levels, whichever is greater. p ₂ —Not more than 0.30 mg/l or natural levels, whichever is greater. p ₃ —Not more than 0.40 mg/l or natural levels, whichever is greater. p ₄ —Not more than 0.03 mg/l or natural levels, whichever is greater.
g	Turbidity		q	Phenol q ₁ Not more than 0.005 mg/l. q ₂ —Maximum 0.02 mg/l.
	g ₁	—Not more than 30 units during the period 5/30 to 9/15, nor more than a monthly mean of 40 units or a maximum of 150 units during the remainder of the year.	r	Color Not more than 50 units.
	g ₂	—Maximum monthly mean 40 units, maximum value not more than 150 units.	s	Copper s ₁ —Not more than 0.02 mg/l. ● s ₂ —Not more than 0.10 mg/l.
	g ₃	—Not more than 100 units.	t	Zinc Not more than 0.05 mg/l.
	g ₄	—For the period 5/15 to 9/15 of any year, not more than 40 units for the period 9/16 to 5/14 of any year, not more than 100 units.	v	Ammonia Nitrogen v ₁ —Not more than 0.5 mg/l. v ₂ —Not more than 1.5 mg/l.
	g ₅	—Maximum monthly mean of 10 units, maximum 150 units unless exceeded by natural conditions.	w	Radioactivity w ₁ —Alpha emitters, maximum 3 pc/l; beta emitters, maximum 1000 pc/l.
	g ₆	—Maximum monthly mean of 20 units, maximum of 150 units, unless exceeded by natural conditions.		

x	Hardness	
x ₁	—Maximum monthly mean	150 mg/l.
x ₂	—Maximum monthly mean	95 mg/l.

(d) The following Table 4 shall display groups of criteria.

TABLE 4

Criteria	Group A	Group B	Group C
pH	a ₁	a ₁	a ₁
Dissolved Oxygen	b ₁ , b ₈	b ₂ , b ₇	b ₅
Iron	c ₁	c ₁	c ₁
Temperature	d ₁	d ₂	d ₆
Dissolved Solids	e ₁	e ₁	e ₁
Bacteria	f ₁	f ₁	f ₁

§ 93.6. Designated water uses and water quality criteria.

(a) The following symbols shall apply to water uses in the tables displaying designated water uses in subsection (b)(1) of this section:

(1)(a) — Maintenance only.

(2)(b) — Passage only.

(3)(c) — Passage and propagation only.

(b) The following tables shall display designated water uses and water quality criteria:

(1) Delaware River Basin (Delaware estuary):

TABLE 5
Description of Waters

Zone Number	Name	Limits of Zone	Water Uses	Specific Criteria
01.010	Delaware Estuary	Philadelphia-Delaware Co. line to Pennsylvania Delaware State line	1.2 ^(a) , 1.3 ^(b) , 2.2, 2.4, 3.1, 3.2, 4.1, 4.2, 4.3	a ₂ , b ₁ , d ₇ , d ₉ , e ₁ , f ₁ , g ₂ , i ₂ , j ₂ , q ₂ , w ₁ , h
01.020	Delaware Estuary	Big Timber Creek to Philadelphia Delaware Co. line	1.2 ^(a) , 1.3 ^(b) , 2.2, 2.4, 3.1, 3.2, 4.1, 4.2, 4.3	a ₂ , b ₁ , c ₁ , d ₇ , d ₉ , e ₁ , f ₁ , g ₂ , h, i ₂ , j ₂ , o ₂ at R.M. 92.47, q ₂ , w ₁
01.030	Delaware Estuary	River Mile 108.4 (about 1 mile below Pennypack Creek) to Big Timber Creek	1.2 ^(a) , 1.3 ^(b) , 2.1, 2.2, 2.4, 3.1, 3.2, 4.1, 4.2, 4.3	a ₂ , b ₁ , c ₁ , d ₇ , d ₉ , e ₁ , f ₁ , g ₂ , h, i ₂ , j ₂ , o ₂ , q, w ₁ , x ₁
01.040	Delaware Estuary	Burlington-Bristol Bridge to River Mile 108.4 (about 1 mile below Pennypack Creek)	1.2, 1.3 ^(c) , 2.1, 2.2, 2.4, 3.1, 3.2, 4.1, 4.2, 4.3	a ₂ , b ₁ , c ₁ , d ₇ , d ₉ , e ₁ , f ₁ , g ₂ , h, i ₁ , j ₁ , o ₁ , q, w ₁ , x ₂
01.050	Delaware Estuary	Head of tide to Burlington-Bristol Bridge	1.2, 1.3 ^(c) , 2.1, 2.2, 2.4, 3.1, 3.2, 3.3, 3.4, 4.1, 4.2, 4.3	a ₂ , b ₁ , c ₁ , d ₇ , d ₉ , e ₁ , f ₁ , g ₁ , h, i ₁ , j ₁ , o ₁ , q, w ₁ , x ₂

(2) Delaware River Basin except the Delaware estuary:

TABLE 6
Description of Waters

Zone Number	Name	Limits of Zone	Water Uses	Specific Criteria
01.060	Delaware River	Lehigh River to head of tide	Add 1.3 and 3.1	Group B; delete e ₁ , Add d ₁₀ , e ₃ , g ₇ , h, i, j ₁ , q, w ₁
01.070	Delaware River	Tocks Island to Lehigh River	Add 1.3 and 3.1	Group B; delete e ₁ , Add d ₁₀ , h, e ₁ , g ₇ , j ₁ , q, w ₁
✓ 01.080	Delaware River	Route 652 Bridge (Narrowsburg, N.Y.) to Tocks Island	Add 1.3 and 3.1	Group B; delete e ₁ , Add d ₁₁ , h, e ₃ , g ₈ to R.M. 254.75 at Port Jervis and g ₃ upstream of R.M. 254.75, j ₁ , q, w ₁
01.090	Delaware River	Confluence of East and West Branches to Route 652 Bridge (Narrowsburg, N.Y.)	Add 1.1, 1.3 and 3.1	Group A; delete d ₁ , e ₁ ; Add d ₄ , d ₁₁ , e ₃ , g ₃ , h, j ₁ , q, w ₁
.				

Temperature - Not more than 5°F rise above ambient temperatures; not to be increased by heated waste discharges to temperatures in excess of 55°F; not to be changed by more than 2°F during any one-hour period.

Dissolved Solids - Not more than 500 mg/1 as a monthly average value; not more than 250 mg/1 at any time.

Bacteria - The fecal coliform density in five consecutive samples shall not exceed a geometric mean of 200 per 100 ml.

Copper - Not more than 0.10 mg/1.

- B. From just above South Branch with main stem to a point where the boundaries of West Vincent, East Vincent and East Pikeland meet.

Protected Uses - Cold water fishes. Maintenance and propagation of the family **Salmonidae** and fish food organisms.

- Conservation area.

Specific Criteria

pH - Not less than 6.0 and not more than 8.5.

Dissolved Oxygen - Minimum daily average 6.0 mg/1; no value less than 5.0 mg/1.

Iron - Total iron not more than 1.5 mg/1.

Temperature - For the period 2/15 to 7/31 not more than 5°F rise above ambient temperature or a maximum of 74°F, whichever is less, not to be changed by more than 2°F during any one-hour period; for the remainder of the year not more than a 5°F rise above ambient temperature or a maximum of 67°F, whichever is less, not to be changed by more than 2°F during any one-hour period.

Dissolved Solids - Not more than 500 mg/1 as a monthly average value; not more than 250 mg/1 at any time.

Bacteria - The fecal coliform density in five consecutive samples shall not exceed a geometric mean of 200 per 100 ml.

Copper - Not more than 0.10 mg/1.

Ammonia

Nitrogen - Not more than 0.5 mg/1.

- C. From the source to, but not including, the South Branch of French Creek and all tributaries named and unnamed.

Protected Uses - Cold water fishes. Maintenance and propagation of the family **Salmonidae** and fish food organisms.

- Conservation area.

Specific Criteria

pH - Not less than 6.0 and not more than 8.5.

Dissolved Oxygen - No value less than 7.0 mg/1.

Iron - Total iron not more than 1.5 mg/1.

Temperature - For the period 1/15 to 7/31 not more than 5°F rise above ambient temperature or a maximum of 74°F, whichever is less, not to be changed by more than 2°F during any one-hour period; for the remainder of the year not more than a 5°F rise above ambient temperature or a maximum of 87°F, whichever is less, not to be changed by more than 2°F during any one-hour period.

Dissolved Solids - Not more than 500 mg/1 as a monthly average value; not more than 250 mg/1 at any time.

Bacteria - The fecal coliform density in five consecutive samples shall not exceed a geometric mean of 200 per 100 ml.

Copper - Not more than 0.10 mg/1.

Ammonia

Nitrogen - Not more than 0.5 mg/1.

- D. South Branch

Protected Uses - Warm water fishes and Trout stocking.

Specific Criteria

pH - Not less than 6.0 and not more than 8.5.

Dissolved Oxygen - For the period 7/15 to 7/31 of any year minimum daily average of 6.0 mg/1, no value less than 5.0 mg/1. For the remainder of the year minimum daily average of 5.0 mg/1 no value less than 4.0 mg/1.

- For the epilimnion of lakes, ponds and impoundments, minimum daily average of 5.0 mg/1, no value less than 4.0 mg/1.

Iron - Total iron not more than 1.5 mg/1.

Temperature - Not more than a 5°F rise above ambient temperature or a maximum of 87°F whichever is less; not to be changed by more than 2°F during any one-hour period.

Dissolved Solids

- Not more than 500 mg/1 as a monthly average value; not more than 250 mg/1 at any time.

Bacteria - The fecal coliform density in five consecutive samples shall not exceed a geometric mean of 200 per 100 ml.

Copper - Not more than 0.10 mg/1.

Source: Title 25 Rules and Regulations, Department of Environmental Resources Sub-part C-Protection of Natural Resources; Article II-Water Resources; Chapter 93-Water Quality Criteria, September 25, 1976 revision.

Note: On March 4, 1978 Department of Environmental Resources formally proposed recommended revisions to Water Quality Criteria (Chapter 93), Wastewater Treatment Requirements Chapter 95, and Industrial Wastes (Chapter 97). The proposed revisions reflect PL 92-500 requirements, and attempt to eliminate deficiencies and inequities across the Com-

TABLE I
Water Chemistry of French Creek
(Lower Reach)

*LAB ANALYSES																	
	NH ₃ -N	NO ₂ -N	NO ₃ -N	SO ₄	As	Cr	Cr ⁶⁺	Cu	Fe	Pb	Mn	Ni ¹	Zn	Al	Fecal Coliform	² Total Alkalinity	² Tot Hardn
A	01 mg/l	01 mg/l	1.39 mg/l	15.0 mg/l	<5.0	20.0	0.0	10.0	160.0	<5.0	10.0	80.0	10.0	100.0	400/100 ml	44 mg/l	155.0
B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	42 mg/l	64.0

FIELD ANALYSES						
	Time	Air Temp	Water Temp	pH	DO	Spetific Conductance
A.	0915	30°C	19°C	8.6	9.9 mg/l	165 µmhos/cm
B	1000	28.5°C	25°C	7.6	8.5 mg/l	160 µmhos/cm

* Values in micrograms/liter, and reported as total values, unless otherwise noted

1 Ni resampled on August 12, 1987 = <50.0 micrograms/l

2 As CaCO₃

A. Department of Environmental Resources; July 20, 1983

B. Pennsylvania Fish Commission; July 18, 1983

(From PA Fish Commission)

TERRESTRIAL FLORA AND FAUNA

The majority of the "basin" is privately owned and, where urban development is absent, agricultural uses predominate. Only a small percentage (~10%) of the "basin" is forested and the majority of the forested areas lie adjacent to French Creek in the Scenic River Corridor. The Bureau of Forestry identified a wide variety of trees in a cursory survey of the French Creek basin in East and West Vincent Townships. Species observed are listed below.

Scientific Name	Common Name	Scientific Name	Common Name
<u>Fraxinus americana</u>	White Ash	<u>Carva glabra</u>	Pignut Hickory
<u>Tilia americana</u>	Basswood	<u>Carva ovata</u>	Shagbark Hickory
<u>Juglans cinerea</u>	Butternut	<u>Carpinus caroliniana</u>	Ironwood
<u>Betula lenta</u>	Sweet Birch	<u>Robinia pseudo-acacia</u>	Black Locust
<u>Betula lutea</u>	Yellow Birch	<u>Acer rubrum</u>	Red Maple
<u>Juniperus virginiana</u>	Red Cedar	<u>Acer saccharum</u>	Sugar Maple
<u>Prunus serotina</u>	Black Cherry	<u>Quercus velutina</u>	Black Oak
<u>Prunus avium</u>	Sweet Cherry	<u>Quercus prinus</u>	Chestnut Oak
<u>Cornus florida</u>	Flowering Dogwood	<u>Quercus rubra</u>	Red Oak
<u>Ulmus americana</u>	American Elm	<u>Quercus coccinea</u>	Scarlet Oak
<u>Nyssa sylvatica</u>	Black Gum	<u>Quercus alba</u>	White Oak

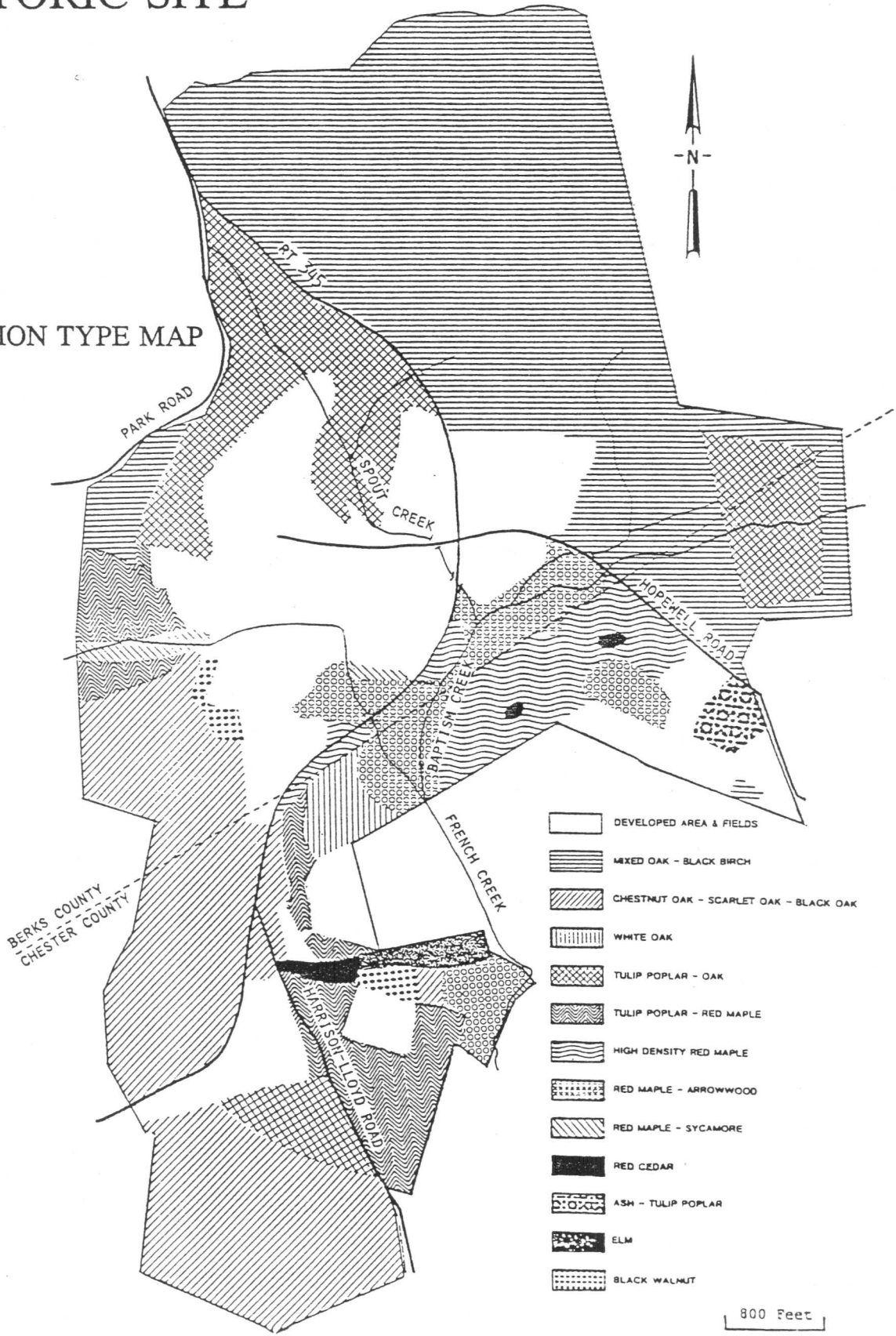
No state forest or game lands are available for recreational use in the study area but sixty acres of land near the upstream limit of the study area have been purchased by East Pikeland Township for public recreation. Other areas in the basin available for public recreation are small and generally limited to the Scenic River Corridor.

According to the local game protector, most lowland small game that is typical of southeastern Pennsylvania is found in the area, along with an abundance of white-tailed deer. Some hunting takes place annually and trapping is active for muskrat, raccoon, fox and mink. A check with the Pennsylvania Natural Diversity Inventory revealed that biota of special concern do not occur within the drainage basin.

In summation, the basin is largely developed. No state forest or game lands are located in the basin and public outdoor recreational areas are limited, although some hunting and trapping does occur. Privately owned forest land occurs along the stream in the scenic corridor, creating an aesthetically pleasing setting for aquatic based recreation. No endangered plant or animal species or species of special concern are known to inhabit the basin.

HOPEWELL FURNACE NATIONAL HISTORIC SITE

VEGETATION TYPE MAP



You will measure stream width on Spart Creek Creek
tributary to Trench creek, Chester County.
From (A) source to (B) mouth
a distance of approximately $\frac{3}{4}$ miles.

Measure to be taken at one-half mile intervals. List measure-
ments in space provided below.

- | | | | | |
|-----|-------------------|------|---------------|--------|
| 1. | <u>(A) source</u> | feet | <u>2 feet</u> | inches |
| 2. | <u>(B)</u> | feet | <u>2 feet</u> | inches |
| 3. | <u>(C)</u> | feet | <u>4 feet</u> | inches |
| 4. | | feet | | inches |
| 5. | | feet | | inches |
| 6. | | feet | | inches |
| 7. | | feet | | inches |
| 8. | | feet | | inches |
| 9. | | feet | | inches |
| 10. | | feet | | inches |
| 11. | | feet | | inches |
| 12. | | feet | | inches |

You will measure stream width on Baptism Creek
 tributary to French creek, Berks County.
 From Headwaters to Chester Co. Line
 a distance of approximately 2 $\frac{1}{4}$ miles,
 Measure to be taken at one-half mile intervals. List measure-
 ments in space provided below.

1.	<u>3</u>	feet	<u>1</u>	inches
2.	<u>6</u>	feet		inches
3.	<u>9</u>	feet	<u>4</u>	inches
4.		feet		inches
5.		feet		inches
6.		feet		inches
7.		feet		inches
8.		feet		inches
9.		feet		inches
10.		feet		inches
11.		feet		inches
12.		feet		inches

Description of Waters

Zone Number	Name	Limits of Zone	Exceptions to Standard Water Use List	Specific Criteria
→ 01.110.29.01	French Creek Basin	From its source to, but not including the South Branch of French Creek and all tributaries, named and unnamed	Add 1.1	Group A; Add s ₂
01.110.29.02	French Creek Basin	None except zone 01.110.29.01	Add 1.4	Group B; Delete b ₂ ; Add b ₅ and s ₂
01.110.34	Manatawny Creek Basin	None	Add 1.1	Group A; Add p ₂ and s ₂
01.110.38	Hay Creek Basin	None	Add 1.1	Group A; Add s ₂
01.110.40	Antietam Creek Basin	None	Add 1.1	Group A; Add s ₂
01.110.43	Angelica Creek Basin	None	Add 1.4	Group B; Delete b ₂ ; Add b ₅ and s ₂
01.110.46.01	Blue Marsh Reservoir	None	None	Group B; Delete b ₂ ; Add b ₁ and p ₁ and s ₂
01.110.46.02	Tulpehocken Creek Basin	From source to Blue Marsh Dam and all tributaries, named and unnamed, except zone 01.110.46.01	Add 1.1	Group A; Add p ₁ and s ₂
01.110.49.01	Maiden Creek Basin	From source to and including Pine Creek and all tributaries, named and unnamed	Add 1.1	Group A; Add s ₂
01.110.49.02	Maiden Creek Basin	From Pine Creek to, but not including Moselem Creek and all tributaries, named and unnamed	Add 1.4	Group A; Delete b ₂ ; Add b ₅ and s ₂
01.110.49.03	Moselem Creek Basin	None	Add 1.1	Group A; Add s ₂
01.110.49.04	Peters Creek Basin	None	Add 1.1	Group A; Add s ₂