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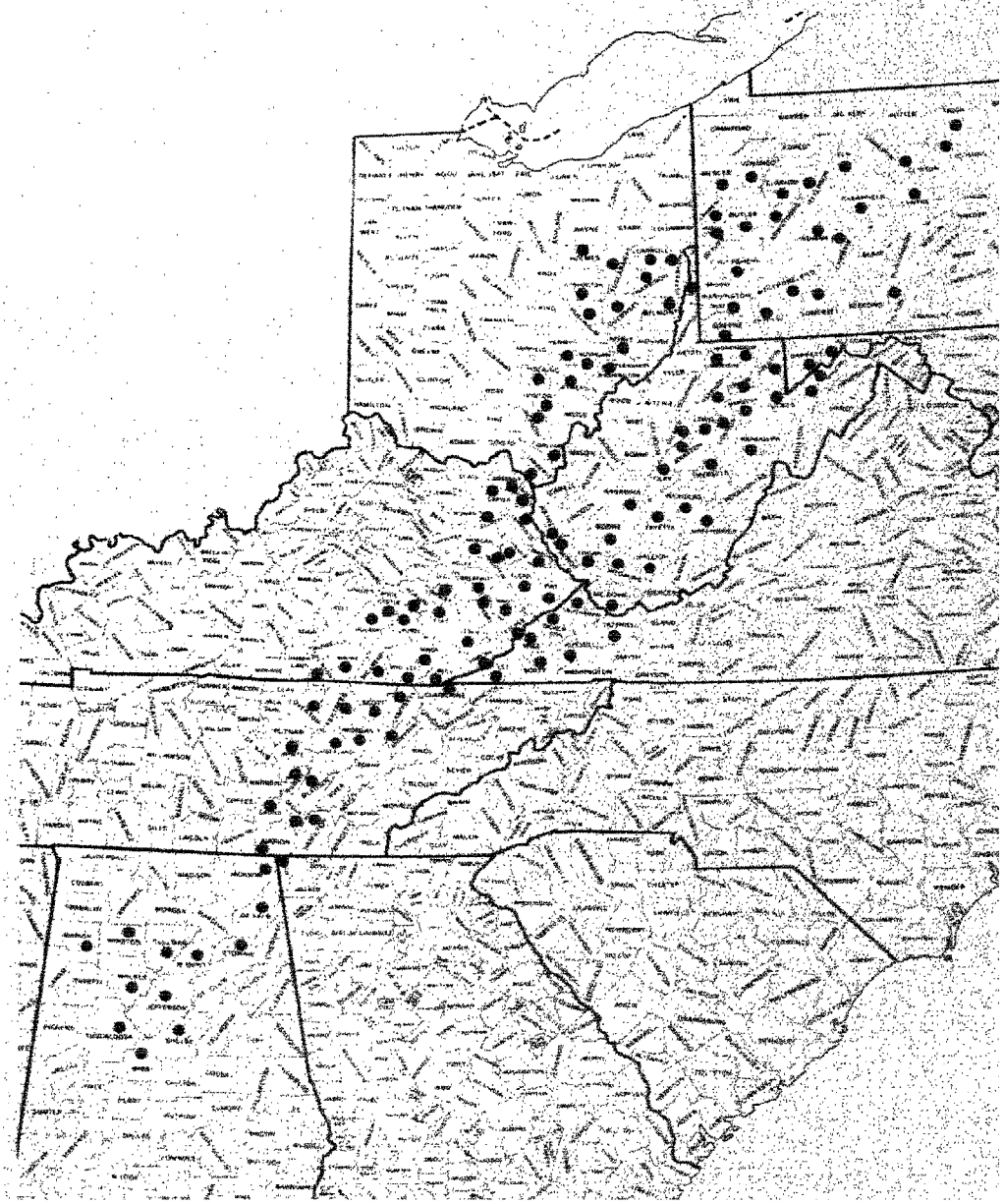
Stream Water Quality in the Coal Region of Virginia

Kenneth L. Dyer

in cooperation with Industrial Environmental Research Laboratory, Office of Research and Development, United States Environmental Protection Agency



STREAM WATER QUALITY IN THE COAL REGION OF VIRGINIA

by

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This study was conducted
in cooperation with
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ABSTRACT

This report is a compilation of water quality data for 31 small streams sampled in seven counties of western Virginia where coal is surface-mined. Twelve of these streams drain unmined watersheds; 19 drain areas where coal has been surface-mined. Most of these streams were sampled at approximate monthly intervals. The water quality data from these streams are presented in this report and should help fill the need for data from small watersheds in western Virginia. Data reported include the common ions, alkalinity, acidity, pH, 16 trace elements, 5 nitrogen and phosphorus species, specific conductance, suspended solids, turbidity, settleable matter, water temperature, and estimated discharge.

Data contained in this report should not only be useful in assessing the impacts on stream water quality of old and recent surface mining for coal, it should also provide a data base of small reference watersheds which can serve as a basis for future studies. The report covers the period June 9, 1977 to July 29, 1979.

THE AUTHOR

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FOREWORD

When energy and material resources are extracted, processed, converted, and used, these operations usually pollute our environment. The resultant air, land, solid waste, and other pollution may adversely affect our aesthetic and physical well-being. Protection of our environment requires that we recognize and understand the complex environmental impacts of these operations and apply corrective measures.

This study was undertaken with the primary objective of establishing a water quality data base for small first-order unmined and surface-mined watersheds throughout Appalachia. There is a need for data that explicitly show changes in water quality attributable to past and recent surface mining. Most previous water quality data in the study area came from watersheds so large that it was impossible to isolate the effects of surface mining from the confounding effects of other human activities.

This report includes a compilation of water quality data for 31 small watersheds in Virginia. Most streams were sampled at approximate monthly intervals from June 1977 through July 1979, as part of a study of the effects of surface mining on water quality in Appalachia. Twelve of these sampled watersheds were unmined; 19 contained areas that had been surface-mined for coal. These data are being released ahead of the interpretative report because of the immediate needs of many potential users.

Regulatory agencies, environmentalists, and writers of environmental impact statements will be particularly interested in these data. The water quality data base provided in this report for small reference watersheds should provide a basis for future studies and should be especially helpful in determining the probable hydrologic consequences of future mining operations.

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LIST OF ABBREVIATIONS AND SYMBOLS

AL = Aluminum
B = Boron
BA = Barium
BE = Beryllium
C = Celsius
CA = Calcium
CFS = Cubic feet per second
CL = Chloride
CO = Cobalt
CO3 = Carbonate
CU = Copper
DA = Day
DEG C = Degrees Celsius
DIS SOLID = Calculated total dissolved solids
EST DISCH = Estimated Discharge
F = Filtered water sample (see Table 2)
FA = Filtered water sample preserved with nitric acid (see Table 2)
FE = Iron
FN = Filtered water sample preserved with sulfuric acid (see Table 2)
FP = Filtered water sample preserved with mercuric chloride (see Table 2)
HCO3 = Bicarbonate
JTU = Jackson turbidity units (assumed to be equivalent to both nephelometric and formazin turbidity units)
K = Potassium
KJ = Unfiltered sample preserved with sulfuric acid (see Table 2)
L (or l) = Liter
LI = Lithium
MG = Magnesium
MG/L (or mg/l) = Milligrams per liter. Essentially the same value as parts per million for concentrations given in this report.
ML/L (or ml/l) = Milliliters per liter
MO = Molybdenum (when found under the date heading MO = Month)
MN = Manganese
N = Nitrogen
NA = Sodium
NEUT RATIO = Neutralization ratio
NH3 = Ammonia
NI = Nickel
NO3 = Nitrate plus nitrite as N, determined on an unpreserved sample (sample F)
*NO3 = Nitrate plus nitrite as N, determined on a sample preserved with H_2SO_4 (sample FN)
ORTHO PO4 = Orthophosphate
P = Phosphorus
PB = Lead

PH = pH
SA = Unfiltered water sample preserved with nitric acid (see Table 2)
SETT MATTER = Settleable matter
SI - Silicon
SO4 - Sulfate
SPEC COND = Specific conductance at 25° Celsius
SR = Strontium
SUSP SOL = Suspended solids
SV = Unfiltered, untreated water sample for settleable matter analyses (see Table 2)
TEMP = Temperature
TI = Titanium
TKN = Total Kjeldahl nitrogen
TOT = Total
TURB = Turbidity
U = Unfiltered, untreated water sample (see Table 2)
UM/CM = Micromhos/centimeter
YR = Year
ZN = Zinc

ACKNOWLEDGMENTS

The cooperation of the Virginia Department of Conservation and Economic Development, Division of Mined Land Reclamation, is gratefully acknowledged. Personnel from this agency designated those areas in which sites suitable for this study might be found. Numerous individuals, including landowners and mining company representatives, cooperated in this study by helping select watersheds which met the criteria for this study, or by allowing access onto or over their land so that the samples might be taken, or both.

SECTION 1

INTRODUCTION

Surface mining throughout Appalachia is known to cause changes in the quality of water downstream from the mined areas (U.S. Army Corps of Engineers and others 1969). Numerous water quality sampling sites have been established on Appalachian streams since 1950, but most of these are on streams that drain large watersheds with multiple land uses so that it is not possible to correlate surface mining with downstream water quality.

A network of sampling sites on small first-order surface-mined and unmined watersheds throughout Appalachia was needed so that water quality data could be correlated with the type and date of surface mining, the type and date of reclamation, and the type of coal mined. These small reference watersheds should provide a good data base for future studies to aid in determining differences in stream water quality from mined and unmined watersheds, differences in the effects of various mining and reclamation techniques on water quality, and water quality recovery rates in streams that have been affected by mining.

Such a network of sampling sites was established in 1977 in the 135 Appalachian counties in nine states where coal was surface mined. The three sites initially selected in each county were to represent three watershed conditions: (1) unmined, (2) surface mined before January 1972, and (3) surface mined after January 1972. The 135 Appalachian counties which comprise the study area are mapped in Figure 1.

Starting in June 1977, 31 water sampling sites were established in the seven counties of Virginia in which surface mining for coal was practiced. Most of these were sampled at approximately monthly intervals until July 1979.

Time was not available for a detailed examination of each watershed, so some may not now be correctly classified by mining status, dates of mining, or hydrologic boundaries. The user of this report should not make crucial decisions based on these data unless the classification of the site can be verified. Verification of mining activity is of special concern as there may be old, unreported underground mine discharge in some watersheds.

Ultimately the data from throughout Appalachia should help determine which methods of surface mining are most effective in reducing the quantity of pollution reaching streams. An interpretive report covering the entire Appalachian study area is to be published later.

SECTION 2

STUDY METHODS

SITE SELECTION

A critical element in collecting valid water-quality data is site selection. Procedures and criteria used for site selection follow:

General Criteria for all Watersheds

1. A first order stream was to be selected if at all practical. A first-order stream is defined as a stream with perennial flow but without perennial tributaries. Information provided by local residents was often used to identify perennial streams. When possible, sampling sites were selected at points where flow was over bedrock to lessen the chance of contamination of samples with streambed materials, to increase likelihood of perennial flow, and to improve the discharge estimates.

2. Springs flowing from hillsides were not to be sampled.

3. When possible watersheds from 50 to 250 acres were selected.

Criteria for Unmined Watersheds

1. These watersheds were to be strictly unmined.

2. These watersheds were to have no roads or cuts which exposed bare ground. Old revegetated logging roads and skid trails were allowed.

3. These watersheds were not to be farmed, disturbed, or developed in any way.

4. Watersheds that were completely forested were to be selected if at all possible; when no completely forested watersheds were available, one that was part forest and part grassland or pasture was substituted.

5. Unmined watersheds were to be as close as possible to the mined watersheds, and as similar in aspect as possible.

6. There were to be no plans to mine or develop the watershed within the 2-year study period.

Criteria for Newly Mined Watersheds

1. No mining should have occurred before January 1972.

2. From 10 to 100 percent of the watershed should have been disturbed by surface mining after January 1972. Active surface mines were permitted on watersheds in this category. Old mines that were worked before January 1972, were permitted provided that all surfaces exposed to the atmosphere before then were completely reworked after January 1972.

3. When possible, watersheds were to be selected where only one seam of coal had been or was being mined. This was to make it possible to better evaluate the effects of mining each coal seam on water quality. Watersheds with two or more seams of coal mined were selected when these were the best available.

Criteria for Old Mined Watersheds

1. No mining or reclamation should have occurred since January 1972.

2. From 10 to 100 percent of the watershed should have been disturbed by surface mining before January 1972.

3. When possible, watersheds were to be selected where only one seam of coal had been mined. Watersheds with two or more seams of coal mined were selected when these were the best available.

4. There should be no plans for further mining or development in the watershed within the 2-year study period.

Problems in Site Selection

Site selection was carried out under severe time restraints; therefore, few of the watersheds selected met the specified criteria fully. Many of the watersheds initially classified as either old mined or newly mined have been found to be a mixture of the two. These have been arbitrarily given site classification numbers indicative of newly mined watersheds--even though in some cases the old mining may have had a greater impact on water quality.

Underground mines were prevalent over much of western Virginia, making it difficult to find watersheds suitable for study there. Time was not available for close examination of the watersheds, thus some may not be what they appeared to be from the limited information then available on mining status, dates of mining, or hydrologic boundaries.

SITE NOMENCLATURE

Site Numbers

Four-digit site numbers were assigned thus:

First digit designates state:

1. Alabama	4. Maryland	7. Tennessee
2. Georgia	5. Ohio	8. Virginia
3. Kentucky	6. Pennsylvania	9. West Virginia

Second and third digits designate county:

(See Table 1 for county designations)

Fourth digit:

0 used as needed for any watershed condition

1, 4, or 7 indicates an unmined watershed

2, 5, or 8 indicates a watershed that has been surface mined since January 1972 (surface mining may still be in progress on some of these)

3, 6, or 9 indicates a watershed that was surface mined before January 1972

Example: In site number 8012 the 8 indicates Virginia, the 01 indicates Buchanan County, and the 2 designates this as a watershed on which surface mining for coal has occurred after January 1972.

Site Names

Names are taken from U.S. Geological Survey topographic maps of the 7-1/2 minute series (scale 1:24,000). The site is designated as being at a community when it is within a mile of the center of the community or within the urbanized area of the community. The site is designated as being near a community when it is more than a mile from the center of the community and outside an urbanized area.

STREAM SAMPLING PROCEDURES

Samples collected as part of this study are listed in Table 2 with treatment, time interval over which collected, and approximate volume of sample.

In addition to the samples described in Table 2 two samples of bottom material (generally rocks, sand, gravel, and/or mud) were collected from the bottoms of most streams sampled, one early in 1978 and one early in 1979. These samples were analyzed by X-ray diffraction for mineralogy and by X-ray fluorescence for major and minor elements including aluminum, calcium, iron, manganese, magnesium, potassium, silicon, and titanium. Data from the analyses of these samples are not given in this report but will be released later.

All samples were collected in plastic bottles, rinsed twice with at least 25 ml of the water being collected. Attempts were made to collect representative stream samples free of bottom material, floating debris, or material put in suspension through disturbance of the stream bottom. Unfiltered samples (KJ, SA, SV, and U) were generally dipped from flowing water or pools, but in extremely shallow streams these samples were collected with a 50-ml prerinsed syringe. When necessary, a clean thin rock was placed on the stream bottom at the collection site to avoid inadvertent collection of bottom material with the syringe.

All filtered samples were collected in a 50 ml plastic syringe and forced through a 0.45-micron type HAWG millipore filter 47 millimeters in diameter. The syringe was prerinsed with two 50 ml slugs of sample water and each filter was prerinsed with 50 ml of sample water. Filters for samples FN and FP (see Table 2 for description) were prerinsed with 200 ml of distilled water or sample water. Collection of samples F and FA generally sufficed for the prerinsing of the filters for samples FN and FP. A few samples were so muddy they could not be filtered at the site; so, liter samples of these were collected, allowed to settle a few hours, and then filtered.

Samples were refrigerated from the time they were received in Berea until they could be analyzed. As much as 2 weeks could pass between collection and refrigeration. Samples were usually stored in the refrigerator a month or two before they were analyzed in the lab. Samples were protected from freezing during the winter.

FIELD MEASUREMENTS

Field measurements were performed concurrently with stream sampling. The reported stream discharges are all listed as estimates, though in a very few cases the discharge was computed when the entire flow was allowed to fill a cup or bucket of known volume during a measured time. Discharge in cubic feet per second was generally estimated by multiplying the mean estimated cross-sectional area of flow in square feet by the mean surface velocity (estimated by movement of a floating leaf or stick) in feet per second times a roughness factor. The assigned roughness factors ranged from 0.5 to 0.9 and were designed to compensate for differences in stream channel shape and roughness.

Field pH measurements were obtained at streamside for most samples collected during the first half of the study. These were generally measured in the flowing stream unless velocities exceeded about 0.5 ft/sec, in which case they were measured at streamside in a cup of water collected for the purpose. Field pH readings were made with a Markson digi-sense pH meter, Model 5985-40, which was standardized with two buffers at each sampling site. The collection of field pH values was discontinued after we discovered that even under carefully controlled laboratory conditions the field meters were giving pH values for natural waters which, though stable, sometimes differed by as much as two whole pH units from readings taken only a few minutes before. Time was not available either to ascertain why field pH readings were inconsistent or to develop a better system for measuring. Because of the unreliability of many of these values, no field pH data are included in this report.

Water temperatures were measured with a thermometer placed in a flowing portion of the stream and are reported in degrees Celsius.

LABORATORY ANALYSES

Most analyses given in this report were determined at the laboratory of the Surface-Mined Area Reclamation Research Unit of the Northeastern Forest Experiment Station in Berea, Kentucky. Most samples of suspended solids were analyzed at Eastern Kentucky University in Richmond, Kentucky under the direction of Dr. Samuel S. Leung, Department of Geology. Special Nutrient samples collected between July 6, and July 29, 1979, were analyzed at the Argonne National Laboratory at Argonne, Illinois, under the direction of Dr. Richard D. Olsen.

An attempt was made to maintain the same analytical techniques throughout the study; however, this was not always possible. Changes and the dates they were instituted have been specified in the following discussions of individual parameters.

Elemental Analyses by Emission Spectrometer

A total of 31 elements was analyzed on the "FA" samples using a Spectraspan III emission spectrometer with DC argon plasma source. Data for 20 of these elements are included in this report. These 20 elements are tabulated in Table 3 along with approximate detection limits and approximate levels of reproducibility.

Concentrations of 11 additional elements were obtained but are not published in this report because their concentrations in natural waters were generally far below the detection limits of the emission spectrometer. These elements and their approximate detection limits in mg/l are: Arsenic (3), bismuth (5), cadmium (0.5), chromium (0.1), germanium (0.1), mercury (0.05), phosphorus (0.7), selenium (0.3), silver (0.05), tin (0.2), and vanadium (0.2).

Other Analyses

Descriptions of the remaining laboratory analyses (anions, nutrients, physical parameters, and calculated values) follow in alphabetical sequence.

Acidity--

Reported as mg/l calcium carbonate equivalent and analyzed in accordance with a modification of the procedure published in Methods for Chemical Analysis of Water and Wastes (EPA 1974). A 25-ml portion of the filtered "F" sample was first acidified to pH 4.0 with 0.02 N H_2SO_4 with a Mettler autotitrator consisting of modules DK 10, DK 11, DK 12, DK 13, and DV 210. Three drops of 30 percent H_2O_2 were then added and the sample boiled for 2 to 4 minutes. Upon cooling, samples were titrated by autotitrator with either 0.02 N NaOH; or 0.1 N NaOH. Paired aliquots titrated with 0.1 N NaOH and containing less than 20 mg/l acidity as $CaCO_3$ differed from their respective means by an average of ± 2.4 mg/l while those containing more than 20 mg/l acidity as $CaCO_3$ differed from their respective means by an average of ± 6.9 percent. Paired samples titrated with 0.02 N NaOH should be in much better agreement in the lower range and in slightly better agreement in the upper range.

Negative acidity values represent excess alkalinity contributed by constituents such as bicarbonates. Negative acidities are frequently reported as zero but the negative values are needed if the final acidity of a mixed water system is to be computed from the acidities of each of its component waters. In general, the negative acidities should be fairly close in absolute value to the alkalinity concentrations, though there can be exceptions.

Acidity is normally determined on unfiltered and untreated raw water samples but such samples were not available at the end of the study when the decision was made to analyze the available samples for acidity. Only filtered samples were available then, so the acidity data reported may differ appreciably from what would have been obtained from unfiltered, untreated samples. If the sediment contained pyritic materials, as was sometimes the case in the study area, then the unfiltered samples would have been higher in acidity than the filtered samples used in this study. If the sediment contained carbonate minerals (rarely the case in the study area) then the unfiltered samples would have been lower in acidity than the values given in this report.

Alkalinity--

Reported as mg/l calcium carbonate equivalent. A 25 ml portion of the "F" sample was titrated with 0.02 N H_2SO_4 to a calculated end point using a Mettler autotitrator (described above). During the first few months of the study alkalinity was determined on 50 ml portions of the unfiltered, untreated "U" sample. After it was observed that the pH of a few of the "U" samples dropped appreciably during storage before analysis, the remaining alkalinities were determined on 25 ml portions of the "F" samples. It had been observed that the "F" samples were not only more stable than the "U" samples, but maintained pH

values that agreed more closely with field pH values. The titration was done in two steps, first to a preliminary end point at pH 5.64, then to a final computed end point based on the number of milliliters of titrant required to reach the preliminary end point. Samples with pH values less than 5.64 were assumed to have no measurable alkalinity. The end points used were essentially the same as those given by Barnes (1964, p. H15, Table 4) but minor corrections were added to account for dilution of the samples by titrant.

Alkalinities of the filtered samples used in this study may be either higher or lower than alkalinities that would have been measured in unfiltered samples, as explained in the preceding section on acidity.

During storage calcium carbonate tended to precipitate from many of those samples in which alkalinity exceeded about 100 mg/l. The reported alkalinity, carbonate, and bicarbonate values from these samples may be lower than the concentrations that would have been found had the samples been analyzed before storage.

Ammonia--

Reported as mg/l N. Ammonia was analyzed on the "FN" sample with a Technicon autoanalyzer II using industrial method number 154-71W tentative, dated February 1973. Technicon gives the detection limit for this method as 0.024 mg N/l and the coefficient of variation at 0.14 mg N/l as 0.31 percent.

Bicarbonate--

Computed from alkalinity, pH, and ionic strength using the formula:

$$HCO_3 = \frac{(1.219)(A2)(HYD)(ALK)}{(9.6 \times 10^{-11}) + (HYD)(A2)}$$

Wherein HCO_3 is bicarbonate in mg/l, ALK is the alkalinity in mg/l calcium carbonate equivalent, HYD is the hydrogen ion concentration in moles/l computed by: HYD = antilog (-pH), and A2 is the activity coefficient for divalent ions computed from the equation:

$$A2 = \text{antilog} \frac{-2.034 \sqrt{I}}{1 + 1.64 \sqrt{I}}$$

where I is the ionic strength (Garrels and Christ 1965, p. 61-62). The value 1.64 is the product of 0.3281 (Garrels and Christ 1965, Table 2.6) and 5 [an approximate value for major ions in the streams sampled (Garrels and Christ

1965, Table 2.7)]. This equation is valid when the total ionic concentration is less than or equal to 0.1 mole per liter and the sample temperature is near 25°C. The ionic strength, I, is defined by:

$$I = 0.5 \sum_{i=1}^{n} C_i Z_i^2$$

wherein n is the number of ion species, i, in the solution; C_i is the concentration in moles/l of ion species, i, in the solution; and Z_i is the charge (or valence) of the ion (Garrels and Christ 1965, p. 56).

Carbonate--

Computed from alkalinity and bicarbonate using the equation:

$$CO_3 = 0.4917\ (1.219\ ALK - HCO_3)$$

wherein CO_3 is carbonate as mg/l, HCO_3 is bicarbonate in mg/l, and ALK is alkalinity in mg/l calcium carbonate equivalent.

Chloride--

Except for the last few samples chloride was determined on the "F" sample with a Technicon autoanalyzer II using industrial method number 99-70 W/B released September 1974, revised February 1976. This procedure depends on the liberation of thiocyanate ion from mercuric thiocyanate by the formation of soluble, un-ionized mercuric chloride. In the presence of ferric ion, the liberated thiocyanate forms a highly colored ferric thiocyanate proportional to the original chloride concentration. Technicon gives the coefficient of variation of this method at 5.0 mg/l as $\pm$ 0.42 percent, and the detection limit as 0.2 mg/l.

Chloride samples collected during the last 2 months of the study were analyzed on a Coulter Industrial Kem-O-Lab, model IKL, using procedures supplied with the instrument dated February 1979. This procedure uses ferric thiocyanate as the colorimetric indicator and is similar to the automated method described in Methods for Chemical Analysis of Water and Wastes (EPA 1974, p. 31-34). The detection limit is about 0.1 mg/l.

Conductivity--

See Specific Conductance

Dissolved Solids--

See Total Dissolved Solids, calculated

Neutralization Ratio--

Computed from the equation:

$$\text{Neutralization ratio} = \frac{\text{gross alkalinity (in meq/l)}}{\text{gross acidity (in meq/l)}}$$

$$= \frac{(Ca^{++} + Mg^{++} + Na^{+} + K^{+}) - (Cl^{-} + F^{-} + NO_3^{-})}{SO_4^{=}}$$

wherein all ions in the water sample are reported in milliequivalents per liter (Hollyday and McKenzie 1973, p. 24-25). The neutralization ratio is unity when the gross alkalinity produced during formation and neutralization of mine drainage is equal to the gross acidity produced concurrently. A neutralization ratio greater than 1.00 indicates that the alkalinity formed was more than enough to neutralize the gross acidity from sulfuric acid released to the water by oxidation of iron sulfide.

Fluoride concentrations were not obtained as a part of this study and so were omitted from the computation of the neutralization ratios. Since fluoride rarely exceeds a few mg/l in natural waters and is low in comparison to the other ions summed in the computations, only negligible errors have been introduced by its omission.

Nitrate--

See Nitrate Plus Nitrite

Nitrate Plus Nitrite--

Nitrate and nitrite were analyzed together on the "F" sample with a Technicon autoanalyzer II using a modification of industrial method number 100-70W, released September 1973. Nitrate is reduced to nitrite by a copper-cadmium reductor column developed by Willis (1980). The nitrite ion reacts with sulfanilamide under acidic conditions to form a diazo compound, which couples with N-1-naphthylethylenediamine dihydrochloride to form a reddish purple azo dye. Technicon states that the coefficient of variation at 1.0 mg N/l is 0.31 percent and that the detection limit is 0.04 mg N/l.

The preserved "FN" samples collected late in the study were analyzed by the Argonne National Laboratory using a similar procedure (Technicon industrial method number 158-71W/A tentative, released December 1972, revised June 1977). The Argonne National Lab reported the detection limit using this method as 0.1 mg N/l.

Nitrite--

See Nitrate Plus Nitrite

Nitrogen, Total Kjeldahl--

Total Kjeldahl nitrogen was analyzed simultaneously with total phosphorus on the "KJ" sample using a Technicon autoanalyzer II and industrial methods number 376-75W/B, released November 1975, and number 334-74W/B released January 1976, both methods revised March 1977. The Argonne National Laboratory reported the detection limit using this method as 0.20 mg/l.

Orthophosphate--

Orthophosphate was analyzed colorimetrically on the "FP" sample with a Technicon autoanalyzer II using industrial method number 155-71W tentative, released January 1973. Ammonium molybdate reacts in an acid medium containing ascorbic acid and antimony to form a phosphomolybdenum-blue complex. The Argonne National Laboratory reported the detection limit using this method as about 0.01 mg/l.

pH--

Reported as pH units. The laboratory pH values were initially analyzed on the unfiltered "U" samples; but after a few months were analyzed only on the filtered "F" samples after it was observed that the latter were in closer agreement with field pH measurements than were the former. The pH value of many of the "U" samples tended to change appreciably (usually to lower pH values) during a few weeks in storage, while the pH value of almost all the "F" samples remained nearly constant for a year or more. Five different types of meters were used to measure pH values. Two of these were highly accurate while two used during the first half of the study were frequently in error, sometimes by as much as two full pH units. Questionable pH values were rerun using one of the more reliable meters when sufficient sample remained.

Phosphorus, Total--

Total phosphorus was analyzed simultaneously with total nitrogen on the "KJ" sample using a Technicon autoanalyzer II and the same methods given earlier for total Kjeldahl nitrogen. The Argonne National Laboratory reported the detection limit using this method as 0.05 mg/l.

Settleable Matter--

Settleable matter was determined as the volume of material settling in an Imhoff cone in 45 minutes, in accordance with the procedure given in Standard Methods for the Examination of Water and Waste Water (APHA 1975, p. 95-96). Precision data are not available but samples were usually read to hundredths of a milliliter. Settleable matter was determined on the approximately 1-liter "SV" sample.

Specific Conductance--

Reported as micromhos/cm at 25° Celsius. Specific conductance was determined on the "U" sample during the first few months of the study, then on the "F" sample for the remainder of the study. This change was made because some samples containing sediment increased in conductivity after a few months storage. The use of the "F" sample gave more reliable results, since most samples were stored prior to analysis. Samples collected during the first third of the study were analyzed on a Yellow Springs Instrument Company model 31 conductivity bridge which gave values reproducible to within ± 30 percent. Many of these samples were rerun on the equipment used for the later samples.

The last two-thirds of the samples were analyzed using improved techniques and a temperature-compensated Markson Electromark analyzer. Precision data are not available but sample reproducibility is about ± 2 percent.

Sulfate--

Sulfate was analyzed on the "F" sample during the first few months of the study, and on the "FA" sample during the remainder of the study. The change was made to avoid interference from the precipitate which formed in some of the unacidified samples. Sulfates were analyzed by a turbidimetric technique using Sulfaver IV powder pillows (Hach Chemical Company 1970, p. 91). Absorbance by the barium sulfate suspension was measured using a Bausch and Lomb Spectronic 20 spectrophotometer. Sulfate standards deviated as much as ± 30 percent from the known concentration when measured from this standard curve. In the latter months of the study the standard curve was calibrated daily, and data obtained during this period probably did not deviate more than about ± 15 percent from the true values.

Suspended Solids--

Suspended solids were determined gravimetrically on either the "U" or "SA" sample using Millipore 47-mm fiberglass filter paper (equivalent to about 0.45 micron pore size), and an analytical balance sensitive to 0.1 mg. Samples and filter paper were dried at 105° C for a minimum of 4 hours and cooled 1.5 hours in a desiccator before being weighed. Acidified "SA" samples were used in the beginning of the study to prevent precipitation of salts which might add to the suspended solids concentration. Unacidified samples were used after a preliminary investigation indicated that error due to precipitation of salts was negligible, and that dissolution of some of the sediment by the acid might introduce a larger error. A further inspection and analysis of "U" and "SA" samples late in the study indicated that during storage there had been appreciable precipitation of iron compounds from the more acid samples, and of calcium carbonate from the more alkaline samples. In either case this would cause the measured suspended solids concentrations to be higher than they would have been at the time the samples were collected. Unreasonably high suspended solids values were systematically deleted when field notes indicated that the streams had been

clear when sampled and when orange or yellow precipitates of iron compounds had formed before analysis. Suspended solids concentrations were less seriously affected by precipitation of calcium carbonate (most adhered to the walls of the container), so little effort was made to delete data that might have been affected by this precipitate. Samples collected during the first half of the study were stored for a year or more before analysis for suspended solids and so are more likely to have been affected by precipitates than the remaining samples, which received more prompt analysis.

The "U" and "SA" samples were collected solely for turbidity and suspended solids analyses; nevertheless, by the time the suspended solids analyses were performed an appreciable part of many of these samples had been lost--either through use in other analyses or through slow leakage from overturned containers. In both cases supernatant liquid was lost, leaving essentially all the now-settled suspended solids. All samples weighing less than 100 grams were corrected for this loss of liquid and were assumed to have weighed exactly 100 grams when collected. Suspended solids concentrations in these 100-ml samples are not highly reproducible, so errors introduced by this type of sample reconstruction should be minor by comparison. Most of these samples were collected from shallow streams and there is some evidence that the recommended collection techniques were not always carefully followed. Traces of bottom material, algae, and/or floating debris probably account for many of the higher values observed in the unmined watershed samples. Suspended solids data were deleted where there was evidence that bottom materials (generally sand and gravel) had been scooped up from the streambed during seasons of low flow. The true suspended solids concentrations should almost always be equal to or less than the reported values.

A big percentage of the samples were clear and without visible turbidity. Careful work by the author indicated that most of these should contain no more than 4 or 5 mg/l suspended solids. After a certain date, the suspended solids data generated by two of the eight analysts stand apart in that most of them run 20 to 100 mg/l higher than data by the other analysts, or data analyzed earlier by these two analysts. The data in question, 2,300 values out of a total of 6,400 analyzed can readily be identified as work of these two analysts from the data alone. Suspended solids data that ran about 40 to 100 mg/l or more above the norm for one group of 300 of these samples were deemed so defective that all of them were deleted. Most of the remaining 2,000 questionable values have been left in the various state reports but they have been marked with asterisks to indicate that they are 5 to 80 mg/l (generally 20 to 40 mg/l) higher than the true values.

Total Dissolved Solids, Calculated--

The calculated total dissolved solids value is the sum of all the dissolved constituents and approximates the quantity of dry residue that would be left after evaporation. It is assumed that all the bicarbonate is converted to carbonate and carbon dioxide when evaporated to dryness at 180° C, so the bicarbonate is multiplied by 0.4917 to give an estimate of residual carbonate. The silicon value is multiplied by 2.142, on the assumption that silicon dioxide residue is left upon evaporation.

Turbidity--

Reported as Jackson turbidity units (JTU)--equivalent to formazin or nephelometric turbidity units. Turbidity was measured on the "U" samples except for a few measured on "SA" samples. Transmittance of light through the sample contained in a 1-inch test tube was measured at a wavelength of 450 nanometers with a Bausch and Lomb Spectronic 20 spectrophotometer. Turbidity was determined from transmittance using a table prepared by the Hach Chemical Company (1970, p. 97). This table was prepared from standard formazin solutions calibrated with a Jackson candle turbidimeter. Recent checking indicates that this table is not very suitable for analysis of natural water samples in that values obtained in the more turbid samples were highly dependent upon the dilution chosen. Turbidities computed from a transmittance of 80 would be abou double those computed from a transmittance of 20.

The turbidity values reported have not been corrected for the small positive bias which may have been introduced by the presence of true color in some of the water samples. Numerous analysts produced the turbidity data contained in this report and it is obvious that some of them deviated from the prescribed methods, perhaps by not adequately dispersing the settled materials or by using 1/2-inch test tubes instead of 1-inch test tubes. In general, most of the questionable data appear to be too low. The most obviously defective turbidity data were deleted. Unreasonably high turbidity values were systematically deleted when field notes indicated that the water had been clear when sampled but the orange and yellow precipitates of iron compounds had formed before analysis.

SECTION 3

RESULTS

A tabulation of sites by site number, county, date of surface mining, latitude, longitude, surface drainage area, percentage of land disturbed by surface mining, and site name is given in Table 1. Site locations and watershed boundaries were drawn on U. S. Geological Survey 7 1/2 minute topographic maps which are reproduced in Figures 2 through 20. Field observations and analytical data are tabulated in Tables 4 through 34. An interpretive report, to be released later, will cover all nine states in the Appalachian study area.

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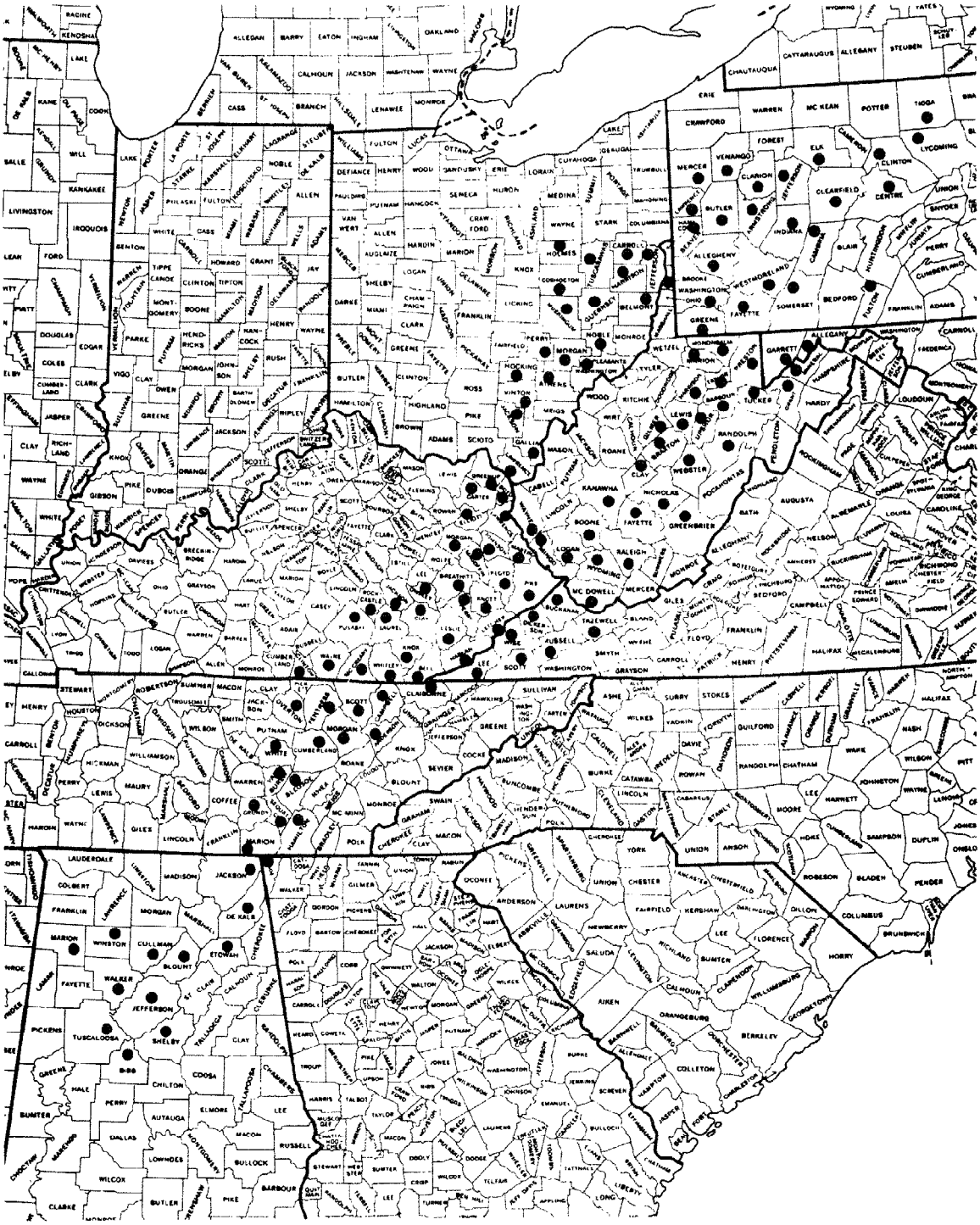

Figure 1. The study area. (Each dot marks one of the 136 Appalachian counties included in this study)

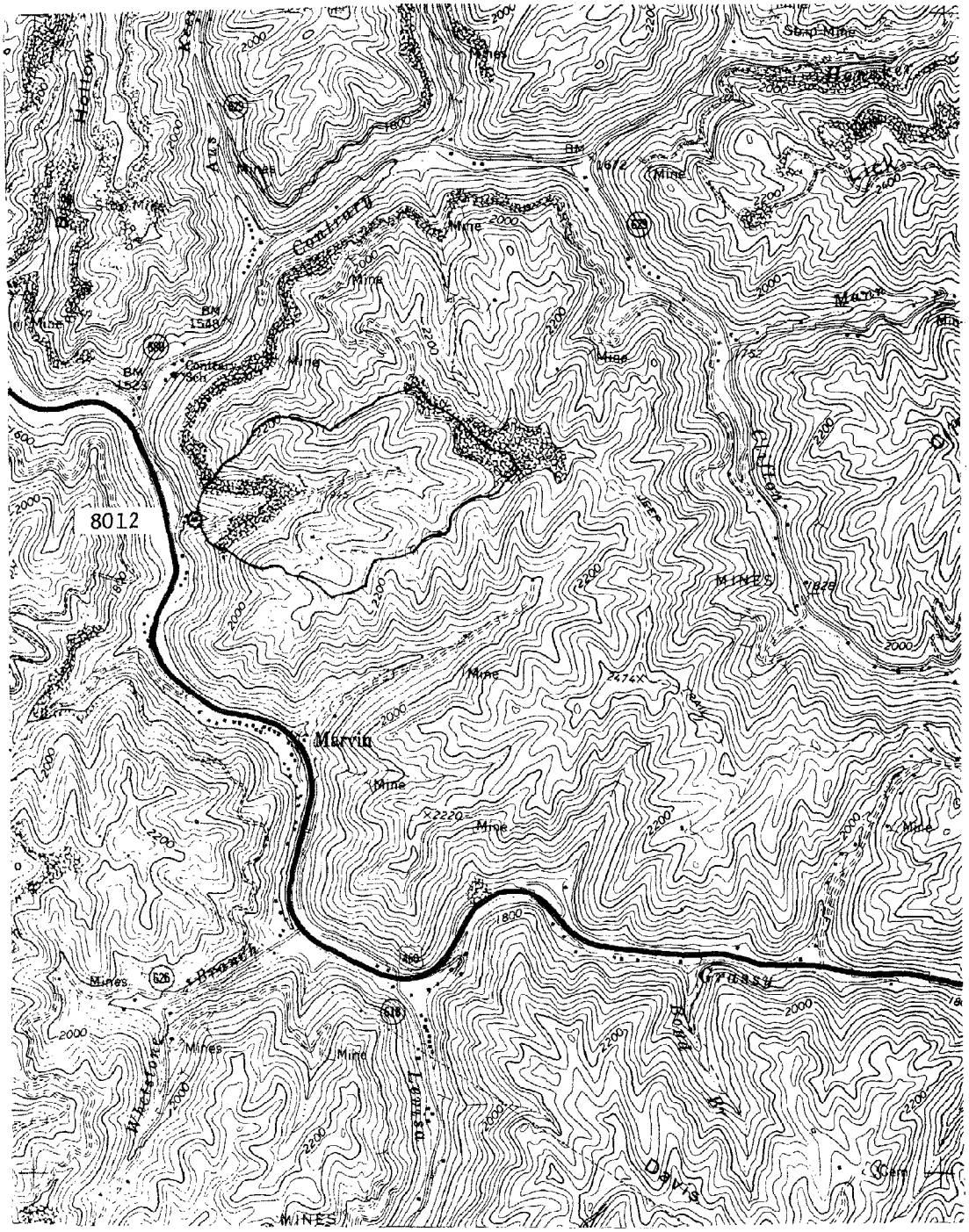

Figure 2. Location map for site 8012, Buchanan, Co., Virginia. Keen Mountain Quadrangle.

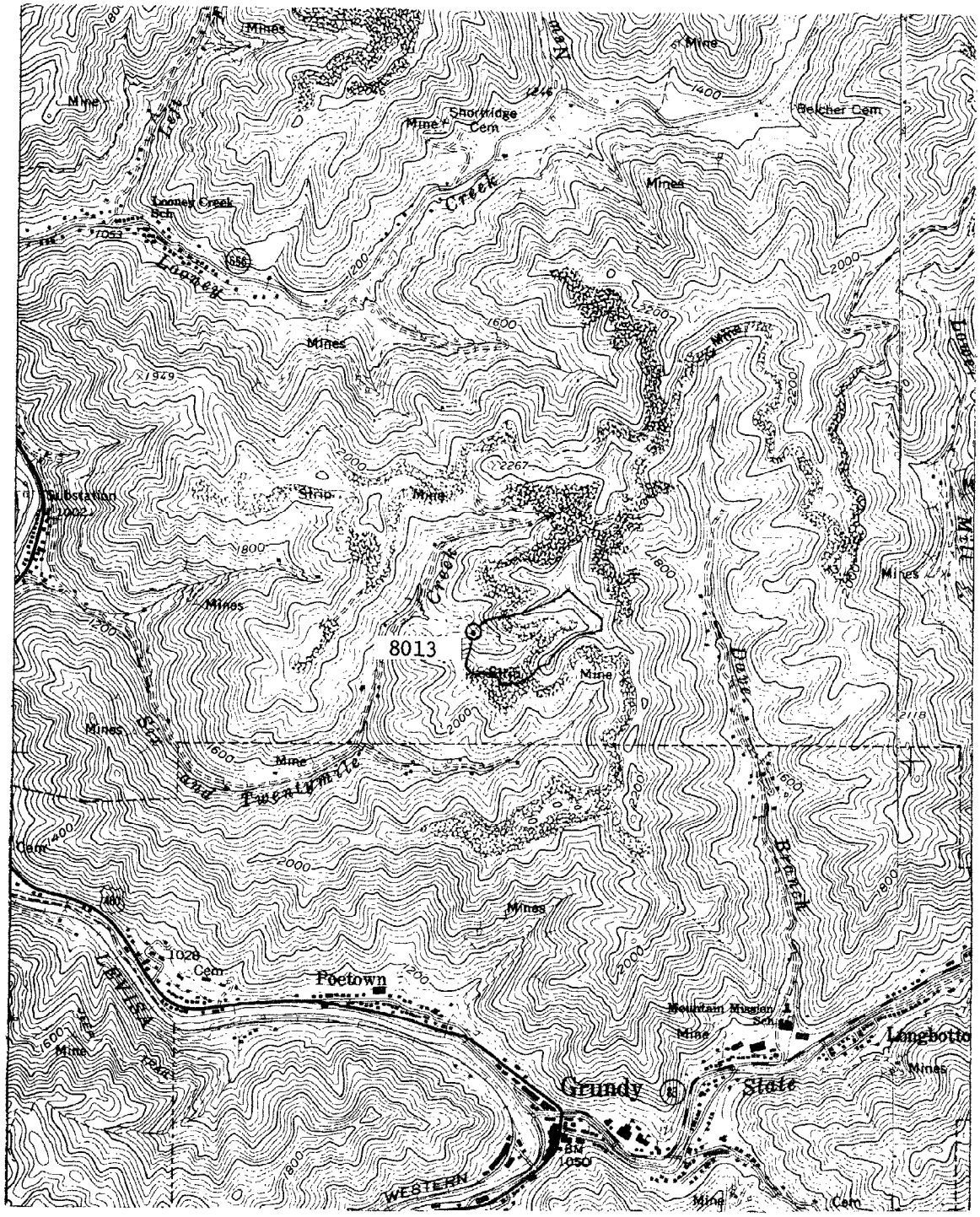

Figure 3. Location map for site 8013, Buchanan Co., Virginia. Grundy Quadrangle.

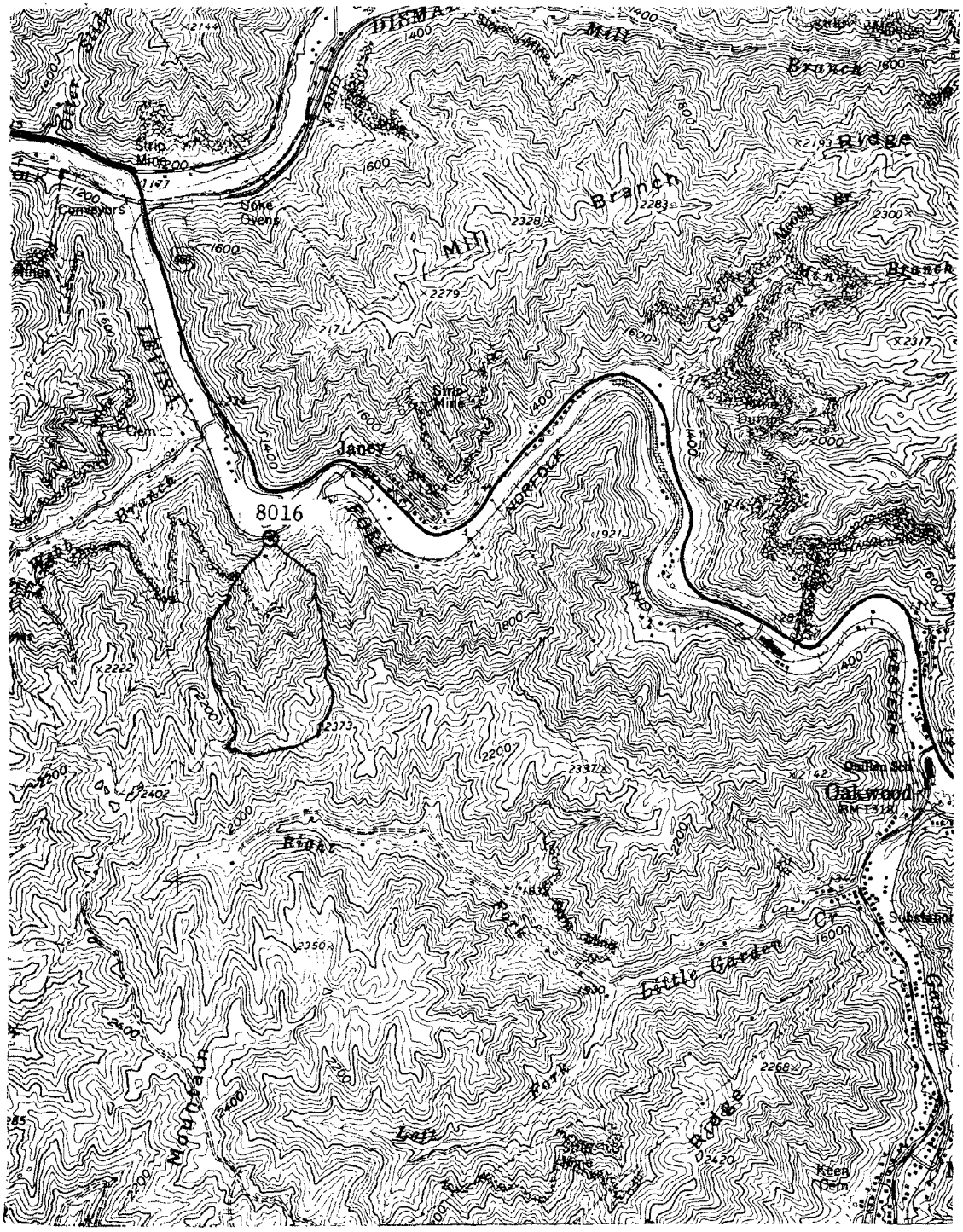

Figure 4. Location map for site 8016, Buchanan Co., Virginia. Vansant Quadrangle.

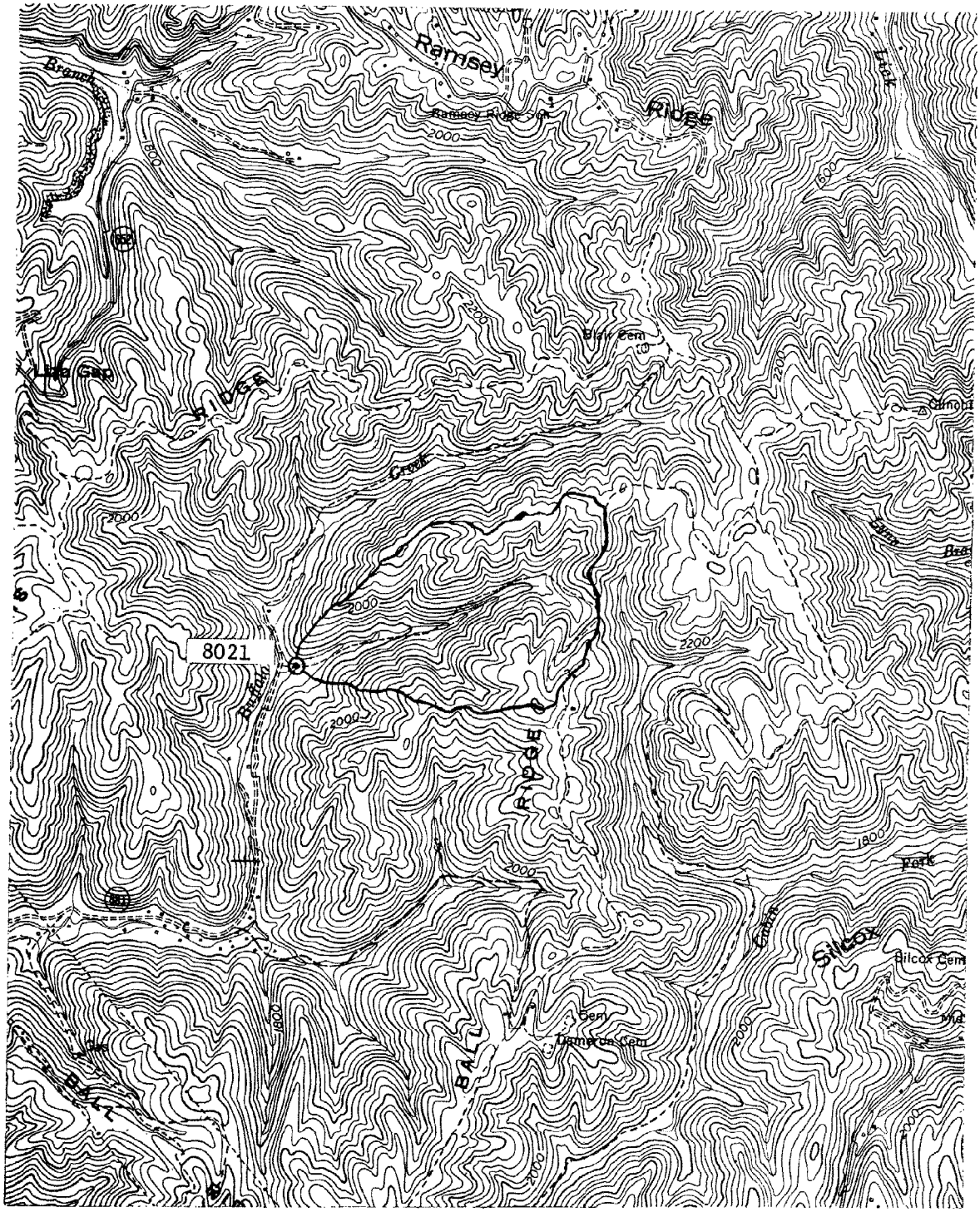

Figure 5. Location map for site 8021, Dickenson Co., Virginia. Nora Quadrangle.

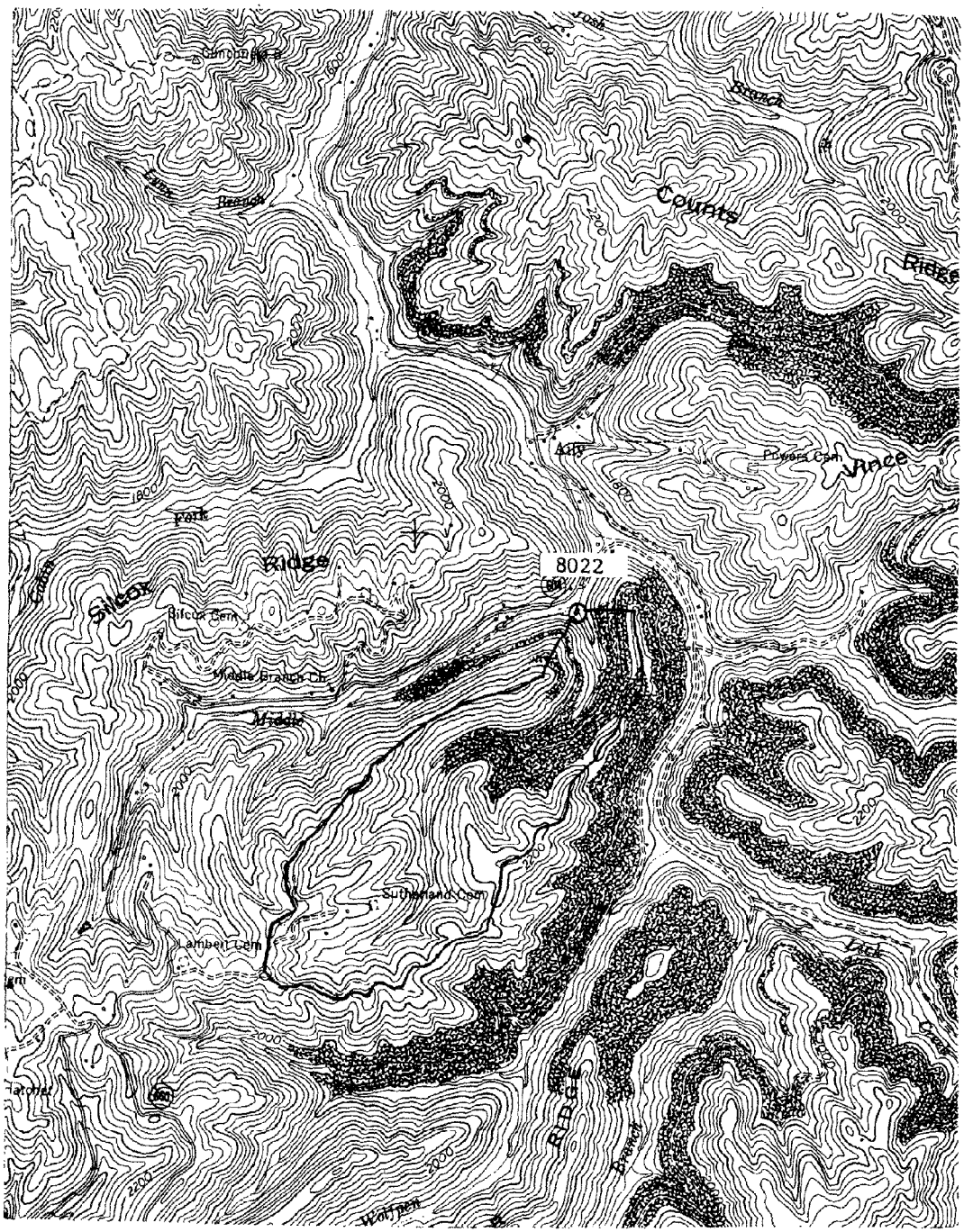

Figure 6. Location map for site 8022, Dickenson Co., Virginia. Nora Quadrangle.

Figure 7. Location map for site 8023, Dickenson Co., Virginia. Nora Quadrangle.

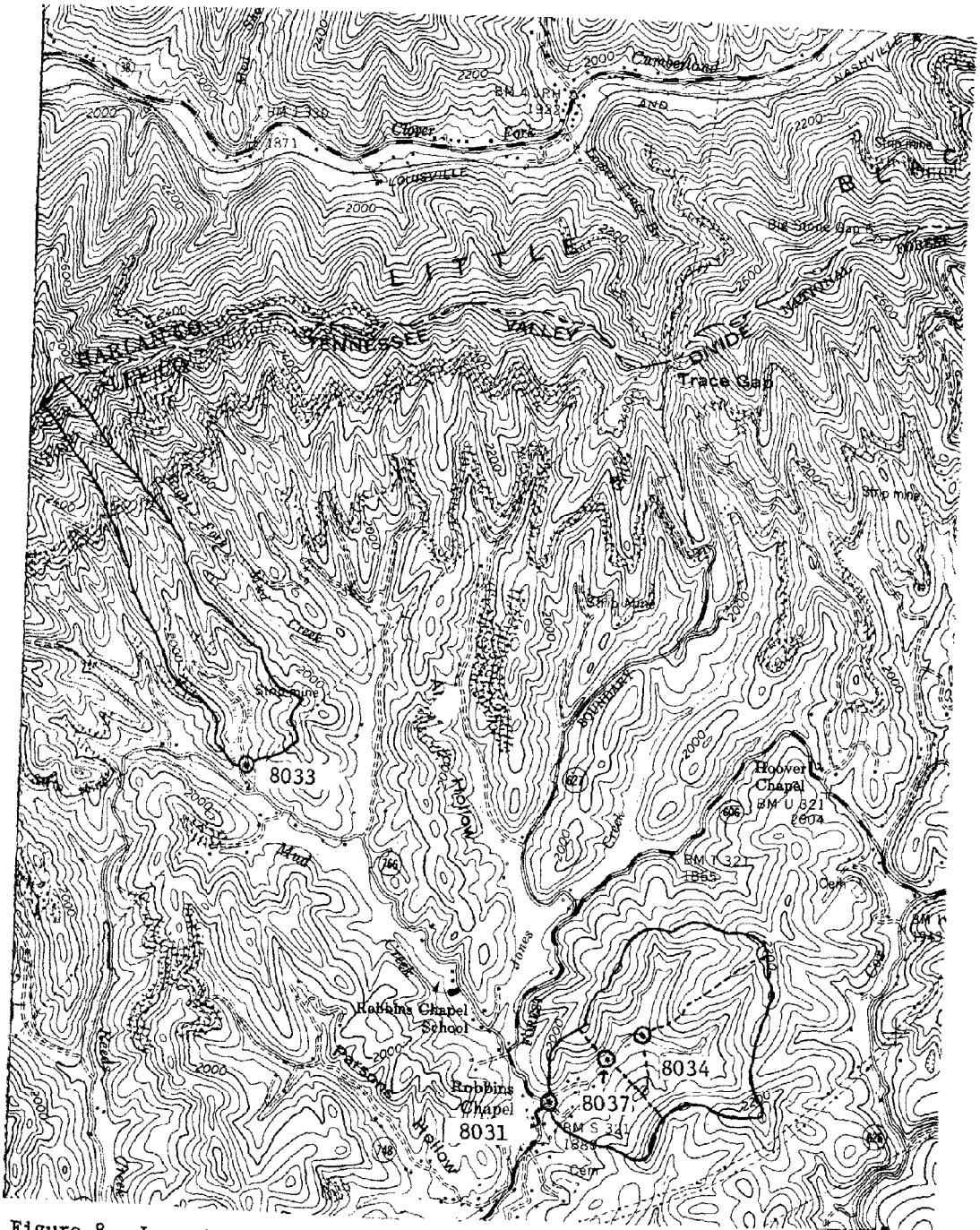

Figure 8. Location map for sites 8031, 8033, 8034, and 8037, Lee Co., Virginia. Keokee Quadrangle.

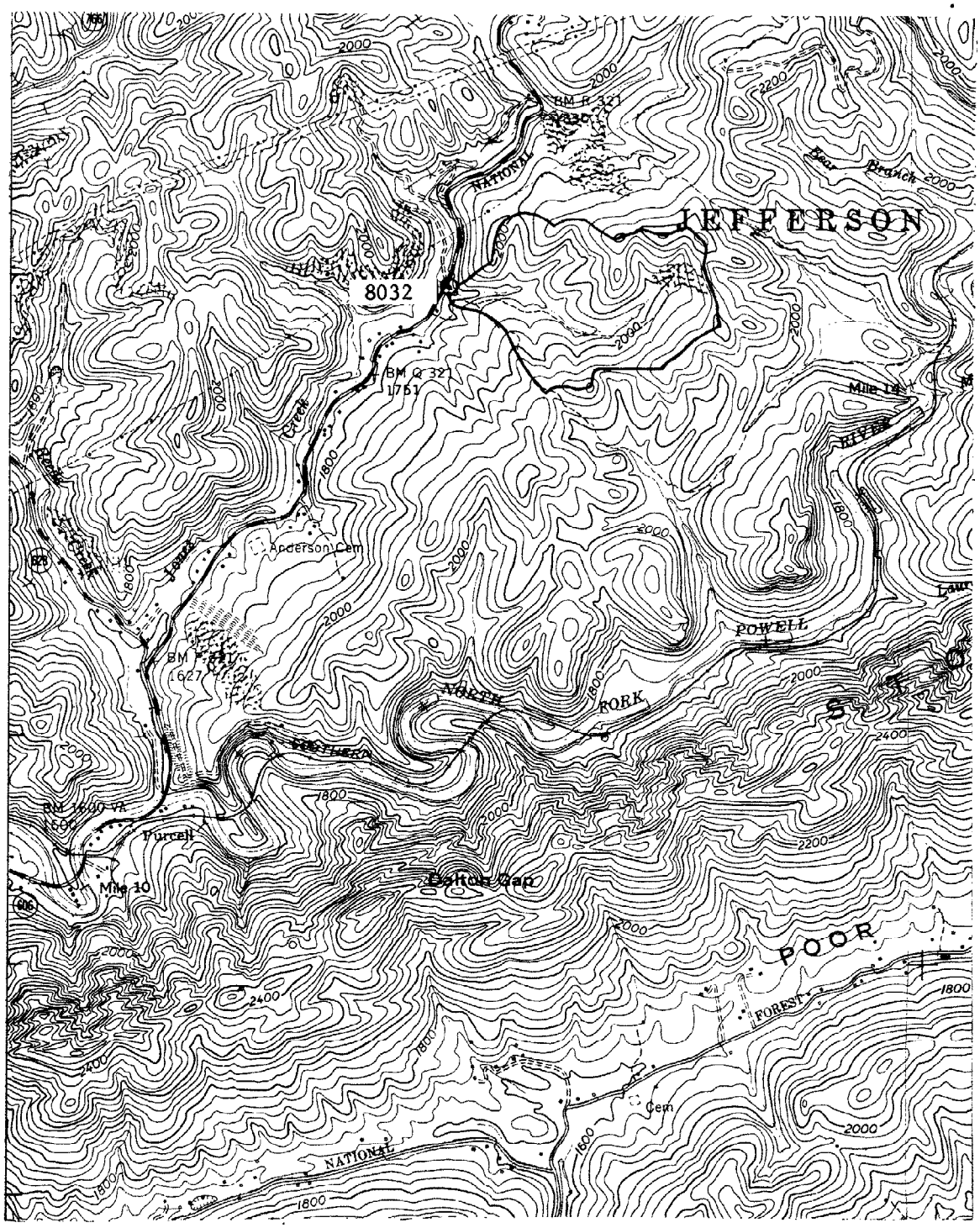

Figure 9. Location map for site 8032, Lee Co., Virginia. Keokee Quadrangle.

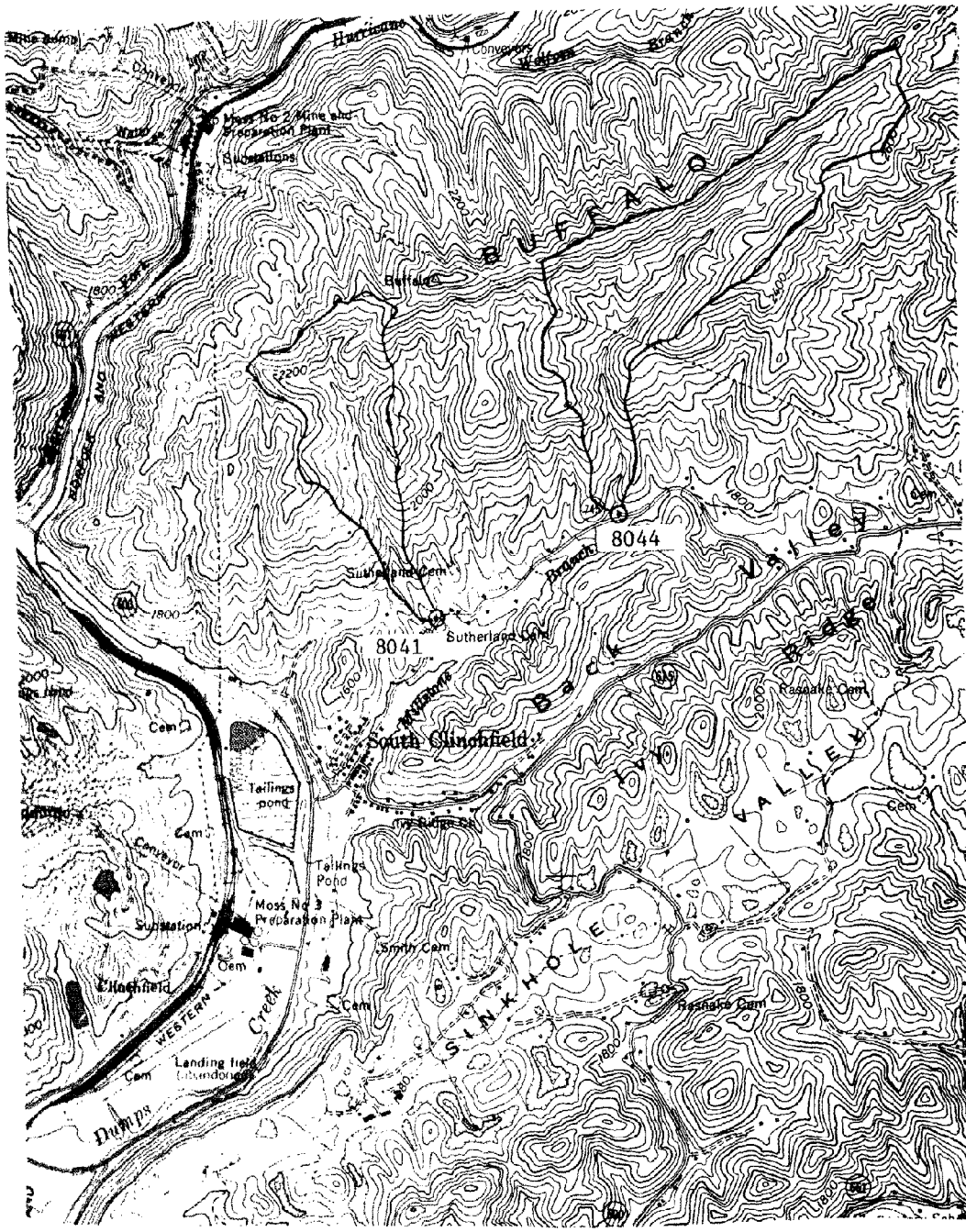

Figure 10. Location map for sites 8041 and 8044, Russell Co., Virginia. Carbo Quadrangle.

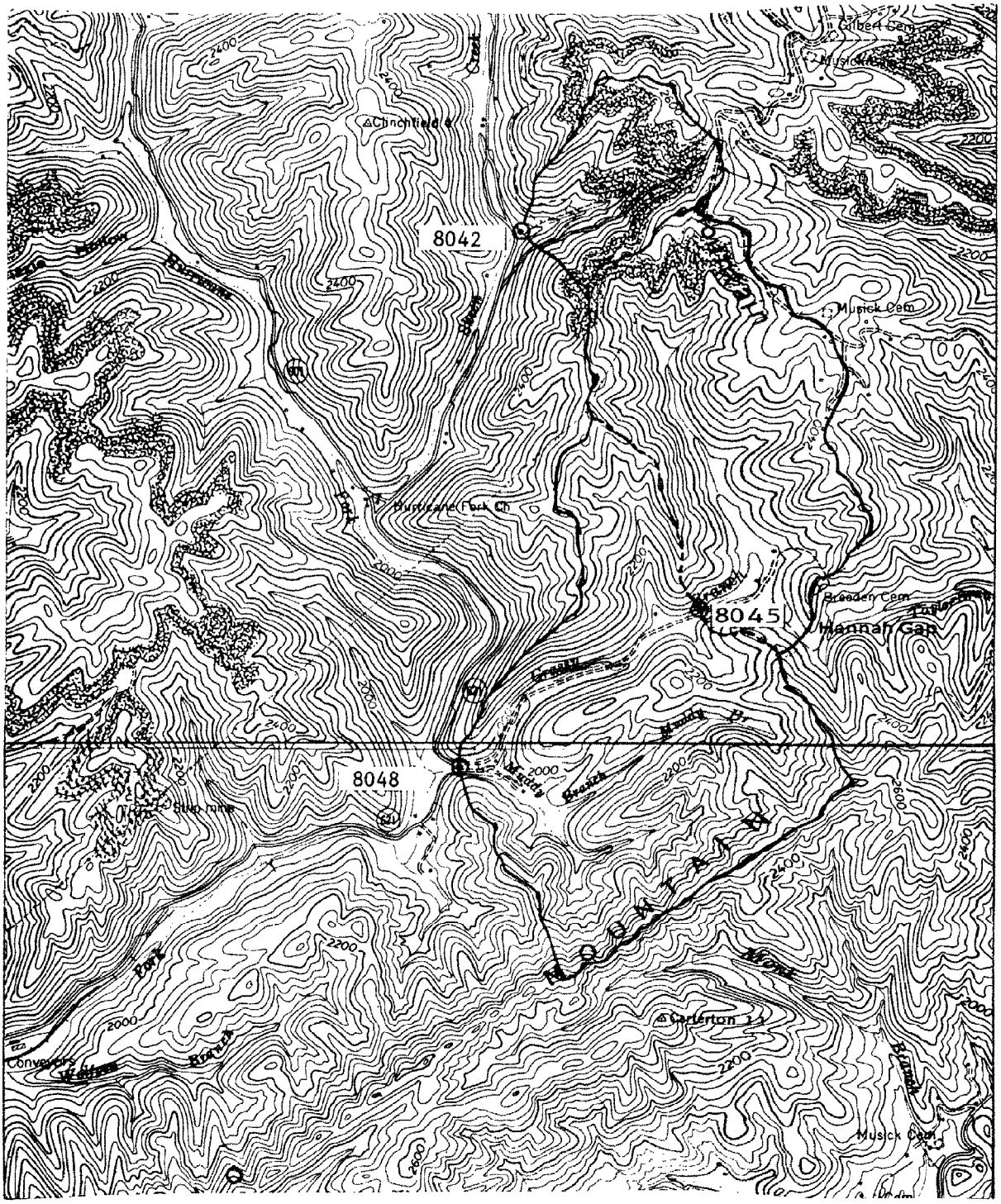

Figure 11. Location map for sites 8042, 8045, and 8048, Russell Co., Virginia. Duty and Carbo Quadrangles.

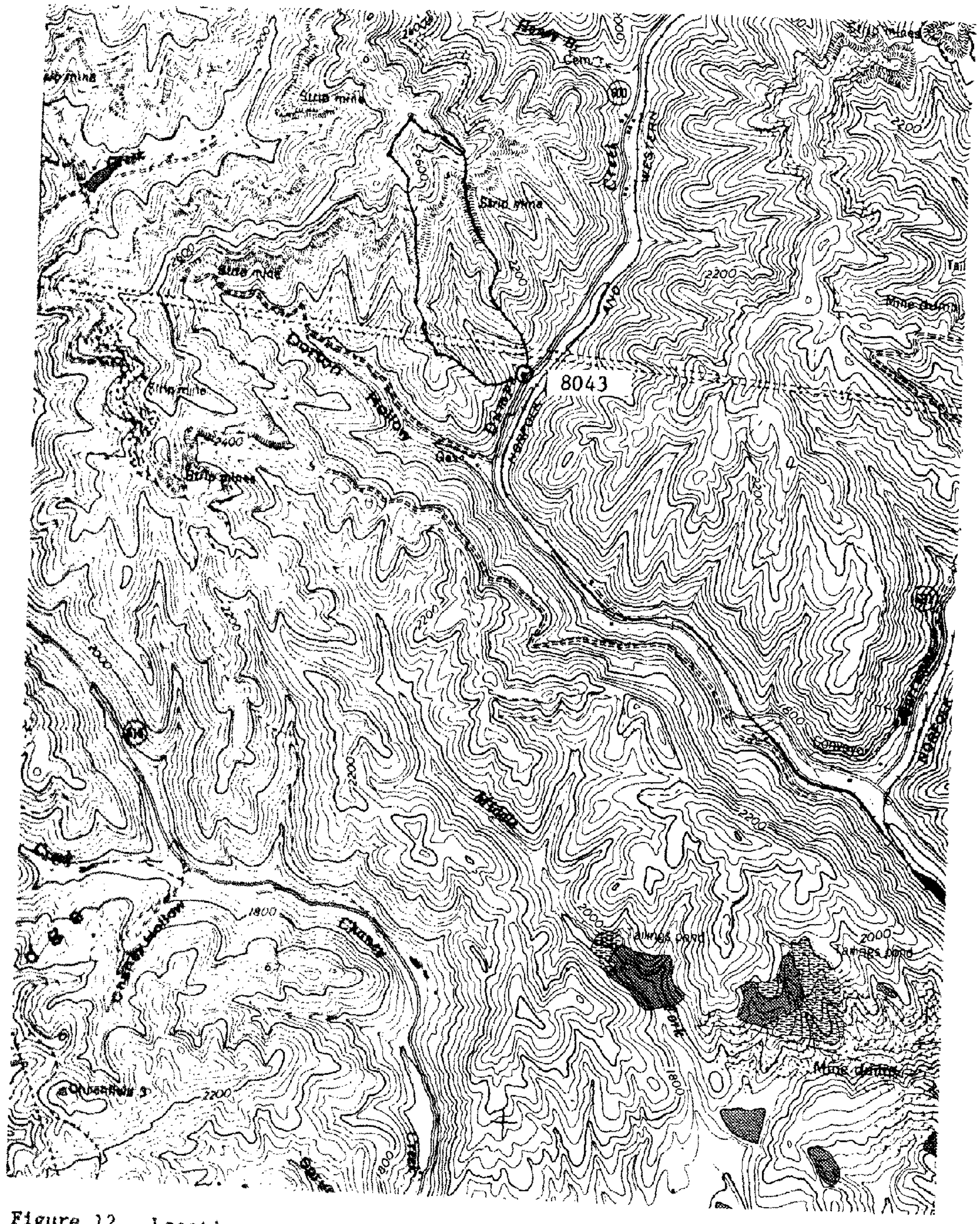

Figure 12. Location map for site 8043, Russell Co., Virginia. Carbo Quadrangle.

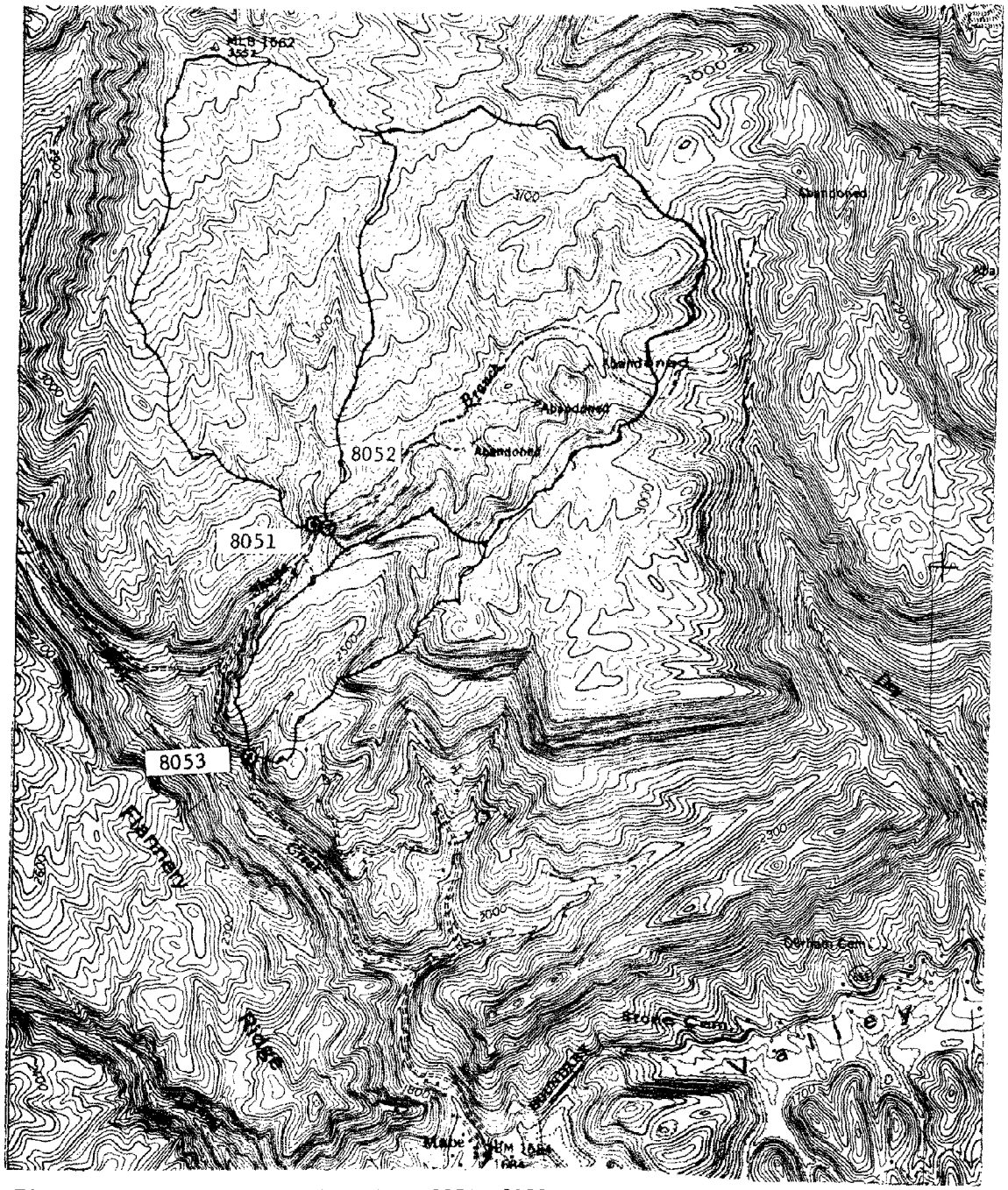

Figure 13. Location map for sites 8051, 8052, and 8053, Scott Co., Virginia. East Stone Gap Quadrangle.

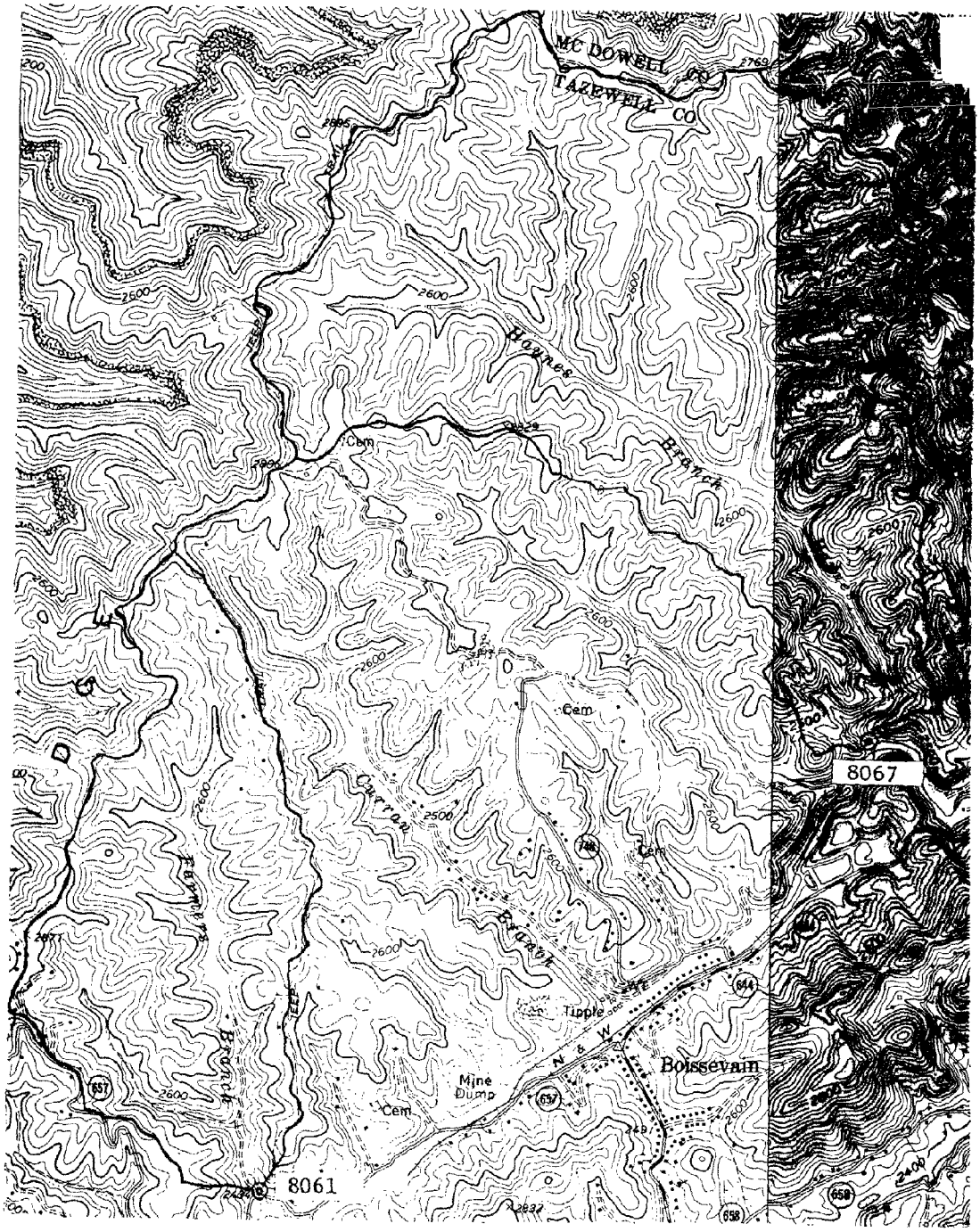

Figure 14. Location map for sites 8061 and 8067, Tazewell Co., Virginia. Anawalt and Bramwell Quadrangles.

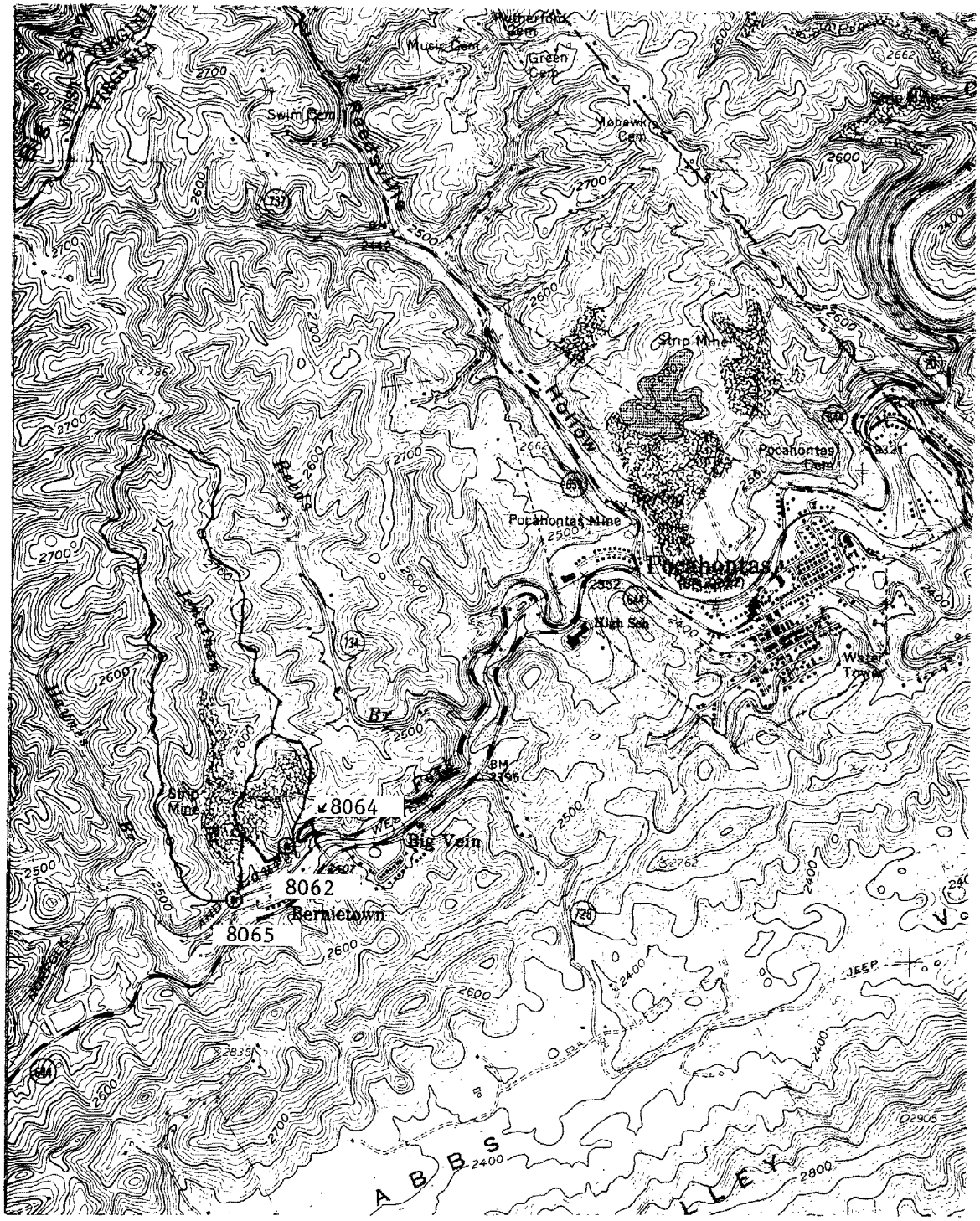

Figure 15. Location map for sites 8062, 8064, and 8065, Tazewell Co., Virginia. Bramwell Quadrangle.

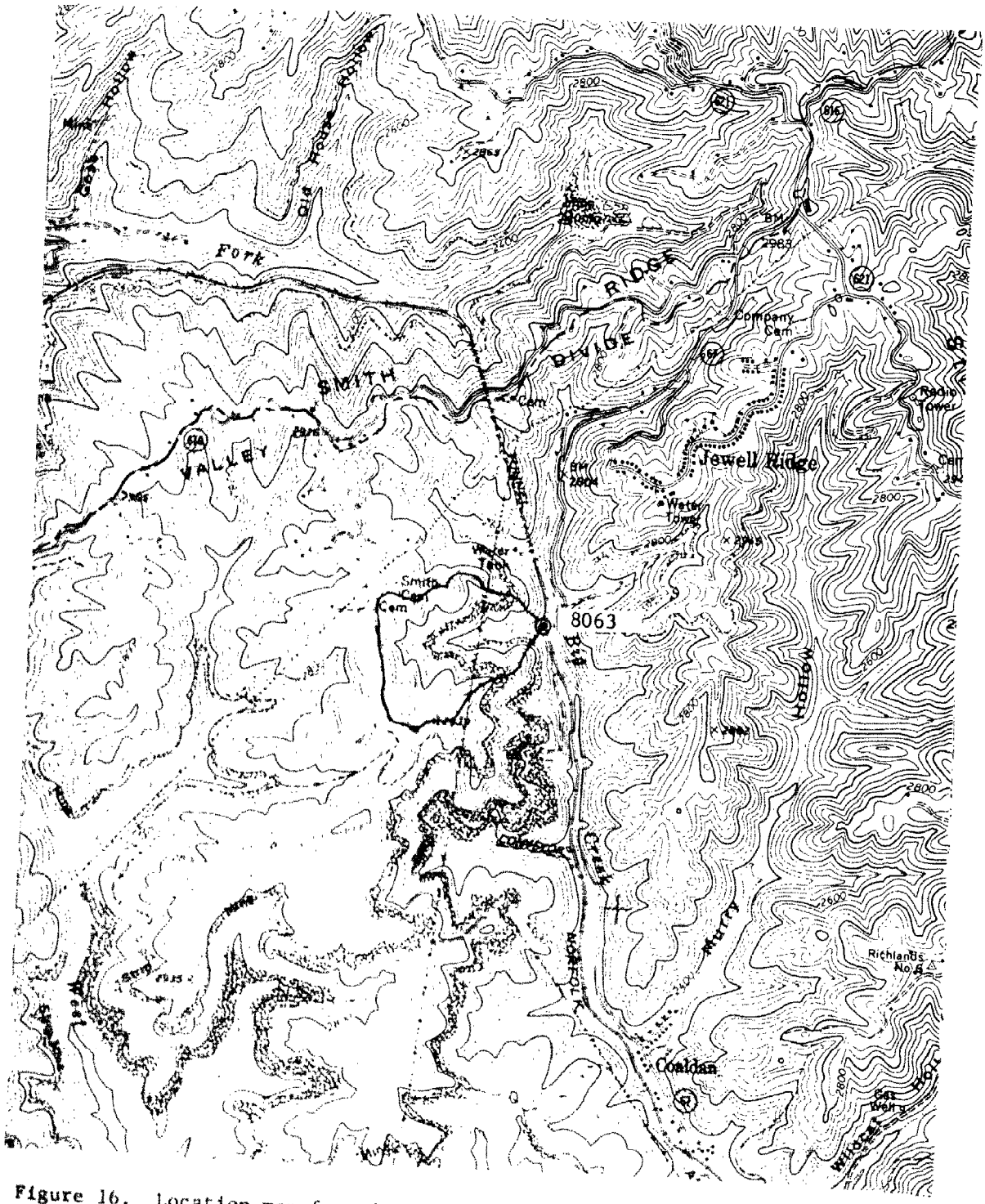

Figure 16. Location map for site 8063, Tazewell Co., Virginia. Jewell Ridge Quadrangle.

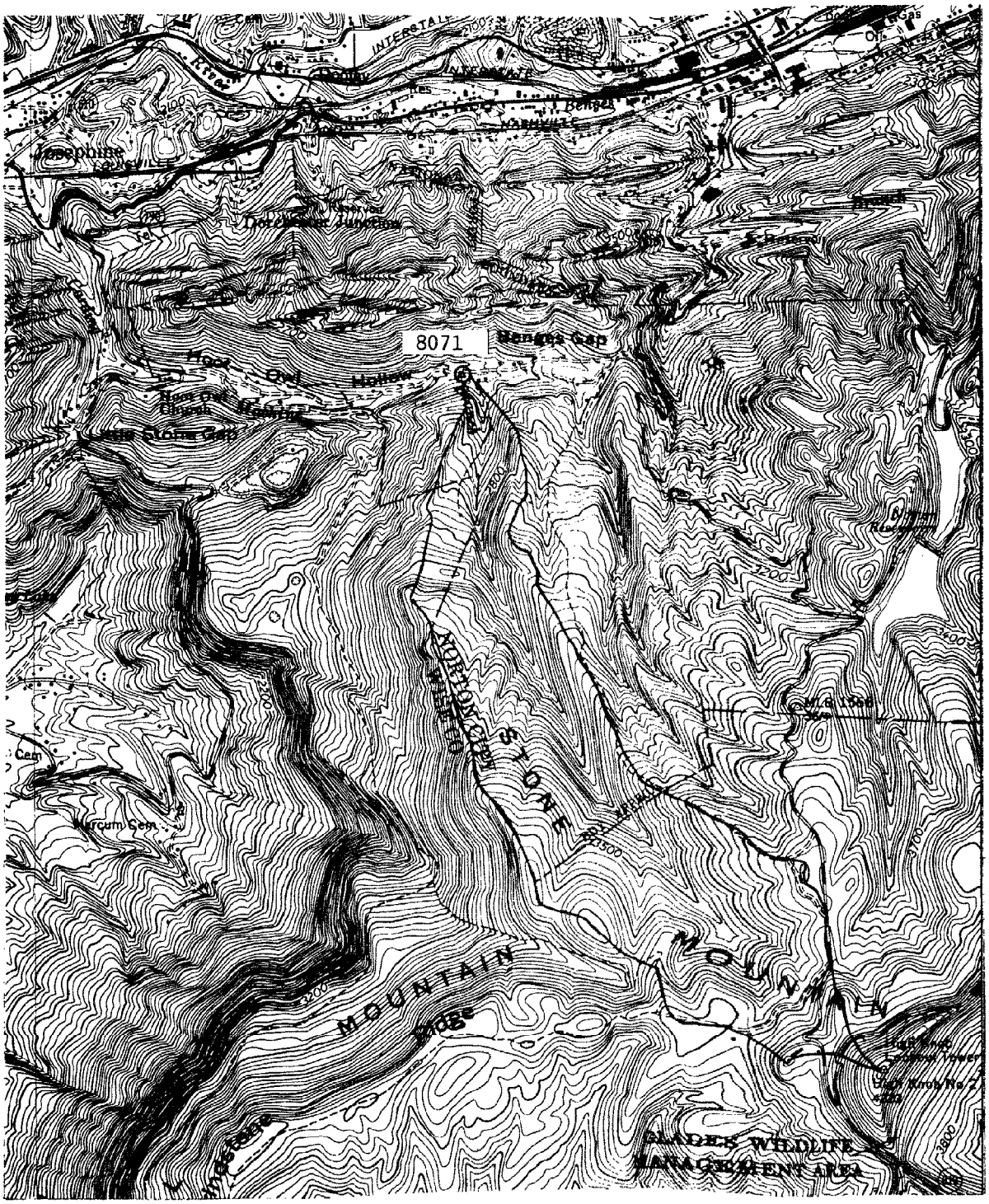

Figure 17. Location map for site 8071, Wise Co., Virginia. Norton Quadrangle.

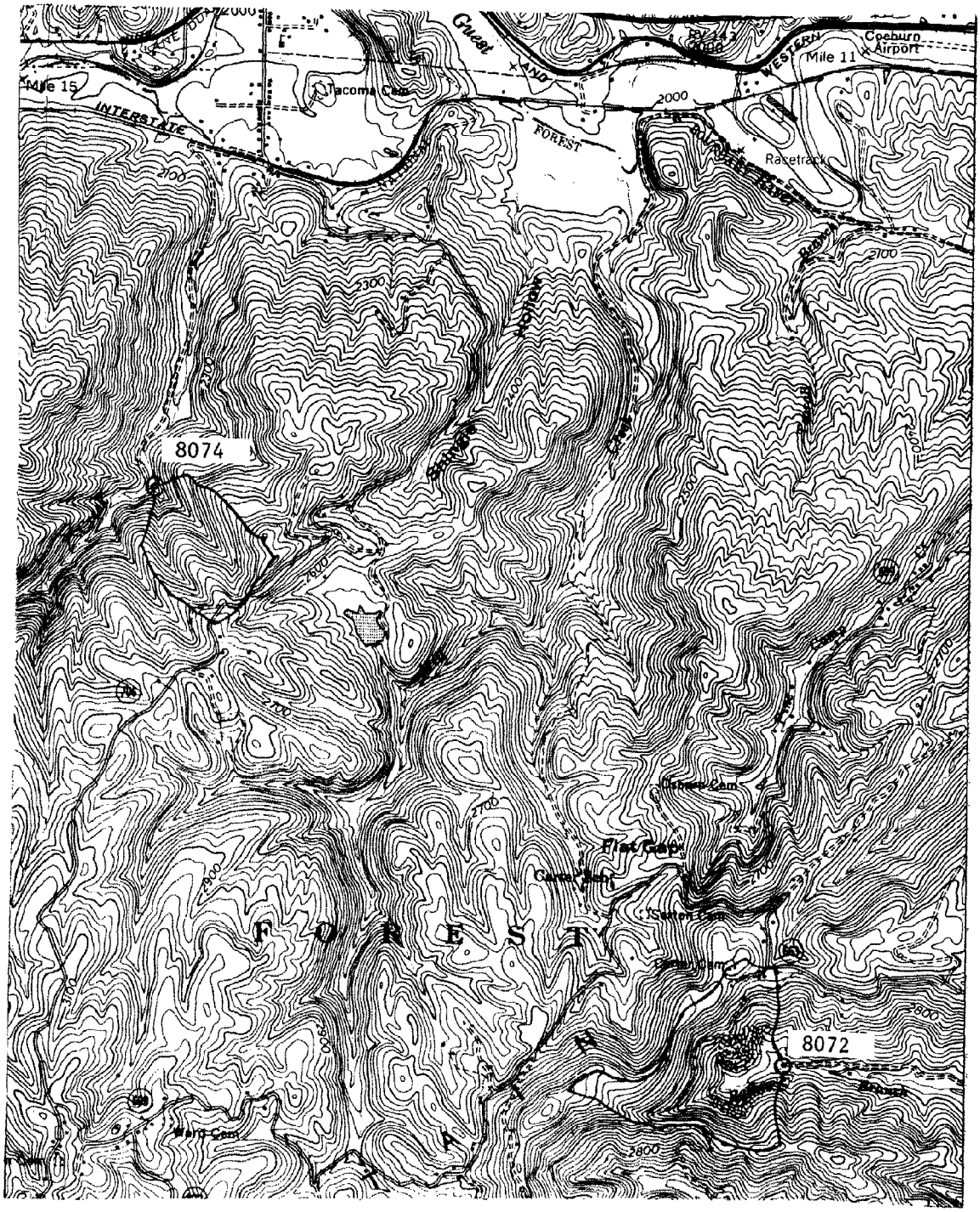

Figure 18. Location map for site 8072 and 8074, Wise Co., Virginia. Wise Quadrangle.

Figure 19. Location map for site 8073, Wise Co., Virginia. Norton Quadrangle.

Figure 20. Location map for site 8075, Wise Co., Virginia. Toms Creek Quadrangle.

TABLE 1. DESCRIPTIVE DATA FOR THE VIRGINIA WATER QUALITY SITES

Site Number	County	Approximate Date of Surf. Min.	Latitude	Longitude	Acres	Percent Disturbed[1/]	Site Name
8012	Buchanan	1974	37°11'24"	81°57'03"	159	15	Tributary to Levisa Fork Big Sandy River at Marvin.
8013	Buchanan	1950	37 17 46	82 06 13	29	40	Tributary to Six and Twentymile Creek near Grundy.
8016	Buchanan	Before 1972	37 13 15	82 02 15	79	4	Tributary to Levisa Fork Big Sandy River at Janey.
8021	Dickenson	Unmined	37 05 27	82 19 50	184	0	Tributary to Buffalo Creek near Stratton.
8022	Dickenson	1971-1976	37 04 50	82 17 02	278	18	Tributary to Middle Branch at Aily.
8023	Dickenson	1963-1966	37 02 27	82 19 45	67	10	Tributary to Blair Branch at Wakenva.
8031	Lee	Unmined[2/]	36 49 50	82 58 27	150	0[2/]	Tributary to Jones Creek at Robbins Chapel.
8032	Lee	1977	36 48 59	82 58 48	129	7	Tributary to Jones Creek near Robbins Chapel.
8033	Lee	1950-1972	36 50 33	82 59 21	106	20	Tributary to Mud Creek near Robbins Chapel.
8034	Lee	Unmined	36 49 59	82 58 12	55	0	Tributary to Jones Creek at Robbins Chapel.
8037	Lee	Unmined	36 49 56	82 58 18	112	0	Tributary to Jones Creek at Robbins Chapel.
8041	Russell	Unmined	36 58 04	82 10 20	101	0	Tributary to Millstone Branch at South Clinchfield.
8042	Russell	After 1972	37 01 09	82 08 47	109	45	Tributary to Skeen Creek near Jahile.

TABLE 1. DESCRIPTIVE DATA FOR THE VIRGINIA WATER QUALITY SITES (Continued)

Site Number	County	Approximate Date of Surf. Min.	Latitude	Longitude	Acres	Percent Disturbed[1/]	Site Name
8043	Russell	Before 1969	36°59'10"	82°12'31"	80	15	Tributary to Dumps Creek near South Clinchfield.
8044	Russell	Unmined	36 58 17	82 09 49	192	0	Tributary to Millstone Branch at South Clinchfield.
8045	Russell	After 1972	37 00 18	82 08 17	280	13	Grassy Branch near South Clinchfield.
8048	Russell	After 1972	36 59 57	82 08 58	716	5	Grassy Branch near South Clinchfield.
8051	Scott	Unmined	36 47 34	82 44 09	371	0	Tributary to Shupe Branch near Mabe.
8052	Scott	1971-1975[3/]	36 47 34	82 44 08	485	3	Shupe Branch near Mabe.
8053	Scott	Before 1969	36 47 02	82 44 20	121	15	Tributary to Stock Creek near Mabe.
8061	Tazewell	Unmined	37 16 40	81 23 54	469	0	Farmers Branch at Boissevain.
8062	Tazewell	1976	37 17 45	81 21 44	26	65	Tributary to Laurel Fork Bluestone River at Bernietown.
8063	Tazewell	Before 1968	37 10 38	81 47 45	76	16	Tributary to Big Creek at Jewell Ridge.
8064	Tazewell	Unmined	37 17 47	81 21 40	1	0	Tributary to Laurel Fork Bluestone River at Big Vein.[4/]
8065	Tazewell	1976	37 17 38	81 21 53	168	13	Jonathan Branch at Bernietown.[5/]
8067	Tazewell	Unmined	37 17 39	81 22 14	1094	0	Hughes Branch at Bernietown.

TABLE 1. DESCRIPTIVE DATA FOR THE VIRGINIA WATER QUALITY SITES (Continued)

Site Number	County	Approximate Date of Surf. Min.	Latitude	Longitude	Acres	Percent Disturbed[1/]	Site Name
8071	Wise	Unmined	36°55'07"	82°38'52"	405	0	Machine Branch at Benges Gap.
8072	Wise	1974-1975	36 53 51	82 30 30	87	30	Ramey Branch near Coeburn.
8073	Wise	Before 1969	36 55 21	82 44 26	67	25	Tributary to Powell River at Kelly View.
8074	Wise	Unmined	36 55 06	82 32 16	50	0	Tributary to Burns Creek near Tacoma.
8075	Wise	1950-1976[6/]	36 58 21	82 27 52	142	(25)	Lawson Branch at Toms Creek.

[1/] The percentage of land disturbed by surface mining was generally not verified by field observations and so may be subject to considerable error. Percentages enclosed by parentheses are based on very scanty or questionable information and may be subject to larger errors.

[2/] Watershed 8031 had no disturbance due to surface mining when it was inspected on August 30, 1977. On April 12, 1979 and before, the stream was always described as clear or murky. By May 8, 1979 a considerable area of land had been disturbed on the right fork of this watershed by road building and by what may have been prospecting for coal. On May 8, 1979 and afterward the stream was almost always described as muddy. The chemistry of the water remained essentially unchanged so the watershed designation of unmined was left unchanged.

[3/] Site 8052 drains an area with underground mines. These mines tilt steeply into the mountain, are flooded, and appear to have no measurable impact on the quality of water in the sampled stream.

[4/] Site 8064 is a spring in a road cut and has a surface drainage area of only an acre.

[5/] Stream 8065 was always dry except for a few pools of water found there on one occasion immediately after a storm.

[6/] Watershed 8075 was alleged to have abandoned underground mines which dated back to about the year 1930.

TABLE 2. TYPES OF WATER SAMPLES COLLECTED AT EACH SITE, VOLUME OF SAMPLE, TREATMENT OF SAMPLE, AND INCLUSIVE DATES OF COLLECTION

Sample Designation	Volume of Sample (ml)	Treatment/Inclusive Dates of Collection
F	100	Filtered (June 9, 1977 to July 29, 1979)
FA	100	Filtered, acidified with 0.5 ml 50% nitric acid (June 9, 1977 to July 29, 1979)
FN	50	Filtered, acidified with 0.25 ml 50% sulfuric acid (July 6, 1979 to July 29, 1979)
FP	50	Filtered, preserved with 0.25 ml 0.5% mercuric chloride (July 6, 1979 to July 29, 1979)
KJ	100	Unfiltered, acidified with 0.5 ml 50% sulfuric acid (July 6, 1979 to July 29, 1979)
SA	100	Unfiltered, acidified with 0.5 ml 50% nitric acid (Collected June 9, 1977 to about June 1978)
SV	1000	Unfiltered, untreated, raw water (Collected April 12, 1979 to July 6, 1979)
U	100	Unfiltered, untreated, raw water (Collected June 9, 1977 to July 29, 1979)

TABLE 3. TABULATION OF ELEMENTS ANALYZED ON THE SPECTRASPAN III EMISSION SPECTROMETER

Element	Approximate detection limit Mg/l	Approximate deviation from the mean
Aluminum	0.2	± 10%
Barium*	0.5	
Beryllium*	0.01	± 0.01 mg/l
Boron	0.05	± 10%
Calcium	0.05	± 10%
Cobalt	0.1	± 20%
Copper	0.02	± 20%
Iron	0.05	± 10%
Lead	0.1	
Lithium*	0.05	± 25%
Magnesium	0.05	± 10%
Manganese	0.05	± 20%
Molybdenum*	0.25	
Nickel	0.03	± 10%
Potassium	0.1	± 10%
Silicon	0.1	± 20%
Sodium	0.05	± 10%
Strontium*	0.03	± 20%
Titanium	0.5	
Zinc	0.3	± 10%

*Analyzed about every third month

TABLE 4. WATER QUALITY FOR SITE 8012 BUCHANAN COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L				MILLIGRAMS PER LITER										
9 2 77	21	0.0006			10	365	220	1.47	7.4		39	48	0	0.9	120	0.0					
9 30 77	14	0.0015			4	326	206	1.06	6.8		14	17	0	1.5	140	0.4					
11 4 77	14	0.02			4	318	208	1.34	7.0		21	26	0	1.2	120	0.7					
12 16 77	5	0.3	23*		4	249	178	1.21	7.4	-11	14	17	0	1.2	110	0.7					
2 28 78	2	0.7			7	258	169	1.23	6.9		7	9	0	1.3	110	0.9					
3 29 78	8	0.6			4	303	191	1.28	7.2		10	12	0	1.0	120	0.7					
4 21 78	8	0.04	43*		6	311	208	1.26	7.2		18	22	0	1.2	130	0.6					
5 17 78	12	0.15	19*		15	222	150	0.84	7.0		7	9	0	1.0	100	0.5					
6 20 78	18	0.1				311	189	1.28	7.5		19	23	0	1.1	110	1.0					
7 19 78	18	0.009			8	324	198	1.27	7.5		27	33	0	1.0	110	1.0					
8 17 78			32*		5	336	205	1.36	7.6		38	46	0	2.9	110	0.7					
12 12 78	6	0.1	7		0	253	160	1.12	7.1		11	14	0	1.6	98	1.1					
1 25 79	3	0.4	3		3	186	109	1.27	6.6		4	5	0	0.4	64	0.6					
2 23 79	6	0.4	12		25	190	106	1.21	6.4	1	7	8	0	0.8	63	0.5					
3 30 79	9	0.4			4	226	137	1.18	6.9	-1	5	6	0	1.0	86	0.5					
5 10 79	14	0.15	2	0.00	10	240	172	1.28	7.3	-4	11	13	0	1.3	110	0.4					
6 14 79	18	0.03	10		4	272	184		7.5	-12	19	23	0		120	0.4					
7 20 79	16	0.15	8		15	251	139	1.21	7.5	-14	16	20	0	1.8	79	0.5	0.1	0.00	0.45	0.05	0.01

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
9 2 77	0.0	0.00			32	0.0	0.00	0.0	3.4		21	0.0		8.4	0.01	0.0	4.1		0.0	0.0
9 30 77	0.0	0.00			24	0.0	0.00	0.0	2.6		18	0.0		8.2	0.01	0.0	3.4		0.0	0.0
11 4 77	0.0	0.02	0.0	0.00	27	0.0	0.00	0.1	2.6	0.10	22	0.0	0.0	6.1	0.01	0.0	4.6	0.1	0.0	0.0
12 16 77	0.0	0.00			20	0.0	0.00	0.1	2.2		20	0.0		4.1	0.01	0.0	4.1		0.0	0.0
2 28 78	0.1	0.01	0.0	0.00	18	0.0	0.00	0.1	2.6	0.00	20	0.0	0.0	4.8	0.02	0.0	3.9	0.1	0.0	0.0
3 29 78	0.0	0.04			22	0.0	0.00	0.1	2.4		24	0.0		4.0	0.01	0.0	4.3		0.0	0.0
4 21 78	0.0	0.00	0.1	0.00	23	0.0	0.00	0.1	2.5	0.04	25	0.0	0.0	5.4	0.02	0.0	3.7	0.1	0.0	0.0
5 17 78	0.0	0.00			15	0.0	0.00	0.0	2.3		11	0.0		3.7	0.01	0.0	3.9		0.0	0.0
6 20 78	0.1	0.00			23	0.0	0.00	0.1	2.8		20	0.0		5.9	0.01	0.0	3.7		0.1	0.0
7 19 78	0.1	0.00	0.1	0.00	24	0.0	0.01	0.0	3.0	0.07	19	0.0	0.0	6.6	0.03	0.1	4.2	0.1	0.0	0.0
8 17 78	0.0	0.00			30	0.0	0.01	0.0	3.3		16	0.0		7.2	0.01	0.0	3.8		0.0	0.0
12 12 78	0.1	0.01			20	0.0	0.00	0.0	2.0		14	0.0		3.8	0.02	0.1	3.7		0.1	0.0
1 25 79	0.1	0.00			15	0.0	0.02	0.0	2.1		9.4	0.0		3.6	0.04	0.0	4.2		0.0	0.0
2 23 79	0.1	0.00			14	0.0	0.00	0.0	1.7		9.2	0.0		2.7	0.02	0.0	3.5		0.0	0.0
3 30 79	0.1	0.01	0.0	0.00	17	0.0	0.00	0.0	1.9	0.20	14	0.0	0.0	2.7	0.03	0.1	3.7	0.1	0.2	0.0
5 10 79	0.0	0.00			22	0.0	0.01	0.0	2.5		19	0.0		4.0	0.00	0.0	4.3		0.0	0.0
6 14 79	0.1	0.00			22	0.0	0.02	0.0	2.6		17	0.0		4.5	0.00	0.0	3.9		0.0	0.0
7 20 79	0.1	0.00	0.2	0.00	19	0.0	0.02	0.1	2.6	0.20	11	0.0	0.0	3.9	0.00	0.0	4.1	0.1	0.0	0.3

TABLE 5. WATER QUALITY FOR SITE 8013 BUCHANAN COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	*NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L				MILLIGRAMS PER LITER										
9 2 77	18	0.004			10	672	538	0.88	4.6		0	0	0	0.4	390	0.0					
9 30 77	16	0.0025			4	732	572	0.88	4.5		0	0	0	1.2	410	0.3					
11 4 77	13	0.015			0	618	464	1.04	4.3		0	0	0	1.0	310	0.6					
12 16 77	6	0.015	23*		4	488	336	0.96	4.3		0	0	0	1.2	230	0.8					
2 28 78	4	0.1			0	603	431	1.08	4.5		0	0	0	1.1	290	0.5					
3 29 78	8	0.09			4	631	450	1.04	4.2		0	0	0	1.0	300	2.4					
4 21 78	10	0.015	39*		4	746	585	0.96	4.3		0	0	0	0.9	410	0.5					
5 17 78	12	0.05	13		7	633	441	0.95	4.3		0	0	0	1.1	310	0.6					
6 20 78	15	0.003				750	492	1.00	4.2		0	0	0	0.9	340	0.3					
7 19 78	17	0.015	26*		0	698	475	0.95	4.2		0	0	0	0.7	330	0.5					
8 17 78			91*		25	477	293	1.09	4.5		0	0	0	0.9	190	0.6					
10 3 78	19	0.0006	46*		2	686	496	0.88	4.3		0	0	0	1.1	350	0.4					
11 15 78	15	0.005	39		30	674	451	1.08	4.6	29	0	0	0	1.1	300	0.4					
12 12 78	6	0.02	4		2	536	399	0.92	4.4	31	0	0	0	1.4	270	1.7					
1 25 79	4	0.07	6		3	448	319	0.91	4.5	26	0	0	0	0.6	220	0.6					
2 23 79	4	0.15	3		0	499	374	0.93	4.3	29	0	0	0	0.8	260	0.7					
3 30 79	11	0.09			3	606	446	0.99	4.3	43	0	0	0	0.7	310	0.5					
5 10 79	14	0.01	20	0.00	0	633	488	0.87	4.3	39	0	0	0	0.7	350	0.4					
6 14 79	16	0.005	12		6	507	338	0.90	4.1	26	0	0	0	1.6	230	0.6					

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
9 2 77	2.8	0.00			62	0.0	0.01	0.0	4.4		45	3.2		6.5	0.16	0.0	12		0.0	0.2
9 30 77	4.0	0.00			73	0.0	0.01	0.1	4.2		42	4.0		7.4	0.19	0.0	11		0.1	0.2
11 4 77	3.2	0.01	0.0	0.01	58	0.1	0.01	0.1	3.3	0.20	44	3.5	0.0	5.6	0.16	0.0	13	0.2	0.1	0.2
12 16 77	2.8	0.00			41	0.0	0.00	0.1	3.1		29	2.8		3.8	0.09	0.0	9.3		0.0	0.1
2 28 78	4.9	0.00	0.0	0.00	56	0.1	0.00	0.0	3.4	0.00	43	2.6	0.0	4.6	0.16	0.0	10.0	0.2	0.0	0.2
3 29 78	4.6	0.00			55	0.1	0.00	0.0	4.0		44	3.3		4.5	0.15	0.0	11		0.0	0.2
4 21 78	6.8	0.00	0.0	0.01	69	0.1	0.00	0.2	4.0	0.15	55	3.8	0.0	5.6	0.23	0.0	13	0.2	0.1	0.3
5 17 78	5.2	0.01			52	0.0	0.01	0.1	3.5		39	2.1		4.8	0.17	0.0	11		0.1	0.3
6 20 78	6.6	0.00			59	0.1	0.01	0.1	4.1		47	3.2		5.7	0.22	0.1	11		0.1	0.3
7 19 78	4.3	0.01	0.0	0.01	59	0.1	0.02	0.1	3.9	0.20	40	3.2	0.0	5.4	0.21	0.1	12	0.2	0.1	0.2
8 17 78	2.2	0.01			37	0.1	0.02	0.3	4.1		27	2.0		4.5	0.16	0.1	11		0.1	0.2
10 3 78	3.4	0.01	0.0	0.01	60	0.0	0.01	0.1	3.9	0.25	39	3.1	0.0	4.5	0.17	0.2	11	0.2	0.1	0.3
11 15 78	4.5	0.00			65	0.1	0.03	0.1	6.3		38	3.5		9.1	0.19	0.1	9.2		0.1	0.2
12 12 78	4.5	0.01			51	0.1	0.01	0.1	3.2		31	2.6		3.6	0.16	0.1	10		0.1	0.2
1 25 79	3.2	0.00			42	0.0	0.01	0.0	2.6		24	1.2		3.0	0.10	0.0	7.4		0.1	0.2
2 23 79	4.6	0.00			50	0.0	0.01	0.0	2.7		29	1.6		3.3	0.13	0.0	8.7		0.1	0.2
3 30 79	7.8	0.00	0.0	0.00	61	0.1	0.02	0.1	3.1	0.25	38	2.1	0.0	4.0	0.20	0.1	9.5	0.2	0.3	0.2
5 10 79	7.2	0.01			59	0.1	0.02	0.1	2.8		39	2.5		3.8	0.17	0.1	9.7		0.2	0.2
6 14 79	3.7	0.01			41	0.0	0.04	0.1	3.7		25	1.8		5.5	0.15	0.1	9.3		0.1	0.3

TABLE 6. WATER QUALITY FOR SITE 8016 BUCHANAN COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID- ITY	ALKA- LINITY	HCO3	CO3	CL	SO4	NO3 AS N	*NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L				MILLIGRAMS PER LITER										
9 2 77	19	0.0003			35	161	129	2.50	7.6		46	56	0	1.8	43	0.3					
9 30 77	16	0.002			4	272	148	2.37	7.3		52	64	0	2.8	50	0.7					
11 4 77	13	0.06			0	102	92	2.02	7.0		24	29	0	3.2	32	0.7					
2 28 78	4	0.25			3	112	68	1.70	7.1		13	16	0	3.2	27	0.5					
3 29 78	8	0.15			8	95	57	1.80	7.2		11	14	0	2.7	21	0.5					
4 21 78	9	0.005			15	139	81	2.21	7.5		24	29	0	2.7	28	0.4					
5 17 78	12	0.05	22*		20	105	63	1.78	7.0		15	18	0	2.2	24	0.5					
6 20 78	17	0.025				140	87	1.89	7.4		27	33	0	2.0	32	0.7					
7 19 78	18	0.0015	48*		10	174	107	2.77	7.5		39	48	0	2.1	31	0.6					
8 17 78	18	0.05			15	133	82	1.90	7.4		26	32	0	2.0	29	0.6					
11 15 78	14	0.015	7		7	281	157	2.92	8.2		79	94	1	3.5	42	0.2					
12 12 78	7	0.15	2		0	109	65	1.63	7.5	-10	11	14	0	2.5	23	1.6					
1 25 79	5	0.25	7		4	86	58	1.33	6.9		7	8	0	2.9	25	0.6					
2 23 79	6	0.25	9		5	90	60	1.69	6.9	-2	11	13	0	2.2	24	0.6					
3 30 79	10	0.2			4	95	66	1.46	7.1	-5	10	12	0	2.3	29	0.5					
5 10 79	13	0.08	2	0.00	9	114	85	1.19	7.3	-12	16	19	0	1.8	43	0.3					
6 14 79	15	0.05	24		5	142	89	1.31	7.5	-13	20	25	0	2.5	42	0.3					
7 20 79	15	0.09	11		15	149	86	1.45	7.3	-13	18	22	0	2.1	40	0.2	0.1	0.01	0.40	0.00	0.01

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
9 2 77	0.0	0.00			15	0.0	0.00	0.0	2.3		5.9	0.0		23	0.01	0.0	4.0		0.0	0.0
9 30 77	0.0	0.02			14	0.0	0.00	0.0	2.2		5.3	0.0		31	0.00	0.0	3.5		0.0	0.0
11 4 77	0.0	0.01	0.0	0.00	10	0.0	0.00	0.0	1.6	0.05	4.6	0.0	0.0	13	0.00	0.0	4.1	0.1	0.0	0.0
2 28 78	0.0	0.01	0.0	0.00	7.2	0.0	0.00	0.0	1.6	0.00	3.7	0.0	0.0	8.4	0.01	0.0	3.2	0.1	0.0	0.0
3 29 78	0.0	0.04			6.7	0.0	0.00	0.0	1.4		3.6	0.0		5.4	0.01	0.0	3.3		0.0	0.0
4 21 78	0.1	0.00	0.0	0.00	8.5	0.0	0.00	0.1	1.7	0.02	4.3	0.0	0.0	13	0.02	0.0	3.1	0.0	0.0	0.0
5 17 78	0.0	0.00			7.2	0.0	0.00	0.0	1.6		3.4	0.0		6.6	0.01	0.0	3.2		0.0	0.0
6 20 78	0.0	0.00			7.9	0.0	0.01	0.0	1.9		3.8	0.0		14	0.00	0.0	3.0		0.0	0.0
7 19 78	0.1	0.00	0.0	0.00	11	0.0	0.01	0.1	2.0	0.03	4.5	0.0	0.0	21	0.02	0.0	3.9	0.1	0.0	0.0
8 17 78	0.0	0.00			9.6	0.0	0.00	0.0	1.7		4.0	0.0		9.2	0.01	0.0	3.7		0.0	0.0
11 15 78	0.1	0.00			14	0.0	0.00	0.1	1.9		5.0	0.0		35	0.01	0.1	3.3		0.1	0.0
12 12 78	0.0	0.00			7.4	0.0	0.01	0.0	1.5		2.8	0.0		7.7	0.00	0.0	3.1		0.0	0.0
1 25 79	0.0	0.00			7.5	0.0	0.01	0.0	1.3		3.0	0.0		3.7	0.02	0.1	3.4		0.1	0.0
2 23 79	0.0	0.00			7.9	0.0	0.01	0.0	1.5		3.4	0.0		5.4	0.00	0.0	3.0		0.0	0.0
3 30 79	0.0	0.00	0.0	0.00	8.1	0.0	0.01	0.0	1.4	0.04	3.7	0.0	0.0	5.4	0.02	0.1	3.4	0.0	0.0	0.0
5 10 79	0.1	0.00			9.4	0.0	0.00	0.0	1.5		4.2	0.0		6.9	0.01	0.0	3.2		0.0	0.0
6 14 79	0.0	0.00			10	0.0	0.00	0.0	1.5		4.0	0.0		8.2	0.01	0.0	3.5		0.0	0.2
7 20 79	0.0	0.00	0.2	0.00	10	0.0	0.00	0.0	1.6	0.08	4.2	0.0	0.0	8.3	0.00	0.0	3.6	0.1	0.0	0.3

TABLE 7. WATER QUALITY FOR SITE 8021 DICKENSON COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L			MILLIGRAMS PER LITER											
6 24 77	18	0.05			4	62	39	1.87	6.9		11	14	0	0.7	12	0.3					
9 1 77	21	0.0015			20	85	52	2.20	6.8		15	18	0	0.7	17	0.1					
9 29 77	16	0.0015			4	113	57	2.48	7.2		16	20	0	2.0	16	0.4					
10 27 77	14	0.06	20		10	54	41	1.66	6.6		12	15	0	0.8	14	0.0					
11 22 77	11	0.6	37		20	52	39	1.91	6.6		8	10	0	0.8	13	0.1					
12 21 77	5	0.15	2		2	52	39	1.66	6.4		5	6	0	0.9	14	0.4					
1 25 78	5	4	69		75	48	31	1.88	6.6		4	5	0	0.6	11	0.0					
3 8 78	4	0.5			95	45	33	1.70	6.7		5	6	0	1.0	12	0.2					
4 19 78	16	0.4	45*		5	57	39	1.44	6.9		7	8	0	3.0	13	0.4					
5 17 78	19	0.5	28*		9	43	35	1.57	6.7		7	9	0	0.9	13	0.1					
6 14 78	13	0.15				46	32	1.81	6.7		5	6	0	0.8	11	0.1					
7 12 78	16	0.02	28*		4	46	35	2.17	7.0		8	10	0	1.0	10	0.3					
8 16 78	18	0.15	34*		35	48	36	2.59	7.1		10	12	0	0.7	9	0.1					
10 4 78	15	0.0003	25*		8	60	45	2.31	6.8		16	19	0	0.8	12	0.2					
11 8 78	8	0.0002	6		15	76	53	2.43	7.3	-19	20	25	0	1.2	15	0.0					
12 13 78	5	0.04	12		5	40	34	1.37	6.8		6	7	0	0.7	13	0.1					
1 31 79	2	0.04	13		5	39	32	1.54	6.5		3	4	0	0.7	13	0.0					
3 13 79			9		5	44	32	1.17	6.7	-2	4	5	0	0.8	13	0.1					
4 3 79	9	0.6	58		25	36	32	1.14	6.7		3	4	0	0.6	14	0.1					
5 9 79	15	0.2	20	0.00	5	42	33	1.67	6.9	1	7	8	0	0.7	11	0.0					
6 14 79	15	0.02	8		15	48	40	1.77	7.2	-3	11	14	0	1.2	12	0.1					
7 24 79	18	0.1	8		30	51	38	1.60	6.9	-7	10	12	0	0.9	12	0.1	0.0	0.01	0.45	0.10	0.01

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
6 24 77	0.0	0.00			2.9	0.0	0.00	0.1	1.4		1.9	0.0		3.6	0.00	0.0	4.0		0.0	0.0
9 1 77	0.0	0.01			5.4	0.0	0.00	0.0	2.1		3.2	0.0		5.2	0.02	0.0	4.2		0.0	0.0
9 29 77	0.0	0.00			5.9	0.0	0.01	0.0	2.1		2.8	0.0		7.7	0.01	0.0	4.0		0.0	0.0
10 27 77	0.0	0.00	0.0	0.00	3.9	0.0	0.02	0.1	1.6	0.04	2.0	0.0	0.0	2.8	0.02	0.0	3.6	0.0	0.0	0.0
11 22 77	0.0	0.00			3.6	0.0	0.00	0.1	1.4		2.3	0.0		3.4	0.00	0.0	4.2		0.0	0.0
12 21 77	0.0	0.00			4.0	0.0	0.00	0.1	1.2		2.3	0.0		2.6	0.00	0.0	4.2		0.0	0.0
1 25 78	0.1	0.00			2.9	0.0	0.00	0.2	1.1		2.1	0.0		2.4	0.00	0.0	4.0		0.0	0.0
3 8 78	0.1	0.01			2.8	0.0	0.00	0.2	1.1		2.0	0.0		2.6	0.00	0.0	3.8		0.0	0.0
4 19 78	0.0	0.00	0.0	0.00	3.2	0.0	0.00	0.1	1.3	0.00	2.2	0.0	0.0	2.9	0.03	0.0	3.7	0.0	0.0	0.0
5 17 78	0.0	0.00			2.8	0.0	0.00	0.1	1.3		1.8	0.0		2.7	0.00	0.0	3.7		0.0	0.0
6 14 78	0.1	0.00			2.8	0.0	0.00	0.1	1.3		2.0	0.0		2.5	0.01	0.0	3.6		0.0	0.0
7 12 78	0.0	0.00	0.0	0.00	3.8	0.0	0.00	0.0	1.3	0.03	2.1	0.0	0.0	2.3	0.00	0.0	4.0	0.0	0.0	0.0
8 16 78	0.0	0.00			4.0	0.0	0.01	0.1	1.8		2.0	0.0		2.3	0.00	0.0	4.4		0.0	0.0
10 4 78	0.0	0.00	0.0	0.00	4.6	0.0	0.00	0.1	1.7	0.02	2.5	0.0	0.0	3.4	0.00	0.0	4.4	0.0	0.0	0.0
11 8 78	0.0	0.00	0.0	0.00	5.6	0.0	0.00	0.1	2.0	0.15	3.0	0.0	0.0	4.4	0.01	0.0	4.2	0.2	0.0	0.0
12 13 78	0.0	0.00			2.7	0.0	0.00	0.1	1.0		1.4	0.0		2.4	0.01	0.0	4.0		0.0	0.0
1 31 79	0.0	0.00	0.0	0.00	3.3	0.0	0.01	0.0	0.8	0.04	1.8	0.0	0.0	2.0	0.00	0.0	3.7	0.0	0.0	0.3
3 13 79	0.0	0.01			2.4	0.0	0.00	0.1	0.9		1.6	0.0		1.4	0.02	0.1	4.0		0.0	0.0
4 3 79	0.1	0.00	0.0	0.00	2.5	0.0	0.01	0.1	1.2	0.25	1.4	0.0	0.0	1.8	0.01	0.0	3.6	0.0	0.0	0.0
5 9 79	0.0	0.00			2.9	0.0	0.00	0.0	1.0		1.8	0.0		2.1	0.01	0.0	4.4		0.1	0.0
6 14 79	0.0	0.00			3.7	0.0	0.00	0.1	1.2		2.0	0.0		2.4	0.00	0.0	4.6		0.0	0.1
7 24 79	0.0	0.01	0.0	0.00	3.4	0.0	0.00	0.1	1.1	0.03	1.7	0.0	0.0	2.2	0.01	0.0	4.6	0.0	0.0	0.0

TABLE 8. WATER QUALITY FOR SITE 8022 DICKENSON COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID- ITY	ALKA- LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PH
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L				MILLIGRAMS PER LITER										
6 24 77	16	0.06			10	358	218	1.41	7.7		42	51	0	4.7	120	1.1					
9 1 77	18	0.04			4	431	268	1.38	7.5		39	47	0	1.7	150	2.0					
9 29 77	16	0.09			4	456	270	1.13	7.5		35	43	0	1.7	160	0.8					
10 27 77	13	0.4	34		4	221	138	1.19	6.6		19	23	0	2.0	77	0.7					
11 22 77	9	0.3	88		15	197	159	1.27	7.3		18	22	0	2.8	89	0.7					
12 21 77	6	0.3	0		0	285	183	1.42	6.7		15	18	0	2.0	110	0.9					
1 25 78	4	9			50	140	90	1.42	6.8		13	16	0	2.2	45	0.5					
3 8 78	4	1.0			30	226	130	1.22	7.0		15	18	0	2.0	73	0.8					
4 19 78	15	0.2	38*		10	282	174	1.55	7.4		22	27	0	3.2	94	0.8					
5 17 78	17	0.3	33*		7	230	133	1.11	7.2		16	20	0	1.9	77	0.7					
6 14 78	13	0.3				281	166	1.19	7.3		11	14	0	1.5	100	0.8					
7 12 78	17	0.2	34*		4	301	193	1.58	7.6		25	30	0	1.7	100	0.7					
8 16 78	19	0.2	39*		20	298	172	1.40	7.6		26	32	0	1.9	93	0.7					
10 4 78	16	0.002	24*		4	379	252	1.38	7.8		40	49	0	2.0	140	0.6					
11 8 78	9	0.003	4		2	370	260	1.28	7.7		43	53	0	2.2	150	0.5					
12 13 78	6	0.02	2		1	254	141	1.20	7.3		19	23	0	1.6	81	0.3					
1 31 79	5	0.08	5		0	212	142	0.98	7.0		8	10	0	1.5	91	0.5					
3 13 79		0.15	8		3	225	128	1.14	6.7	-7	10	12	0	1.7	76	0.6					
4 3 79	10	1.5	92		70	130	81	1.21	6.6	-6	7	8	0	1.1	46	0.4					
5 9 79	13	0.5	7	0.00	7	196	126	1.25	7.3	-9	14	17	0	1.1	72	0.4					
6 14 79	14	0.05	3		5	219	129	1.40	7.5	-12	20	24	0	1.7	69	0.4					
7 24 79	17	0.15	8		20	240	128	1.28	7.5	-16	18	22	0	1.6	70	0.5	0.2	0.02	0.40	0.05	0.00

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
6 24 77	0.1	0.00			23	0.0	0.00	0.1	2.6		27	0.0		5.6	0.00	0.1	3.8		0.0	0.0
9 1 77	0.0	0.04			40	0.0	0.00	0.1	3.4		24	0.0		8.8	0.07	0.0	4.5		0.0	0.0
9 29 77	0.1	0.00			35	0.0	0.01	0.0	3.2		21	0.0		9.4	0.01	0.0	4.2		0.0	0.0
10 27 77	0.1	0.00	0.0	0.00	18	0.0	0.02	0.0	2.4	0.08	10	0.1	0.0	4.7	0.02	0.0	3.7	0.1	0.0	0.0
11 22 77	0.0	0.00			21	0.0	0.00	0.1	2.6		13	0.0		7.1	0.04	0.0	4.4		0.1	0.0
12 21 77	0.0	0.00			21	0.0	0.01	0.1	2.3		23	0.0		4.9	0.01	0.0	4.6		0.0	0.0
1 25 78	0.0	0.01			12	0.0	0.00	0.1	1.6		7.4	0.0		3.8	0.01	0.0	3.9		0.0	0.0
3 8 78	0.0	0.03			16	0.0	0.00	0.1	1.8		11	0.0		4.4	0.01	0.0	4.0		0.0	0.0
4 19 78	0.1	0.00	0.0	0.00	22	0.0	0.00	0.1	2.5	0.03	22	0.0	0.0	5.6	0.04	0.0	3.9	0.1	0.1	0.0
5 17 78	0.0	0.00			16	0.0	0.00	0.0	2.1		10	0.0		4.7	0.01	0.0	3.6		0.0	0.0
6 14 78	0.0	0.00			19	0.0	0.01	0.1	2.6		17	0.0		5.0	0.02	0.1	3.7		0.0	0.0
7 12 78	0.0	0.01	0.2	0.00	32	0.0	0.00	0.0	2.6	0.09	20	0.0	0.0	4.9	0.00	0.1	4.6	0.1	0.1	0.0
8 16 78	0.1	0.01	0.0	0.00	24	0.0	0.02	0.0	2.7	0.09	15	0.0	0.0	7.9	0.04	0.1	3.6	0.1	0.0	0.0
10 4 78	0.1	0.00	0.1	0.00	39	0.0	0.00	0.0	3.1	0.10	22	0.0	0.0	7.3	0.01	0.1	4.5	0.2	0.0	0.0
11 8 78	0.1	0.00			39	0.0	0.00	0.0	2.5		22	0.0		7.0	0.02	0.1	4.0		0.1	0.0
12 13 78	0.0	0.00			19	0.0	0.01	0.0	2.0		11	0.0		4.4	0.01	0.0	4.1		0.0	0.0
1 31 79	0.1	0.00	0.0	0.00	18	0.0	0.00	0.1	1.7	0.15	10	0.0	0.0	3.4	0.02	0.1	4.0	0.1	0.2	0.4
3 13 79	0.0	0.00			17	0.0	0.02	0.0	2.0		10	0.0		4.3	0.02	0.0	3.9		0.0	0.0
4 3 79	0.1	0.00			11	0.0	0.00	0.1	1.8		6.4	0.0		2.7	0.01	0.0	3.0		0.0	0.0
5 9 79	0.0	0.00			18	0.0	0.00	0.0	1.9		10	0.0		3.7	0.01	0.0	4.0		0.1	0.0
6 14 79	0.1	0.00			19	0.0	0.01	0.0	2.4		11	0.0		4.5	0.00	0.0	4.1		0.0	0.0
7 24 79	0.0	0.00	0.0	0.00	17	0.0	0.01	0.0	2.1	0.15	10	0.0	0.0	3.9	0.00	0.0	4.5	0.1	0.0	0.0

TABLE 9. WATER QUALITY FOR SITE 8023 DICKENSON COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L				MILLIGRAMS PER LITER										
9 1 77	19	0.002			10	126	68	1.99	6.7		17	21	0	1.0	26	0.2					
9 29 77	16	0.0025			4	125	70	1.76	7.3		20	24	0	1.9	26	0.3					
10 27 77	13	0.08	86		20	88	54	1.41	6.7		12	15	0	2.4	19	0.9					
11 22 77	10	0.04	81		50	75	56	1.69	6.5		14	17	0	1.5	20	0.4					
12 21 77	6	0.05	2		6	80	51	1.56	7.0		7	8	0	2.3	19	0.7					
4 19 78	16	0.08	39*		15	79	50	1.65	7.1		9	11	0	3.6	18	0.4					
5 17 78	20	0.09	28*		10	472	282	2.20	8.1		93	111	1	3.4	110	0.5					
6 14 78	14	0.025				69	41	1.70	6.8		10	12	0	1.4	14	0.4					
7 12 78	17	0.02	31*		20	66	48	1.63	7.0		9	11	0	1.5	19	0.3					
8 16 78	20	0.009	25*		8	80	50	2.07	7.3		14	17	0	0.8	17	0.3					
10 4 78	15	0.0006	18*		0	92	62	1.63	7.4		18	22	0	1.5	23	0.3					
11 8 78	10	0.0001	31		20	94	69	1.19	6.5	-10	8	10	0	1.2	35	0.2					
12 13 78	5	0.01	3		5	67	48	1.75	7.4		11	14	0	2.4	15	0.6					
1 31 79			4		15	62	42	1.59	6.7	-2	5	6	0	1.4	17	0.5					
3 13 79		0.01	14		3	61	45	1.32	6.8		7	8	0	1.4	19	0.4					
4 3 79	10	0.15	54		60	267	156	1.67	7.7		38	46	0	0.9	79	0.4					
5 9 79	14	0.08	4	0.00	15	60	44	1.50	6.8	-1	7	8	0	0.9	18	0.3					
6 14 79	15	0.02	20		5	65	49	1.80	7.1	-2	11	13	0	2.1	16	0.4					
7 24 79	19	0.09	9		25	70	49	1.59	7.1	-8	11	13	0	1.9	18	0.3	0.0	0.01	0.45	0.05	0.01

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
9 1 77	0.0	0.00			8.3	0.0	0.00	0.0	1.9		5.0	0.0		5.1	0.00	0.0	4.5		0.0	0.0
9 29 77	0.0	0.00			8.0	0.0	0.01	0.1	1.9		4.3	0.0		5.6	0.01	0.0	4.2		0.0	0.0
10 27 77	0.1	0.00	0.0	0.00	5.4	0.0	0.01	0.1	1.8	0.03	2.9	0.1	0.0	3.3	0.02	0.0	3.5	0.0	0.0	0.0
11 22 77	0.0	0.00			5.6	0.0	0.01	0.1	1.9		3.6	0.1		3.9	0.01	0.0	3.9		0.0	0.0
12 21 77	0.1	0.00			5.0	0.1	0.00	0.1	1.8		3.8	0.1		3.0	0.02	0.0	4.1		0.1	0.0
4 19 78	0.1	0.01	0.0	0.00	5.2	0.0	0.00	0.1	1.6	0.01	3.7	0.0	0.0	3.2	0.04	0.0	3.2	0.0	0.1	0.0
5 17 78	0.3	0.00			27	0.0	0.01	0.3	3.8		18	0.0		53	0.02	0.0	2.8		0.0	0.0
6 14 78	0.1	0.00			3.7	0.0	0.01	0.1	1.7		2.8	0.0		2.8	0.02	0.0	3.1		0.0	0.0
7 12 78	0.0	0.01	0.0	0.00	5.6	0.0	0.00	0.1	1.5	0.02	3.2	0.0	0.0	2.6	0.00	0.1	3.8	0.0	0.0	0.0
8 16 78	0.0	0.00			5.9	0.0	0.01	0.0	1.7		3.5	0.0		3.2	0.01	0.0	4.0		0.0	0.0
10 4 78	0.0	0.00	0.0	0.00	6.7	0.0	0.00	0.0	1.8	0.00	3.9	0.0	0.0	3.5	0.01	0.0	4.3	0.0	0.0	0.0
11 8 78	0.0	0.00			7.1	0.0	0.01	0.0	1.6		3.9	0.0		4.5	0.02	0.0	4.5		0.1	0.0
12 13 78	0.0	0.00			4.6	0.1	0.03	0.0	1.7		2.3	0.0		4.6	0.03	0.0	3.6		0.0	0.1
1 31 79	0.1	0.00	0.0	0.00	5.1	0.0	0.01	0.1	1.1	0.06	2.9	0.0	0.0	2.4	0.00	0.0	3.3	0.0	0.0	0.2
3 13 79	0.1	0.00			4.5	0.0	0.01	0.1	1.4		2.8	0.0		2.4	0.02	0.0	3.5		0.1	0.0
4 3 79	0.1	0.00			21	0.1	0.01	0.1	2.8		18	0.0		3.7	0.03	0.1	2.5		0.1	0.0
5 9 79	0.0	0.00			4.7	0.0	0.00	0.0	1.4		2.8	0.0		2.5	0.00	0.0	3.7		0.0	0.0
6 14 79	0.1	0.01			5.3	0.0	0.01	0.0	1.6		3.2	0.0		2.9	0.00	0.0	4.2		0.0	0.1
7 24 79	0.0		0.0	0.00	5.1	0.0		0.1	1.7	0.08	3.0	0.0	0.0	2.9	0.00	0.0	4.2	0.0	0.0	0.0

TABLE 10. WATER QUALITY FOR SITE 8031 LEE COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L							MILLIGRAMS PER LITER							
1 28 78	2	1.0			25	37	21	2.33	6.7		7	9	0	2.2	5	0.2					
3 9 78	8	2.5	33		35	25	21	1.48	6.4		3	4	0	0.8	7	0.1					
4 20 78	9	0.1	55*		15	30	27	1.92	7.0		7	9	0	0.7	8	0.1					
5 18 78	20	0.4	30*		20	32	26	1.71	6.9		7	8	0	1.2	7	0.3					
6 13 78	18	0.15				43	29	2.21	6.9		12	15	0	1.2	7	0.0					
7 11 78	22	0.02	18*		8	65	55	2.88	7.3		23	28	0	1.7	14	0.1					
8 17 78	22	0.01	35*		35	56	39	4.12	7.1		16	20	0	1.5	6	0.1					
10 3 78	18	0.001	32*		5	118	69	5.67	7.1		41	50	0	4.1	9	0.0					
11 7 78	11	0.001	19		45	148	98	3.99	7.1	-34	43	53	0	5.9	17	0.2					
12 12 78	5	0.06	15		20	33	30	2.46	7.2		11	13	0	0.9	7	0.2					
2 2 79			11		20	32	27	1.66	6.7		4	5	0	0.8	10	0.1					
3 14 79	6	0.03	32		25	28	29	1.49	6.7	0	8	10	0	0.7	10	0.1					
4 12 79	13	0.01	24	0.05	55	44	27	1.52	6.8	-2	6	7	0	0.8	9	0.1					
5 8 79	17	0.4		0.20																	
5 15 79	16	0.02	51	0.10	80	38	32	1.94	6.8	-4	10	12	0	0.5	9	0.2					
6 5 79	15	0.003	46	0.35	70	35	32	1.53	6.8	-1	9	11	0	0.8	10	0.1					
7 6 79	20	0.001	52*	0.35	120	77	49	5.04	7.7		27	33	0	0.7	7	0.1	0.1	0.07	0.85	0.30	0.01
7 29 79	20	0.003	33		40	77	55	3.87	7.1		30	37	0	1.9	9	0.3	0.0	0.09	0.50	0.10	0.00

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
1 28 78	0.0	0.01	0.0	0.00	2.5	0.0	0.00	0.1	0.7	0.00	1.0	0.0	0.0	2.5	0.00	0.0	0.8	0.0	0.0	0.0
3 9 78	0.0	0.00			1.4	0.0	0.00	0.1	0.8		1.2	0.0		1.3	0.00	0.0	2.8		0.0	0.0
4 20 78	0.0	0.00	0.0	0.00	2.4	0.0	0.00	0.2	0.8	0.00	1.6	0.1	0.0	1.8	0.00	0.0	3.0	0.0	0.0	0.0
5 18 78	0.0	0.00			2.0	0.0	0.00	0.2	0.7		1.3	0.0		1.6	0.00	0.0	3.2		0.0	0.0
6 13 78	0.1	0.00			2.2	0.0	0.02	0.3	1.2		1.5	0.1		1.9	0.02	0.0	2.8		0.0	0.0
7 11 78	0.0	0.01	0.0	0.00	7.2	0.0	0.00	0.7	1.3	0.03	3.0	0.2	0.0	5.6	0.00	0.0	3.5	0.0	0.0	0.0
8 17 78	0.0	0.00			5.6	0.0	0.00	0.6	1.6		2.2	0.2		2.3	0.00	0.0	3.9		0.0	0.0
10 3 78	0.0	0.01	0.0	0.00	9.2	0.0	0.00	0.5	2.3	0.03	3.2	0.2	0.0	8.9	0.01	0.0	3.3	0.0	0.0	0.0
11 7 78	0.1	0.05			7.8	0.0	0.01	0.8	6.3		3.3	0.2		18	0.01	0.0	4.8		0.0	0.0
12 12 78	0.0	0.00			3.5	0.0	0.00	0.2	0.7		1.3	0.1		2.1	0.01	0.0	3.1		0.0	0.0
2 2 79	0.1	0.00			3.2	0.0	0.00	0.2	0.7		1.5	0.1		1.5	0.00	0.0	2.8		0.0	0.2
3 14 79	0.1	0.00			2.4	0.0	0.01	0.2	0.9		1.5	0.1		1.5	0.01	0.0	3.1		0.0	0.0
4 12 79	0.0	0.00	0.1	0.00	2.4	0.0	0.00	0.2	0.7	0.10	1.4	0.1	0.0	1.3	0.00	0.0	2.9	0.0	0.1	0.1
5 8 79																				
5 15 79	0.1	0.00			3.5	0.0	0.00	0.3	1.1		1.6	0.1		1.6	0.01	0.0	3.2		0.0	0.1
6 5 79	0.1	0.00			2.6	0.0	0.02	0.3	0.9		1.3	0.1		2.0	0.00	0.0	3.7		0.0	0.0
7 6 79	0.1	0.01	0.0	0.00	7.8	0.0	0.00	0.5	1.2	0.05	2.6	0.2	0.0	2.5	0.02	0.0	4.5	0.0	0.0	0.1
7 29 79	0.0	0.00			7.3	0.0	0.00	0.4	2.0		2.9	0.3		3.1	0.01	0.0	4.0		0.0	0.0

TABLE 11. WATER QUALITY FOR SITE 8032 LEE COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L			---------- MILLIGRAMS PER LITER ----------											
6 30 77	17	0.02			30	204	107	0.84	6.2		4	5	0	0.9	68	0.7					
7 27 77	23	0.01			55	284	152	1.01	6.6		6	7	0	0.8	96	0.1					
8 30 77	19	0.04			50	234	154	0.86	6.4		7	8	0	0.3	100	0.8					
9 28 77	17	0.03			40	244	144	0.93	6.7		6	7	0	1.2	93	0.1					
10 28 77	14	0.15	10		4	204	110	0.95	6.4		8	10	0	1.1	70	0.1					
11 23 77	11	2.0	73		65	89	54	0.69	6.4		2	3	0	0.6	37	0.1					
12 22 77	5	0.2	0		4	128	68	1.15	6.7		3	4	0	0.8	40	0.2					
1 28 78	2	1.0			10	99	52	1.28	6.4		3	4	0	0.5	29	0.5					
3 9 78	7	0.3	65		110	116	59	1.25	6.3		2	3	0	0.7	33	0.3					
4 20 78	10	0.2	44*		6	73	43	1.27	6.5		2	2	0	0.6	23	0.2					
5 18 78	17	0.15	25*		20	83	52	1.06	6.4		4	5	0	1.1	28	0.3					
6 13 78	16	0.2				97	59	1.03	6.4		3	4	0	1.0	35	0.2					
7 11 78	18	0.04	39*		15	131	92	1.04	6.7		4	5	0	1.4	56	0.1					
8 17 78	21	0.06	16*		10	134	78	0.86	6.6		4	5	0	0.9	49	0.1					
10 3 78	16	0.005	28*		0	140	91	1.01	6.9		8	10	0	0.9	54	0.0					
11 7 78	11	0.0006	16		3	157	89	1.20	6.8	2	7	9	0	0.8	51	0.1					
12 12 78	5	0.01	3		3	91	59	1.33	7.0		7	8	0	0.7	31	0.1					
2 2 79		0.03	6		1	94	68	1.20	6.4		2	3	0	0.8	40	0.1					
3 14 79	6	0.025	7		2	86	64	1.14	6.5	2	5	6	0	0.7	36	0.1					
4 12 79	12	0.02	23	0.00	25	77	52	1.10	6.5	2	2	3	0	0.7	30	0.1					
5 15 79	15	0.004	11		0	90	56	1.16	6.4		2	2	0	0.8	30	0.7					
6 5 79	15	0.03	5		10	77	55	1.26	6.4	0	7	9	0	0.5	29	0.1					
7 6 79	18	0.003	55*		6	103	60	1.16	7.1		5	6	0	0.5	34	0.0	0.0	0.01	0.50	0.15	0.01
7 29 79	19	0.01	6		20	121	72	1.07	6.5	2	5	6	0	0.7	43	0.1	0.1	0.00	0.50	0.00	0.00

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	---------- MILLIGRAMS PER LITER ----------																			
6 30 77	0.0	0.00			10	0.0	0.00	1.2	1.8		7.4	2.2		2.3	0.01	0.0	3.4		0.0	0.0
7 27 77	0.0	0.00			18	0.0	0.00	3.4	2.4		12	3.9		2.6	0.01	0.0	4.1		0.0	0.0
8 30 77	0.0	0.00			16	0.0	0.00	1.8	2.2		11	2.1		2.6	0.02	0.0	4.0		0.0	0.0
9 28 77	0.0	0.00			15	0.0	0.01	2.8	2.2		11	3.4		3.1	0.03	0.0	3.6		0.0	0.0
10 28 77	0.1	0.00	0.0	0.00	12	0.1	0.02	0.5	1.9	0.08	8.1	1.4	0.0	2.2	0.04	0.1	3.4	0.0	0.0	0.0
11 23 77	0.0	0.00			4.5	0.0	0.00	0.3	0.7		3.2	0.4		1.1	0.01	0.0	1.9		0.0	0.0
12 22 77	0.1	0.00			7.8	0.0	0.00	0.4	1.2		5.9	0.7		1.6	0.01	0.0	3.3		0.0	0.0
1 28 78	0.0	0.00	0.0	0.00	6.1	0.0	0.00	0.3	1.1	0.00	5.2	0.5	0.0	1.5	0.01	0.0	1.6	0.0	0.0	0.0
3 9 78	0.0	0.01			7.1	0.0	0.00	0.2	1.3		5.4	0.4		1.6	0.01	0.0	2.9		0.0	0.0
4 20 78	0.0	0.00	0.0	0.00	4.6	0.0	0.00	0.1	1.0	0.01	3.9	0.3	0.1	1.6	0.01	0.0	2.5	0.0	0.0	0.0
5 18 78	0.0	0.00			5.2	0.0	0.01	0.2	1.0		4.0	0.3		1.5	0.00	0.0	3.2		0.0	0.0
6 13 78	0.1	0.00			5.3	0.0	0.01	0.2	1.8		4.7	0.4		2.2	0.03	0.1	2.6		0.1	0.0
7 11 78	0.1	0.01	0.0	0.00	10	0.0	0.00	1.1	2.0	0.04	7.3	1.6	0.0	2.0	0.00	0.0	3.6	0.0	0.0	0.0
8 17 78	0.1	0.01			7.3	0.1	0.00	0.9	1.6		5.5	0.8		1.3	0.06	0.3	3.2		0.5	0.0
10 3 78	0.0	0.00	0.0	0.00	9.6	0.0	0.00	0.9	1.6	0.02	6.9	1.8	0.0	1.7	0.01	0.0	3.8	0.0	0.0	0.0
11 7 78	0.0	0.00			10	0.0	0.01	0.1	1.8		7.5	1.6		2.6	0.04	0.0	3.9		0.1	0.0
12 12 78	0.0	0.00			7.1	0.0	0.00	0.2	1.0		5.3	0.4		1.8	0.01	0.0	3.0		0.0	0.0
2 2 79	0.1	0.00	0.0	0.00	8.9	0.0	0.01	0.1	1.1	0.07	5.6	0.4	0.0	1.9	0.03	0.1	3.2	0.0	0.3	0.3
3 14 79	0.1	0.00			6.8	0.0	0.03	0.2	1.7		4.8	0.2		2.4	0.04	0.0	3.2		0.0	0.0
4 12 79	0.0	0.00	0.2	0.00	5.8	0.0	0.00	0.1	1.0	0.03	4.3	0.2	0.0	1.2	0.01	0.0	2.8	0.0	0.0	0.2
5 15 79	0.1	0.00			6.5	0.0	0.01	0.2	1.2		4.7	0.2		1.6	0.01	0.0	3.2		0.0	0.1
6 5 79	0.1	0.00			6.5	0.0	0.00	0.2	1.2		4.4	0.2		1.6	0.00	0.0	3.1		0.0	0.0
7 6 79	0.0	0.00	0.0	0.00	6.6	0.0	0.02	0.1	1.3	0.05	5.1	0.4	0.0	1.5	0.01	0.0	3.3	0.0	0.0	0.0
7 29 79	0.1	0.01			8.3	0.0	0.00	0.0	1.5		5.5	0.3		1.7	0.01	0.0	3.6		0.0	0.0

TABLE 12. WATER QUALITY FOR SITE 8033 LEE COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L			MILLIGRAMS PER LITER											
6 30 77	18	0.09			20	266	131	0.84	5.8		2	2	0	0.7	93						
7 27 77	24	0.05			65	291	153	1.01	6.7		10	12	0	0.6	98	0.1					
8 30 77	20	0.08			25	248	158	0.92	6.5		14	17	0	0.6	100	0.1					
9 28 77	17	0.01			50	243	139	0.91	6.8		10	12	0	0.9	91	0.0					
10 28 77	16	0.1	25		10	204	127	0.97	6.1		5	6	0	0.7	82	0.0					
11 23 77	12	0.9	42		30	115	77	0.93	6.2		1	1	0	0.5	48	0.1					
12 22 77	1	0.3	1		2	209	127	0.87	4.8		0	0	0	0.6	84	0.1					
1 28 78	2	0.3			4	179	85	1.11	4.4		0	0	0	0.2	52	0.1					
3 9 78	9	0.4			10	117	69	1.02	4.9		0	0	0	0.5	42	0.2					
4 20 78	10	0.1	39*		0	223	118	1.08	4.6		0	0	0	0.4	75	0.1					
5 18 78	19	0.4	14		2	157	97	0.83	5.2		0	0	0	0.9	65	0.1					
6 13 78	19	0.09				161	95	0.84	5.9		1	1	0	0.5	64	0.1					
7 11 78	20	0.01			4	266	177	1.02	6.4		2	3	0	0.4	120	0.0					
8 17 78	21	0.09	11		0	222	122	0.84	6.6		4	5	0	0.4	81	0.0					
10 3 78	16	0.002	10		80	264	183	0.96	7.1		12	15	0	0.8	120	0.1					
11 7 78	10	0.0004	7		5	318	224	0.96	6.7	5	3	4	0	0.8	160	0.0					
12 12 78	3	0.015	5		0	185	99	0.93	6.4	12	2	3	0	0.7	63	0.0					
2 2 79	2	0.004	6		8	212	118	1.05	4.6		0	0	0	1.0	74	0.1					
3 14 79	7	0.002	9		1	132	94	0.78	4.8	9	0	0	0	0.7	64	0.1					
4 12 79	19	0.01	21	0.00	25	132	83	0.97	4.7	8	0	0	0	0.8	53	0.0					
5 15 79	18	0.003			6	258	137	0.71	3.6	22	0	0	0	0.9	88	2.3					
6 5 79	14	0.01	3		5	127	80	0.99	4.8	8	0	0	0	0.4	51	0.1					
7 6 79	17	0.002	27*		15	269	191		5.4	4	0	0	0		140	0.0	0.0	0.06	0.35	0.05	0.01
7 29 79	18	0.0008	33		45	217	120	0.93	6.4	10	2	2	0	0.5	79	0.1	0.2	0.10	0.40	0.05	0.00

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
6 30 77	0.1	0.00			12	0.0	0.01	0.8	1.6		9.1	2.2		2.7	0.02	0.1	3.3		0.0	0.1
7 27 77	0.2	0.00			17	0.0	0.01	1.8	1.8		13	2.9		3.5	0.02	0.0	3.9		0.0	0.0
8 30 77	0.0	0.00			16	0.0	0.00	1.3	2.3		12	2.1		3.7	0.02	0.0	3.9		0.0	0.0
9 28 77	0.4	0.00			14	0.0	0.01	3.2	2.2		10	1.7		3.5	0.02	0.0	3.3		0.0	0.0
10 28 77	0.1	0.01	0.0	0.00	14	0.0	0.00	1.4	1.8	0.06	10	1.8	0.0	2.4	0.02	0.0	4.8	0.1	0.0	0.0
11 23 77	0.4	0.00			7.3	0.0	0.00	0.5	1.5		5.6	0.9		2.1	0.02	0.0	4.2		0.1	0.0
12 22 77	1.0	0.00			12	0.0	0.00	2.7	1.5		10	2.0		2.2	0.04	0.0	4.9		0.0	0.1
1 28 78	1.3	0.00	0.0	0.00	8.6	0.0	0.01	1.4	1.5	0.00	7.9	1.2	0.0	2.0	0.03	0.0	3.9	0.1	0.1	0.1
3 9 78	0.6	0.02			6.2	0.0	0.00	0.4	1.4		6.1	1.0		1.7	0.02	0.0	3.6		0.0	0.0
4 20 78	1.2	0.00	0.0	0.00	13	0.0	0.00	1.2	1.3	0.04	11	2.1	0.0	2.7	0.04	0.0	4.0	0.1	0.0	0.0
5 18 78	0.9	0.00			8.2	0.1	0.01	0.6	1.2		7.7	1.4		2.0	0.05	0.2	4.0		0.3	0.0
6 13 78	0.1	0.00			7.6	0.1	0.02	1.0	1.6		7.8	1.8		2.1	0.05	0.1	3.2		0.0	0.0
7 11 78	0.1	0.01	0.1	0.00	17	0.0	0.00	2.4	1.6	0.09	19	3.3	0.0	2.7	0.00	0.0	4.6	0.2	0.0	0.0
8 17 78	0.1	0.01			11	0.1	0.01	3.4	1.6		9.3	1.9		1.8	0.07	0.3	3.8		0.5	0.0
10 3 78	0.1	0.00			18	0.0	0.00	2.4	2.0		16	2.5		3.0	0.02	0.0	4.3		0.0	0.0
11 7 78	0.1	0.00			27	0.0	0.00	0.4	4.7		19	1.9		3.3	0.02	0.1	4.1		0.0	0.0
12 12 78	1.0	0.00			9.8	0.0	0.01	1.2	1.4		7.8	1.2		1.7	0.03	0.0	4.5		0.0	0.0
2 2 79	1.3	0.01	0.1	0.00	14	0.0	0.02	1.9	1.6	0.15	10	1.5	0.0	2.3	0.05	0.1	4.6	0.1	0.2	0.3
3 14 79	0.8	0.00			8.3	0.0	0.01	0.4	1.2		6.6	0.9		1.6	0.03	0.0	4.0		0.0	0.1
4 12 79	0.7	0.00	0.2	0.00	8.5	0.0	0.00	0.3	1.3	0.05	6.8	0.9	0.0	1.6	0.05	0.0	4.2	0.0	0.0	0.2
5 15 79	0.7	0.00			12	0.0	0.01	0.6	1.0		9.5	1.5		1.8	0.06	0.1	4.6		0.2	0.1
6 5 79	0.5	0.00			8.2	0.0	0.00	0.5	1.1		6.7	1.0		1.7	0.03	0.0	4.0		0.0	0.1
7 6 79	0.2	0.00	0.0	0.00	18	0.1	0.01	1.7	1.2	0.40	17	2.4	0.0	2.5	0.00	0.0	5.5	0.2	0.2	0.0
7 29 79	0.1	0.01			13	0.0	0.00	0.8	1.6		9.6	1.9		2.2	0.03	0.0	4.5		0.0	0.0

TABLE 13. WATER QUALITY FOR SITE 8034 LEE COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L				MILLIGRAMS PER LITER										
8 30 77	20	0.015			40	63	31	5.79	7.4		15	18	0	0.4	4	0.1					

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
8 30 77	0.0	0.01			4.2	0.0	0.00	0.2	1.0		2.2	0.0		1.9	0.01	0.0	3.6		0.0	0.0

TABLE 14. WATER QUALITY FOR SITE 8037 LEE COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L				MILLIGRAMS PER LITER										
6 30 77	17	0.04			25	49	29	2.37	6.7		11	14	0	0.5	6	0.4					
7 27 77	21	0.004			55	61	35	3.36	7.1		14	17	0	0.5	7	0.1					
9 28 77	16	0.01			30	59	33	9.83	7.2		20	24	0	0.4	2	0.1					
10 28 77	15	0.06	37		8	32	26	3.59	6.8		11	14	0	0.8	4	0.1					
11 23 77	12	0.4	33		20	24	25	1.60	6.8		5	6	0	0.4	7	0.4					
12 22 77	4	0.15	5		4	31	29	1.64	6.9		5	6	0	0.6	9	0.1					

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
6 30 77	0.0	0.00			2.3	0.0	0.00	0.2	0.6		1.6	0.0		1.7	0.00	0.0	3.4		0.0	0.0
7 27 77	0.0	0.00			3.8	0.0	0.00	0.3	0.9		2.4	0.1		2.4	0.00	0.0	4.0		0.0	0.0
9 28 77	0.0	0.00			4.4	0.0	0.01	0.2	1.0		2.3	0.1		2.2	0.01	0.0	3.7		0.0	0.0
10 28 77	0.1	0.00	0.0	0.00	2.4	0.1	0.02	0.1	1.0	0.04	1.5	0.0	0.0	1.6	0.02	0.0	3.4	0.0	0.0	0.0
11 23 77	0.0	0.00			1.6	0.0	0.00	0.1	0.7		1.2	0.0		1.6	0.00	0.0	3.4		0.0	0.0
12 22 77	0.0	0.00			2.0	0.1	0.00	0.2	1.0		1.9	0.0		1.5	0.02	0.1	3.9		0.2	0.0

TABLE 15. WATER QUALITY FOR SITE 8041 RUSSELL COUNTY, VIRGINIA

DATE			WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID- ITY	ALKA- LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO	DA	YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L					MILLIGRAMS PER LITER									
1	28	78	0	1.5	7		10	50	35	1.90	6.6		6	7	0	1.1	11	0.3					
3	8	78	4	0.09			30	55	39	1.98	6.9		9	11	0	1.4	12	0.4					
4	19	78	15	0.06	50*		20	71	46	2.22	7.2		14	17	0	2.9	13	0.2					
5	17	78	18	0.08	24*		20	53	40	2.47	7.1		13	16	0	1.1	10	0.2					
6	14	78	15	0.3				56	39	2.39	6.9		14	17	0	1.1	10	0.3					
7	12	78	17	0.01	48*		15	68	51	3.07	7.4		21	26	0	1.0	12	0.2					
8	16	78	23	0.025	32*		30	73	48	4.84	7.3		24	29	0	0.8	7	0.3					
10	5	78	13	0.002	15		15	74	52	2.77	7.4		22	27	0	1.3	12	0.2					
11	8	78	9	0.002	12		3	74	51	2.77	7.4	-17	20	25	0	1.6	12	0.1					
12	13	78	4	0.04	7		7	50	41	1.55	7.2		10	12	0	1.3	13	0.5					
2	1	79	0	0.02	2		15	51	40	2.10	6.9	-6	9	11	0	1.4	11	0.3					
3	14	79	6	0.02	20		8	49	39	1.76	6.9	-4	11	13	0	1.4	12	0.3					
4	3	79	10	0.4	135		75	48	35	1.47	6.7		5	6	0	1.2	13	0.2					
5	9	79	15	0.1	65	0.00	55	53	44	2.22	7.4	-8	19	23	0	1.1	11	0.2					
6	14	79	17	0.01	16		20	60	46	2.62	7.3	-10	19	23	0	1.4	10	0.3					
7	24	79	20	0.15	27		35	56	41	2.10	7.2	-8	13	16	0	1.4	10	0.2	0.0	0.01	0.45	0.10	0.00

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE			AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO	DA	YR	MILLIGRAMS PER LITER																			
1	28	78	0.0	0.02	0.0	0.00	3.6	0.0	0.01	0.1	1.4	0.00	2.2	0.0	0.0	2.3	0.00	0.0	3.9	0.0	0.0	0.0
3	8	78	0.1	0.02			4.2	0.0	0.00	0.1	1.5		2.3	0.0		2.4	0.01	0.0	4.0		0.0	0.0
4	19	78	0.0	0.00	0.0	0.00	5.5	0.0	0.00	0.1	1.8	0.01	2.6	0.0	0.0	3.2	0.01	0.0	3.7	0.0	0.0	0.0
5	17	78	0.0	0.00			4.5	0.0	0.00	0.1	1.4		2.3	0.0		2.5	0.00	0.0	4.6		0.0	0.0
6	14	78	0.1	0.01			3.8	0.1	0.02	0.1	2.5		2.3	0.1		2.4	0.05	0.2	3.0		0.2	0.0
7	12	78	0.0	0.00	0.0	0.00	6.8	0.0	0.00	0.1	2.0	0.03	2.8	0.0	0.0	3.6	0.00	0.0	4.2	0.0	0.0	0.0
8	16	78	0.1	0.01			6.6	0.0	0.01	0.2	2.0		2.6	0.0		2.8	0.01	0.0	4.8		0.0	0.0
10	5	78	0.0	0.00	0.0	0.00	6.7	0.0	0.00	0.1	2.2	0.02	2.7	0.0	0.0	2.9	0.00	0.0	4.4	0.0	0.0	0.0
11	8	78	0.0	0.00			6.7	0.0	0.01	0.1	2.5		2.6	0.0		3.2	0.01	0.0	4.5		0.0	0.0
12	13	78	0.0	0.00			4.0	0.0	0.00	0.1	1.5		1.7	0.0		2.3	0.01	0.0	4.4		0.0	0.0
2	1	79	0.1	0.00	0.0	0.00	4.8	0.0	0.01	0.1	1.3	0.04	2.2	0.0	0.0	2.3	0.00	0.0	4.1	0.0	0.0	0.2
3	14	79	0.0	0.00			3.9	0.0	0.01	0.1	1.4		2.1	0.0		2.1	0.01	0.0	4.0		0.0	0.0
4	3	79	0.1	0.00	0.0	0.00	3.6	0.1	0.02	0.1	1.5	0.15	1.7	0.0	0.0	1.8	0.05	0.1	3.6	0.0	0.1	0.0
5	9	79	0.0	0.01			4.6	0.0	0.00	0.1	1.5		2.3	0.0		2.2	0.01	0.0	4.3		0.0	0.0
6	14	79	0.0	0.00			5.5	0.0	0.00	0.1	1.5		2.2	0.0		2.4	0.00	0.0	4.7		0.0	0.1
7	24	79	0.0	0.01	0.0	0.00	4.4	0.0	0.00	0.2	1.4	0.03	2.0	0.0	0.0	2.0	0.01	0.0	4.9	0.0	0.1	0.0

TABLE 16. WATER QUALITY FOR SITE 8042 RUSSELL COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L														
														MILLIGRAMS PER LITER							
6 22 77	19	0.02			30	536	309	1.67	7.2		89	108	0	1.2	150	0.1					
8 25 77	22	0.03			4	485	249	2.88	7.6		84	102	0	1.5	87	0.5					
9 29 77	18	0.006			4	560	370	1.73	8.0		96	115	1	1.5	180	0.1					
10 27 77	14	0.04			10	326	211	2.09	8.4		58	69	1	1.6	88	0.7					
11 22 77	11	0.25	25		4	480	311	1.82	7.5		69	84	0	1.4	150	0.4					
12 21 77	7	0.09	3		0	508	335	2.53	8.1		186	223	2	1.7	110	0.5					
1 28 78	4	1.5	15		10	412	242	1.78	7.7		55	67	0	1.3	120	0.9					
10 5 78	13	0.001	44*		20	459	302	1.77	8.3		103	123	2	1.4	130	0.1					
11 8 78	8	0.0003	7		2	462	328	1.66	8.4	-97	97	114	2	1.7	160	0.0					
12 13 78	8	0.02	38		8	446	319	1.58	8.1		79	94	1	0.7	160	0.8					
2 1 79	5	0.05	16		5	426	282	2.19	8.1	-75	89	107	1	1.6	120	0.3					
3 14 79	8	0.02			15	395	267	2.11	7.7	-76	89	107	0	1.9	110	0.5					
4 3 79	10	0.6	70		25	228	127	1.61	7.5		35	43	0	1.3	58	0.5					
5 9 79	14	0.25	14	0.00	15	391	296	1.79	8.2	-85	97	116	1	1.1	130	0.3					
6 14 79	15	0.1	21		10	367	262	1.81	8.2	-74	87	104	1	1.7	120	0.1					
7 24 79	16	0.2	12		20	392	228	1.88	8.2	-80	82	98	1	1.4	94	0.4	0.0	0.02	0.45	0.05	0.01

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
6 22 77	0.1	0.00			42	0.0	0.01	0.0	3.5		22	0.0		28	0.00	0.1	3.6		0.1	0.0
8 25 77	0.1	0.02			48	0.0	0.01	0.1	3.8		20	0.0		25	0.02	0.0	4.0		0.0	0.0
9 29 77	0.1	0.01			57	0.0	0.00	0.0	3.3		30	0.0		29	0.01	0.0	4.2		0.1	0.0
10 27 77	0.1		0.1	0.00	30	0.0	0.00	0.1	2.3	0.20	21	0.0	0.0	14	0.01	0.0	5.8	1.2	0.0	0.0
11 22 77	0.1	0.00			48	0.0	0.00	0.0	3.0		24	0.0		30	0.02	0.1	5.4		0.1	0.0
12 21 77	0.1	0.00			45	0.1	0.00	0.1	3.0		26	0.0		27	0.02	0.1	5.9		0.1	0.0
1 28 78	0.0	0.02	0.1	0.00	31	0.0	0.01	0.0	2.9	0.00	24	0.0	0.0	19	0.01	0.0	4.7	0.8	0.0	0.0
10 5 78	0.2	0.00	0.1	0.00	47	0.0	0.00	0.0	3.0	0.15	19	0.0	0.0	22	0.02	0.1	4.8	1.0	0.1	0.0
11 8 78	0.2	0.00			51	0.0	0.00	0.0	2.8		20	0.0		29	0.01	0.1	3.9		0.1	0.0
12 13 78	0.2	0.01			52	0.0	0.01	0.1	2.9		19	0.0		23	0.04	0.2	5.5		0.1	0.0
2 1 79	0.2	0.01			49	0.0	0.01	0.1	2.4		21	0.0		25	0.03	0.1	5.0		0.2	0.3
3 14 79	0.1	0.00			40	0.0	0.01	0.0	2.5		20	0.0		27	0.01	0.0	4.6		0.0	0.0
4 3 79	0.1	0.00			17	0.0	0.00	0.1	2.2		8.6	0.0		9.6	0.00	0.0	3.0		0.0	0.0
5 9 79	0.0	0.02			48	0.0	0.00	0.0	2.3		20	0.0		21	0.01	0.0	5.2		0.0	0.0
6 14 79	0.1	0.00			39	0.0	0.01	0.0	2.7		17	0.0		23	0.00	0.0	4.5		0.0	0.1
7 24 79	0.1	0.00	0.1	0.00	35	0.0	0.01	0.0	2.5	0.15	13	0.0	0.0	21	0.01	0.1	4.8	0.6	0.0	0.0

TABLE 17. WATER QUALITY FOR SITE 8043 RUSSELL COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UH/CM	MG/L				MILLIGRAMS PER LITER										
6 9 77	15	0.006			10	615	372	1.99	7.6		111	135	0	1.3	160						
8 25 77	19	0.004			25	521	347	2.17	8.0		104	125	1	0.9	140	0.4					
9 29 77	14	0.003			8	573	356	2.19	8.1		105	126	1	1.0	140	0.2					
10 27 77	13	0.025			8	313	197	2.06	7.0		52	63	0	0.9	80	0.3					
11 22 77	10	0.04	17		20	504	296	1.81	8.2		70	83	1	0.9	130	0.2					
12 21 77	6	0.06	5		2	448	271	1.83	8.2		74	88	1	1.1	120	1.1					
1 25 78	5	10	1690		1400	179	105	1.43	7.1		12	15	0	0.8	54	0.7					
3 8 78	5	0.2			40	302	182	1.82	7.6		46	56	0	1.0	81	0.3					
4 19 78	14	0.02	45#		10	511	337	1.72	8.2		91	109	1	3.1	150	0.2					
5 17 78	18	0.08	18#		20	377	247	1.72	8.0		67	81	0	1.0	110	0.2					
6 14 78	14	0.25				399	252	1.65	7.9		62	75	0	1.0	120	0.2					
7 12 78	18	0.004	52#		4	541	348	1.60	8.1		100	120	1	1.1	160	0.1					
8 16 78	21	0.007	63#		70	503	325	1.83	8.2		94	113	1	0.9	140	0.1					
10 5 78	15	0.0004	30#		40	563	337	2.04	8.4		120	142	2	1.1	130	0.3					
11 8 78	9	0.0002	16		7	597	406	1.64	8.5		137	160	3	1.2	180	0.1					
12 13 78	5	0.003	7		3	383	220	1.83	7.8		66	79	0	1.0	93	0.4					
2 1 79	2	0.01			0	360	224	1.47	7.8		51	62	0	1.0	110	0.2					
3 14 79	7	0.015	9		5	318	210	1.52	7.8	-53	61	73	0	1.3	98	0.2					
4 3 79	10	0.25	88		30	173	120	1.47	7.7		28	34	0	0.8	57	0.2					
5 9 79	14	0.15	31	0.00	15	332	232	1.54	8.0	-51	69	83	0	1.0	110	0.2					
6 14 79	15	0.03	11		8	439	280	1.76	8.0	-75	86	104	1	1.0	120	0.1					
7 24 79	18	0.08	10		15	355	223	1.43	8.0	-57	61	73	0	1.0	110	0.2	0.0	0.01	0.45	0.05	0.00

Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CD	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
6 9 77	0.1	0.00	0.1	0.00	22	0.0	0.00	0.2	2.9	0.20	10	0.0	0.1	100	0.01	0.0	3.6	0.1	0.0	0.0
8 25 77	0.0	0.00			22	0.0	0.01	0.1	3.6		9.5	0.0		100	0.02	0.0	3.3		0.0	0.0
9 29 77	0.0	0.03			22	0.0	0.00	0.0	3.0		9.4	0.0		110	0.01	0.0	3.9		0.0	0.0
10 27 77	0.1	0.02	0.0	0.00	14	0.0	0.00	0.1	2.1	0.07	7.5	0.0	0.0	49	0.01	0.0	5.2	0.2	0.1	0.0
11 22 77	0.1	0.00			16	0.0	0.00	0.0	2.6		8.0	0.0		82	0.01	0.0	3.8		0.1	0.0
12 21 77	0.1	0.02			18	0.1	0.00	0.2	2.6		9.8	0.0		64	0.03	0.1	4.5		0.2	0.0
1 25 78	0.1	0.04	0.0	0.00	12	0.0	0.00	0.2	1.8	0.00	6.9	0.0	0.0	12	0.00	0.0	3.3	0.1	0.0	0.0
3 8 78	0.1	0.00			13	0.0	0.00	0.1	1.8		7.0	0.0		42	0.01	0.0	3.5		0.0	0.0
4 19 78	0.0	0.00	0.0	0.00	20	0.0	0.00	0.1	3.0	0.05	10	0.0	0.0	85	0.01	0.0	3.0	0.3	0.0	0.0
5 17 78	0.0	0.01			18	0.0	0.00	0.1	2.3		9.0	0.0		54	0.00	0.0	4.0		0.0	0.0
6 14 78	0.0	0.00			17	0.0	0.01	0.0	2.9		8.4	0.0		58	0.01	0.0	3.3		0.0	0.0
7 12 78	0.0	0.01	0.1	0.00	22	0.0	0.00	0.0	3.4	0.08	9.9	0.0	0.1	79	0.00	0.0	3.9	0.3	0.0	0.0
8 16 78	0.1	0.01			23	0.0	0.01	0.1	3.2		11	0.0		77	0.01	0.1	4.5		0.1	0.0
10 5 78	0.1	0.01	0.1	0.00	22	0.0	0.00	0.0	3.2	0.06	10	0.0	0.0	84	0.02	0.1	3.9	0.3	0.0	0.0
11 8 78	0.1	0.00			24	0.0	0.01	0.0	2.6		10	0.0		95	0.01	0.0	3.7		0.0	0.0
12 13 78	0.1	0.01	0.0	0.00	18	0.0	0.00	0.1	2.3	0.15	8.0	0.0	0.0	47	0.02	0.1	4.3	0.2	0.0	0.0
2 1 79	0.1	0.00			19	0.0	0.00	0.1	2.0		8.4	0.0		41	0.04	0.1	3.8		0.2	0.5
3 14 79	0.1	0.00			17	0.0	0.01	0.0	2.2		6.8	0.0		39	0.02	0.0	3.5		0.0	0.1
4 3 79	0.1	0.00			9.8	0.0	0.00	0.1	1.6		4.6	0.0		20	0.02	0.0	3.6		0.0	0.0
5 9 79	0.1	0.01			19	0.0	0.01	0.0	2.2		8.0	0.0		42	0.01	0.0	3.9		0.1	0.0
6 14 79	0.1	0.01			23	0.0	0.01	0.3	2.6		8.9	0.0		60	0.00	0.0	4.0		0.0	0.5
7 24 79	0.1	0.00	0.0	0.00	18	0.0	0.01	0.0	2.2	0.08	7.5	0.0	0.1	39	0.00	0.0	4.4	0.2	0.0	0.0

TABLE 18. WATER QUALITY FOR SITE 8044 RUSSELL COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID- ITY	ALKA- LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L				MILLIGRAMS PER LITER										
6 22 77	18	0.007			4	57	36	1.74	7.1		12	15	0	1.0	11	0.1					
8 25 77	22	0.007			30	97	53	3.15	6.8		23	28	0	1.0	12	0.2					
9 29 77	16	0.01			4	95	56	5.49	7.1		30	36	0	1.5	8	0.2					
10 27 77	13	0.04			20	70	51	2.45	7.3		16	19	0	1.9	12	0.4					
11 22 77	9	0.03	26		8	58	44	2.63	7.2		12	15	0	1.3	12	0.1					
12 21 77	4	0.06			8	63	45	1.79	6.5		11	13	0	1.6	14	0.3					

DATE	AL	B	BA	BE	CA	CD	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
6 22 77	0.0	0.00			3.2	0.0	0.00	0.0	1.2		1.8	0.0		2.2	0.00	0.0	3.4		0.0	0.0
8 25 77	0.0	0.02			7.4	0.0	0.00	0.1	2.3		2.9	0.0		3.7	0.01	0.0	4.2		0.0	0.0
9 29 77	0.0	0.00			8.6	0.0	0.00	0.1	2.3		3.4	0.0		4.6	0.00	0.0	4.3		0.0	0.0
10 27 77	0.1	0.03	0.0	0.00	6.1	0.0	0.00	0.2	2.0	0.04	2.8	0.0	0.0	3.1	0.01	0.0	5.1	0.0	0.0	0.0
11 22 77	0.0	0.00			5.5	0.0	0.00	0.1	1.8		2.6	0.0		3.2	0.01	0.0	4.4		0.1	0.0
12 21 77	0.1	0.00			4.6	0.0	0.00	0.2	1.5		2.5	0.0		2.4	0.01	0.0	4.8		0.1	0.0

TABLE 19. WATER QUALITY FOR SITE 8045 RUSSELL COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID- ITY	ALKA- LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L				MILLIGRAMS PER LITER										
6 22 77	19	0.05			25	147	73	2.00	7.1		26	32	0	1.5	26	0.1					

DATE	AL	B	BA	BE	CA	CD	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
6 22 77	0.0	0.00			7.3	0.0	0.01	0.2	2.1		4.2	0.1		9.0	0.00	0.1	2.8		0.1	0.0

TABLE 20. WATER QUALITY FOR SITE 8048 RUSSELL COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	#NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L				MILLIGRAMS PER LITER										
3 8 78	4	2.0	59		60	58	42	1.93	6.9		8	10	0	1.4	14	0.2					
4 19 78	17	0.8	53#		15	90	58	2.13	7.3		18	22	0	2.3	19	0.2					
5 17 78	19	1.0	31#		15	57	40	2.03	7.2		10	12	0	1.1	13	0.1					
6 14 78	15	0.4				78	51	2.51	7.4		18	22	0	1.5	14	0.1					
7 12 78	15	0.4	42#		8	103	61	2.97	7.6		26	32	0	1.2	16	0.1					
8 16 78	23	0.25	19#		4	88	56	2.79	7.5		23	28	0	1.3	14	0.2					

Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CD	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
3 8 78	0.1	0.04			4.1	0.0	0.00	0.2	1.4		2.9	0.0		3.5	0.00	0.0	3.7		0.0	0.0
4 19 78	0.0	0.00	0.0	0.00	6.7	0.0	0.00	0.2	1.8	0.01	3.9	0.0	0.0	5.4	0.00	0.0	3.1	0.1	0.0	0.0
5 17 78	0.0	0.00			4.0	0.0	0.00	0.1	1.4		2.5	0.0		3.8	0.00	0.0	3.6		0.0	0.0
6 14 78	0.0	0.00			5.8	0.0	0.00	0.2	1.8		3.2	0.0		4.4	0.01	0.0	3.7		0.1	0.0
7 12 78	0.0	0.00	0.0	0.00	8.8	0.0	0.00	0.2	2.0	0.05	4.1	0.0	0.0	4.7	0.00	0.0	3.5	0.1	0.0	0.0
8 16 78	0.0	0.01			6.5	0.0	0.01	0.3	1.9		3.4	0.0		4.9	0.02	0.1	4.2		0.1	0.0

TABLE 21. WATER QUALITY FOR SITE 8051 SCOTT COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L			MILLIGRAMS PER LITER											
8 31 77	18	0.0000			0	16	12	1.31	5.1		0	0	0	0.3	4	0.2					
9 29 77	13	0.01			4	17	14	1.15	6.0		2	2	0	1.1	4	0.1					
10 27 77	12	2.5			4	22	19	0.83	5.2		0	0	0	0.6	8	0.0					
11 23 77	10	4	33		40	16	12	0.93	4.4		0	0	0	0.7	5	0.0					
12 22 77	2	1.0	0		2	29	16	1.00	5.5		0	0	0	0.3	8	0.5					
1 28 78	2	6	4		8	17	10	1.61	5.0	9	0	0	0	0.3	4	0.0					
4 20 78	5	0.7	45*		4	14	15	0.71	5.4		0	0	0	0.6	8	0.1					
5 18 78	15	0.6	18*		8		11		5.3		0	0	0		5	0.1					
6 13 78	13	0.4				14	11	1.00	5.2		0	0	0	0.7	4	0.0					
7 11 78	18	0.015	32*		4	14	15	0.85	5.3		0	0	0	0.6	7	0.1					
8 17 78	12	0.08	18*		0	15	14	1.07	5.1		0	0	0	0.5	7	0.0					
10 3 78	14	0.004	16*		9	15	14	0.72	4.8		0	0	0	0.5	7	0.0					
11 8 78	8	0.003	7		4	14	13	1.24	5.9	4	1	1	0	0.5	4	0.1					
12 14 78	4	0.2	5		0	14	10	1.00	5.2	3	0	0	0	0.5	4	0.0					
2 2 79	0	0.25	3		0	14	17	1.26	4.8		0	0	0	0.5	8	0.0					
3 14 79	6	0.1	7		0	15	11	0.66	4.7	4	0	0	0	0.6	5	0.0					
4 3 79	8	0.3			2	15	12	0.66	5.1		0	0	0	0.6	6	0.1					
5 8 79	12	0.7	4	0.00	3	15	12	0.98	4.9	9	0	0	0	0.3	6	0.0					
6 13 79	15	0.1	11		0	14	13	0.68	5.1	5	0	0	0	0.7	6	0.0					
7 23 79	14	0.1	1		8	16	13	0.87	5.0	11	0	0	0	0.6	5	0.0	0.0	0.01	0.40	0.15	0.02

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CD	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
8 31 77	0.0	0.00			0.6	0.0	0.00	0.0	0.4		0.7	0.1		0.8	0.00	0.0	1.9		0.0	0.0
9 29 77	0.0	0.01			0.8	0.0	0.00	0.0	0.6		0.5	0.0		0.9	0.01	0.0	2.0		0.0	0.0
10 27 77	0.1	0.02	0.0	0.00	0.9	0.1	0.00	0.1	0.5	0.04	1.0	0.0	0.0	0.5	0.02	0.0	3.4	0.0	0.1	0.0
11 23 77	0.1	0.00			0.6	0.0	0.00	0.1	0.3		0.7	0.0		0.6	0.00	0.0	1.5		0.0	0.0
12 22 77	0.0	0.01			1.8	0.0	0.00	0.1	0.4		1.2	0.0		0.4	0.02	0.0	0.5		0.1	0.0
1 28 78	0.1	0.05	0.0	0.00	0.7	0.0	0.00	0.0	0.4	0.00	0.9	0.0	0.0	0.6	0.01	0.0	1.1	0.0	0.1	0.0
4 20 78	0.1	0.00	0.0	0.00	0.7	0.0	0.00	0.0	0.4	0.01	0.8	0.0	0.0	0.5	0.00	0.0	1.4	0.0	0.0	0.0
5 18 78	0.1	0.00			0.8	0.0	0.00	0.0	0.4		0.7	0.0		0.5	0.00	0.0	1.0		0.0	0.0
6 13 78	0.0	0.00			0.6	0.0	0.01	0.0	0.2		0.6	0.0		0.5	0.01	0.0	2.0		0.0	0.0
7 11 78	0.1	0.01	0.0	0.00	0.9	0.0	0.00	0.0	0.4	0.02	0.8	0.0	0.0	0.5	0.00	0.0	1.8	0.0	0.0	0.0
8 17 78	0.0	0.00			0.7	0.0	0.00	0.0	0.4		1.3	0.0		0.4	0.00	0.0	2.0		0.0	0.0
10 3 78	0.0	0.00	0.0	0.00	0.8	0.0	0.01	0.0	0.5	0.01	0.6	0.0	0.0	0.4	0.00	0.0	2.0	0.0	0.0	0.0
11 8 78	0.1	0.00			0.8	0.0	0.00	0.0	0.7		0.6	0.0		0.7	0.00	0.0	2.0		0.0	0.0
12 14 78	0.1	0.00			0.6	0.0	0.02	0.0	0.4		0.5	0.0		0.4	0.01	0.0	1.7		0.0	0.0
2 2 79	0.1	0.00	0.0	0.00	1.8	0.0	0.00	0.3	0.5	0.01	1.2	0.1	0.0	0.6	0.00	0.0	1.7	0.0	0.0	0.2
3 14 79	0.1	0.00			0.5	0.0	0.00	0.0	0.3		0.5	0.0		0.3	0.00	0.0	1.4		0.0	0.0
4 3 79	0.1	0.00	0.0	0.00	0.7	0.0	0.00	0.0	0.4	0.10	0.5	0.0	0.0	0.4	0.00	0.0	1.3	0.0	0.0	0.0
5 8 79	0.1	0.00			0.6	0.0	0.00	0.0	0.4		0.8	0.0		0.4	0.00	0.0	1.6		0.0	0.0
6 13 79	0.1	0.00			0.8	0.0	0.00	0.0	0.4		0.6	0.0		0.3	0.00	0.0	1.7		0.0	0.1
7 23 79	0.1	0.00	0.0	0.00	0.6	0.0	0.00	0.1	0.4	0.01	0.7	0.0	0.0	0.4	0.02	0.0	2.0	0.0	0.1	0.0

TABLE 22. WATER QUALITY FOR SITE 8052 SCOTT COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L			MILLIGRAMS PER LITER											
8 31 77	18	0.01			40	29	20	5.22	7.3		9	11	0	0.5	3	0.2					
9 29 77	12	0.02			90	51	33	2.73	6.7		10	12	0	1.1	9	0.1					
10 27 77	13	3			15	17	20	1.17	5.4		0	0	0	0.9	7	0.0					
11 23 77	10	3	82		70	23	18	1.37	5.0		0	0	0	0.6	8	0.1					
12 22 77	1	1.5	0		4	31	23	0.83	5.5		0	0	0	0.3	10	0.3					
1 28 78	2	6	8		15	18	14	1.42	5.5		0	0	0	0.4	6	0.1					
3 9 78	5	2.0			20	17	14	1.18	6.1		0	0	0	0.4	7	0.1					
4 20 78	5	0.8	48*		1	21	22	1.17	6.7		5	6	0	0.6	9	0.1					
5 18 78	15	1.0	35*		10	18	16	1.32	6.5		2	3	0	0.6	7	0.1					
6 13 78	21	0.3				23	16	2.07	6.4		3	4	0	0.7	4	0.1					
7 11 78	20	0.06	119*		150	41	31	2.11	7.0		9	11	0	0.8	10	0.1					
8 17 78	18	0.07	26*		50	31	27	1.46	6.8		8	10	0	0.6	10	0.1					
10 3 78	15	0.02	54*		15	36	23	2.91	6.9		10	12	0	0.6	5	0.0					
11 8 78	8	0.01	26		10	45	31	2.71	7.3	-8	15	18	0	0.9	8	0.1					
12 14 78	2	0.5	8		0	19	16	1.03	6.6		1	1	0	0.5	7	0.0					
2 2 79	0	0.3	3		2	19	15	1.39	6.3	1	2	2	0	0.5	6	0.1					
3 14 79	7	0.2	9		3	19	16	0.93	6.2	2	2	2	0	0.7	7	0.1					
4 3 79	9	1.0			35	16	15	0.82	6.0	12	1	1	0	1.3	7	0.0					
5 8 79	15	1.0	22	0.00	15	16	16	1.14	6.4	2	2	3	0	0.3	7	0.0					
6 13 79	15	0.15	7		9	18	17	1.20	6.5		5	6	0	1.1	5	0.0					
7 23 79	14	0.25	12		20	23	18	1.81	6.6	0	5	6	0	0.6	5	0.0	0.0	0.04	0.40	0.15	0.01

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
8 31 77	0.0	0.02			2.7	0.0	0.00	0.1	1.0		1.9	0.1		0.9	0.01	0.0	1.5		0.0	0.0
9 29 77	0.0	0.00			4.2	0.0	0.01	2.2	1.5		2.7	0.6		1.6	0.01	0.0	1.7		0.0	0.0
10 27 77	0.1		0.0	0.00	1.2	0.1	0.00	0.2	0.7	0.04	1.1	0.1	0.0	0.6	0.02	0.0	3.9	0.0	0.1	0.0
11 23 77	0.1	0.00			1.8	0.0	0.01	0.3	0.7		1.3	0.1		1.0	0.00	0.0	1.8		0.0	0.0
12 22 77	0.2	0.00			1.5	0.1	0.00	0.6	1.0		0.9	0.1		0.8	0.02	0.1	2.4		0.1	0.0
1*28 78	0.1	0.04	0.0	0.00	1.1	0.0	0.00	0.2	0.5	0.00	1.1	0.0	0.0	0.7	0.00	0.0	1.7	0.0	0.0	0.0
3 9 78	0.1	0.00			1.1	0.0	0.00	0.1	0.6		1.1	0.0		0.6	0.01	0.0	1.4		0.0	0.0
4 20 78	0.0	0.00	0.0	0.00	1.5	0.0	0.00	0.4	0.6	0.01	1.4	0.2	0.0	0.8	0.00	0.0	1.6	0.0	0.0	0.0
5 18 78	0.0	0.00			1.5	0.0	0.00	0.2	0.7		1.1	0.1		0.7	0.01	0.0	1.2		0.0	0.0
6 13 78	0.1	0.00			1.4	0.0	0.02	0.3	0.6		1.1	0.1		0.8	0.01	0.0	2.1		0.0	0.0
7 11 78	0.1	0.01	0.0	0.00	3.5	0.1	0.01	0.5	1.4	0.03	2.6	0.2	0.0	1.3	0.00	0.0	1.8	0.0	0.2	0.0
8 17 78	0.0	0.01			2.5	0.0	0.01	0.6	1.0		1.6	0.2		0.9	0.01	0.0	2.0		0.0	0.0
10 3 78	0.0	0.00	0.0	0.00	2.6	0.0	0.00	0.7	1.0	0.00	1.8	0.3	0.0	0.8	0.01	0.0	1.8	0.0	0.0	0.0
11 8 78	0.1	0.00			3.5	0.0	0.00	0.4	1.7		2.4	0.2		1.2	0.01	0.0	1.8		0.0	0.0
12 14 78	0.0	0.00			1.2	0.0	0.00	0.3	0.6		0.8	0.1		0.6	0.01	0.0	2.1		0.0	0.0
2 2 79	0.2	0.00	0.0	0.00	1.6	0.0	0.02	0.1	0.3	0.02	0.9	0.0	0.0	0.5	0.00	0.0	1.3	0.0	0.0	0.3
3 14 79	0.0	0.00			1.2	0.0	0.00	0.2	0.5		0.8	0.0		0.5	0.00	0.0	1.6		0.0	0.0
4 3 79	0.1	0.01	0.0	0.00	1.1	0.0	0.00	0.0	0.5	0.10	0.8	0.0	0.0	0.5	0.01	0.0	1.5	0.0	0.0	0.0
5 8 79	0.0	0.00			1.1	0.0	0.00	0.2	0.6		1.0	0.0		0.6	0.00	0.0	1.8		0.0	0.0
6 13 79	0.0	0.00			1.3	0.0	0.00	0.3	0.6		0.8	0.1		0.5	0.00	0.0	2.0		0.0	0.1
7 23 79	0.0	0.00	0.0	0.00	1.4	0.0	0.00	0.3	0.7	0.01	1.3	0.1	0.0	0.6	0.02	0.1	2.1	0.0	0.1	0.0

TABLE 23. WATER QUALITY FOR SITE 8053 SCOTT COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L					MILLIGRAMS PER LITER									
8 31 77	24	0.0001			200	72	43	1.94	6.9		15	18	0	0.5	16	0.1					
9 29 77	13	0.006			130	66	42	1.50	6.7		9	11	0	1.1	18	0.1					
10 27 77	15	0.1			50	48	31	1.36	5.9		3	4	0	0.6	14	0.1					
11 23 77	12	0.3	135		85	47	31	1.41	5.5		4	5	0	0.8	14	0.2					
12 22 77	4	0.2			15	54	32	1.34	6.2		1	1	0	0.4	16	0.3					
1 28 78	2	1.5	19		30	45	27	1.48	5.8		0	0	0	0.1	14	0.1					
3 9 78	5	0.6			75	46	30	1.31	5.8		3	4	0	0.8	14	0.3					
4 20 78	6	0.09	114*		75	41	31	1.19	6.4		2	3	0	0.6	16	0.1					
5 18 78	15	0.1	56*		60	45	27	1.08	6.5		2	3	0	1.2	13	0.4					
6 13 78	21	0.05				47	24	1.20	6.5		3	4	0	0.9	12	0.1					
7 11 78	22	0.01	186*		170	48	34	1.58	6.6		5	6	0	1.0	14	0.1					
8 17 78	17	0.015	65*		250	58	34	1.25	6.7		5	6	0	0.7	16	0.1					
10 3 78	16	0.0005	41*		30	58	36	1.81	6.7		7	9	0	0.8	14	0.1					
12 14 78	3	0.003	16		10	52	37	0.92	6.7		1	1	0	0.7	22	0.1					
2 1 79	2	0.15	62		15	54	33	1.20	6.3		2	3	0	0.9	17	0.2					
3 14 79	8	0.06	6		5	41	27	1.18	6.3	2	2	2	0	0.8	13	0.2					
4 3 79	10	0.9			230	38	27	1.17	6.5	0	2	3	0	0.7	13	0.1					
5 8 79	15	0.4	84	0.00	100	37	26	1.35	6.5	1	2	3	0	0.5	12	0.1					
6 13 79	15	0.05	72		8	43	33	1.19	6.7	2	6	7	0	0.7	16	0.1					
7 23 79	16	0.1	65		120	53	33	1.30	6.6	1	5	6	0	0.9	14	0.2	0.0	0.04	0.45	0.10	0.01

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
8 31 77	0.1	0.08			5.3	0.1	0.01	0.1	1.4		3.5	0.1		1.4	0.03	0.1	2.6		0.3	0.0
9 29 77	0.1	0.00			5.0	0.0	0.00	0.1	1.4		3.0	0.0		1.5	0.01	0.0	2.9		0.0	0.0
10 27 77	0.0	0.00	0.0	0.00	3.1	0.0	0.00	0.1	0.9	0.05	2.5	0.1	0.0	1.2	0.00	0.0	2.6	0.0	0.0	0.0
11 23 77	0.0	0.00			3.2	0.0	0.00	0.1	1.0		2.6	0.0		1.3	0.01	0.0	2.2		0.0	0.0
12 22 77	0.0	0.00			3.1	0.1	0.00	0.1	1.1		2.9	0.0		1.0	0.03	0.0	2.8		0.2	0.0
1 28 78	0.0	0.02	0.0	0.00	2.9	0.0	0.00	0.0	0.8	0.00	2.7	0.0	0.0	1.0	0.01	0.0	2.0	0.0	0.0	0.0
3 9 78	0.1	0.00			3.1	0.0	0.00	0.3	0.8		2.4	0.0		1.1	0.01	0.0	1.9		0.0	0.0
4 20 78	0.1	0.00	0.0	0.00	2.7	0.0	0.00	0.1	0.9	0.01	2.5	0.0	0.0	1.1	0.01	0.0	2.2	0.0	0.1	0.0
5 18 78	0.1	0.00			2.4	0.0	0.01	0.1	0.9		2.0	0.0		0.9	0.02	0.1	1.4		0.1	0.0
6 13 78	0.2	0.00			2.4	0.0	0.02	0.0	0.8		1.9	0.0		1.0	0.01	0.0	1.0		0.0	0.0
7 11 78	0.1	0.02	0.0	0.00	3.8	0.1	0.00	0.1	1.3	0.03	3.0	0.0	0.0	1.0	0.00	0.0	2.6	0.0	0.2	0.0
8 17 78	0.0	0.01			3.4	0.0	0.00	0.1	1.2		2.5	0.0		1.0	0.00	0.0	2.8		0.0	0.0
10 3 78	0.0	0.00	0.0	0.00	4.3	0.0	0.00	0.1	1.4	0.01	3.0	0.0	0.0	1.1	0.01	0.0	3.0	0.0	0.0	0.0
12 14 78	0.0	0.01			3.6	0.0	0.00	0.0	1.0		2.4	0.0		0.8	0.02	0.1	2.6		0.1	0.0
2 1 79	0.1	0.01	0.0	0.00	3.6	0.0	0.00	0.1	0.8	0.04	2.7	0.0	0.0	0.9	0.00	0.0	2.0	0.0	0.0	0.4
3 14 79	0.1	0.00			2.4	0.0	0.00	0.1	0.8		2.2	0.0		0.6	0.03	0.1	2.4		0.0	0.0
4 3 79	0.1	0.01	0.0	0.00	2.7	0.0	0.01	0.1	0.9	0.15	1.8	0.0	0.0	0.9	0.01	0.0	1.9	0.0	0.0	0.0
5 8 79	0.0	0.01			2.5	0.0	0.00	0.0	0.9		2.1	0.0		0.8	0.02	0.1	2.3		0.1	0.0
6 13 79	0.1	0.00			3.2	0.0	0.00	0.1	1.0		2.3	0.0		0.8	0.00	0.0	2.5		0.0	0.1
7 23 79	0.1	0.01	0.0	0.00	3.0	0.0	0.00	0.1	1.1	0.02	2.6	0.0	0.0	0.9	0.03	0.1	2.7	0.0	0.2	0.0

TABLE 24. WATER QUALITY FOR SITE 8061 TAZEWELL COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L				MILLIGRAMS PER LITER										
6 23 77	18	0.025			4	193	97	1.66	7.3		31	38	0	0.5	41	0.1					
9 2 77	23	0.0006			8	298	169	1.45	7.1		29	35	0	0.4	86	0.0					
10 13 77	7	0.01	4		4	279	183	1.32	7.5		23	28	0	0.4	100	0.0					
12 15 77	6	0.9	12		0	197	114	1.59	6.2		34	41	0	0.9	51	0.1					
2 27 78	8	0.7			6	217	125	2.03	7.8		43	53	0	0.7	49	0.1					
3 29 78	7	2.0	6		4	162	92	2.02	7.1		30	37	0	0.7	36	0.1					
4 20 78	9	0.15	67*		8	232	142	1.64	7.9		48	58	0	0.6	61	0.1					
5 17 78	14	0.4	13		7	176	106	1.77	7.5		35	43	0	0.7	44	0.1					
6 20 78	24	0.1				224	159	2.04	7.5		31	38	0	0.5	68	0.0					
7 19 78	19	0.025	44*		5	247	145	1.39	7.4		25	30	0	0.1	73	0.0					
8 16 78	20	0.2	26*		5	241	106	2.53	7.9		48	57	0	1.0	32	0.5					
10 4 78	16	0.0015	26*		7	248	154	1.17	7.4		26	32	0	1.0	84	0.0					
11 16 78	14	0.006	3		10	268	164	1.24	7.7		25	30	0	1.5	88	0.0					
12 12 78	6	0.003	3		3	252	158	1.12	7.2	-19	20	24	0	0.8	89	0.1					
1 29 79	5	0.6	1		3	169	103	1.67	7.2		22	27	0	0.1	47	0.1					
2 22 79	6	0.6	3		1	171	104	1.60	6.5	-25	28	34	0	0.5	48	0.1					
3 29 79	14	0.6			5	171	109	1.62	7.5	-28	32	39	0	0.8	48	0.1					
5 10 79	17	0.7	17	0.00	20	183	114	1.74	7.9	-33	35	43	0	1.1	48	0.5					
6 15 79	13	0.2	4		2	185	113		7.9	-36	44	54	0		43	0.0					
7 19 79	18	0.04	3		8	262	149	2.03	8.0	-48	52	62	0	0.8	58	0.1	0.1	0.10	0.65	0.05	0.01

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
6 23 77	0.0	0.00			16	0.1	0.01	0.0	1.4		5.5	0.1		3.5	0.00	0.2	4.2		0.2	0.0
9 2 77	0.1	0.06	0.0	0.00	29	0.0	0.01	0.2	2.1	0.15	9.4	0.2	0.0	7.2	0.04	0.1	7.6	0.2	0.3	0.0
10 13 77	0.0		0.0	0.00	30	0.0	0.00	0.3	1.8	0.15	12	0.1	0.0	6.3	0.01	0.0	8.6	0.2	0.0	0.0
12 15 77	0.0	0.00	0.1	0.00	20	0.0	0.00	0.0	1.1	0.15	6.9	0.0	0.0	3.4	0.01	0.0	4.6	0.6	0.0	0.0
2 27 78	0.0	0.00			23	0.0	0.00	0.1	1.5		8.5	0.1		4.7	0.01	0.0	4.7		0.0	0.0
3 29 78	0.1	0.00			16	0.0	0.00	0.2	1.1		6.5	0.1		3.7	0.01	0.0	4.1		0.0	0.0
4 20 78	0.0	0.00	0.0	0.00	23	0.0	0.00	0.1	1.4	0.05	8.8	0.1	0.0	5.0	0.02	0.0	5.3	0.4	0.0	0.0
5 17 78	0.0	0.01			17	0.0	0.00	0.1	1.3		7.0	0.1		3.9	0.01	0.0	4.7		0.0	0.0
6 20 78	0.1	0.01			36	0.0	0.01	0.1	1.8		10	0.1		4.8	0.02	0.1	8.3		0.1	0.0
7 19 78	0.1	0.00			22	0.0	0.02	0.1	1.7		9.4	0.1		5.0	0.03	0.1	8.7		0.0	0.0
8 16 78	0.1	0.00			18	0.1	0.02	0.1	1.5		7.0	0.0		4.9	0.03	0.1	4.3		0.0	0.0
10 4 78	0.1	0.01	0.0	0.00	22	0.0	0.01	0.2	2.8	0.10	8.8	0.1	0.0	3.8	0.02	0.1	6.9	0.2	0.1	0.0
11 16 78	0.1	0.00			24	0.0	0.00	0.2	3.2		10	0.1		5.3	0.01	0.0	7.9		0.0	0.0
12 12 78	0.1	0.00			23	0.0	0.00	0.2	2.1		8.7	0.1		4.8	0.03	0.0	7.6		0.1	0.0
1 29 79	0.1	0.00			19	0.0	0.02	0.1	1.5		6.2	0.1		4.1	0.04	0.0	5.1		0.0	0.0
2 22 79	0.1	0.00	0.0	0.00	18	0.0	0.01	0.1	1.2	0.10	6.4	0.0	0.0	3.3	0.02	0.0	4.1	0.3	0.0	0.0
3 29 79	0.1	0.00	0.0	0.00	19	0.0	0.00	0.0	1.2	0.20	6.6	0.0	0.0	3.1	0.02	0.1	4.4	0.4	0.1	0.0
5 10 79	0.1	0.01			21	0.0	0.00	0.1	1.1		7.1	0.0		3.4	0.02	0.1	3.9		0.1	0.0
6 15 79	0.0	0.00			22	0.0	0.01	0.0	1.3		7.4	0.1		3.8	0.00	0.0	4.1		0.0	0.0
7 19 79	0.1	0.00	0.1	0.00	32	0.0	0.01	0.1	1.5	0.10	8.3	0.0	0.0	4.4	0.00	0.0	5.3	0.3	0.0	0.3

TABLE 25. WATER QUALITY FOR SITE 8062 TAZEWELL COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L					MILLIGRAMS PER LITER									
12 15 77	6	0.25	21*		4	268	163	1.03	6.7		8	10	0	1.7	99	1.5					
3 29 78	7	0.06	25		60	202	113	1.38	7.2		11	13	0	1.5	60	1.0					
5 17 78	12	0.006	17*		6	202	121	1.10	6.8		7	9	0	1.3	64	2.7					
1 24 79	4	0.06	13		10	182	108	1.29	6.5		8	10	0	1.7	59	1.1					
2 22 79	5	0.015	5		6	183	116	1.14	6.7	0	4	5	0	0.9	67	1.4					
3 29 79	10	0.01			0	277	193	1.10	6.6		2	3	0	1.9	110	3.8					
5 10 79	17	0.003	5	0.00	5	383	302	1.08	6.9	0	6	7	0	1.8	160	12					
6 15 79	17	0.0008	5		6	382	270	1.17	7.1		11	13	0	1.7	150	7.5					
7 19 79	19	0.0003	1		8	546	344	0.95	7.1	-3	8	10	0	3.0	190	12	1.9	0.02	0.50	0.00	0.01

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
12 15 77	0.0	0.00			23	0.0	0.00	0.0	2.4		12	0.2		3.2	0.01	0.0	5.0		0.0	0.0
3 29 78	0.1	0.00	0.1	0.00	16	0.0	0.00	0.2	2.4	0.06	9.9	0.2	0.0	3.3	0.02	0.0	4.0	0.1	0.1	0.0
5 17 78	0.0	0.00	0.1	0.00	15	0.0	0.00	0.0	2.3	0.08	9.2	0.0	0.0	3.2	0.01	0.0	4.2	0.1	0.0	0.0
1 24 79	0.1	0.00			17	0.0	0.00	0.0	2.4		8.7	0.1		2.1	0.03	0.1	3.4		0.1	0.0
2 22 79	0.1	0.01	0.1	0.00	16	0.0	0.00	0.1	2.3	0.20	9.1	0.0	0.0	2.2	0.06	0.1	3.9	0.1	0.2	0.0
3 29 79	0.1	0.01	0.1	0.00	28	0.0	0.01	0.0	2.9	0.20	16	0.0	0.0	3.6	0.03	0.0	4.2	0.1	0.2	0.0
5 10 79	0.1	0.00			40	0.0	0.00	0.0	3.3		27	0.0		4.4	0.02	0.0	4.5		0.1	0.0
6 15 79	0.1	0.00			36	0.0	0.01	0.0	3.5		26	0.0		4.7	0.00	0.0	4.4		0.0	0.0
7 19 79	0.1	0.00	0.1	0.00	40	0.1		0.0	4.3	0.40	29	0.1	0.0	5.9	0.02	0.1	4.7	0.2	0.0	0.0

TABLE 26, WATER QUALITY FOR SITE 8063 TAZEWELL COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID- ITY	ALKA- LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L				MILLIGRAMS PER LITER										
9 2 77	20	0.0008			10	368	205	1.94	7.6		68	83	0	0.6	90	0.1					
9 30 77	15	0.0015			10	337	210	1.94	7.7		65	79	0	1.0	92	0.1					
11 4 77	13	0.01	0		4	234	158	1.52	7.2		30	37	0	0.6	82	0.1					
12 15 77	6	0.1	18*		10	194	118	0.99	6.5		7	8	0	0.8	74	0.3					
2 27 78	0	0.1			10	167	97	1.31	7.3		15	18	0	0.5	52	0.2					
3 29 78	10	0.07			4	167	100	1.13	7.0		10	12	0	0.8	58	0.3					
4 21 78	5	0.015	55*		8	192	115	1.36	7.4		21	26	0	0.6	61	0.2					
5 17 78	15	0.015	19*		8	151	88	1.17	6.9		7	8	0	0.8	50	0.5					
6 20 78	27	0.0009				253	147	1.12	7.3		20	24	0	0.6	88	0.2					
7 19 78	23	0.003	57*			213	117	1.37	7.4		24	29	0	0.3	61	0.2					
8 16 78	20	0.04	32*		10	175	102	1.05	7.3		15	18	0	0.8	60	0.1					
10 3 78	17	0.0008	28*		3	237	133	1.60	7.8		52	64	0	0.8	58	0.1					
11 15 78	15	0.002	6		3	233	123	1.89	8.0		51	61	0	1.0	49	0.1					
12 12 78	6	0.02	2		2	181	130	1.02	7.1	-7	8	10	0	0.7	79	0.8					
1 25 79	2	0.04	4		4	183	107	1.19	6.4		3	4	0	0.4	66	0.1					
2 22 79	4	0.1	86		60	137	100	0.99	6.4	2	4	5	0	0.4	63	0.3					
3 29 79	10	0.1			1	142	91	1.14	7.0	-4	6	7	0	1.0	53	0.4					
5 10 79	16	0.02	5	0.00	9	134	89	1.31	7.0	-3	8	10	0	0.5	49	0.2					
6 15 79	16	0.002	11		0	146	91	1.40	7.3	-4	14	17	0	1.7	46	0.2					
7 20 79	18	0.002	30		60	152	85	1.60	7.2	-15	18	22	0	0.8	40	0.2	0.1	0.01	0.55	0.05	0.00

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
9 2 77	0.1	0.01			52	0.0	0.00	0.0	2.2		10	0.0		3.8	0.01	0.0	2.3		0.0	0.0
9 30 77	0.0	0.00			54	0.0	0.01	0.0	2.1		10	0.0		4.4	0.01	0.0	2.7		0.0	0.0
11 4 77	0.1	0.03	0.0	0.00	31	0.0	0.00	0.1	2.2	0.15	10	0.1	0.0	3.8	0.01	0.0	4.1	0.1	0.1	0.0
12 15 77	0.1	0.00	0.0	0.00	17	0.0	0.00	0.1	1.6	0.15	7.3	0.5	0.0	2.3	0.02	0.0	4.0	0.1	0.0	0.0
2 27 78	0.0	0.01			15	0.0	0.00	0.1	1.5		6.5	0.0		3.1	0.00	0.0	3.8		0.0	0.0
3 29 78	0.0	0.00			14	0.0	0.00	0.2	1.7		6.7	0.2		2.8	0.01	0.0	3.6		0.1	0.0
4 21 78	0.0	0.00	0.0	0.00	19	0.0	0.00	0.1	1.7	0.04	7.6	0.0	0.0	3.3	0.00	0.0	3.6	0.1	0.0	0.0
5 17 78	0.0	0.01	0.0	0.00	12	0.0	0.00	0.1	1.6	0.08	6.3	0.3	0.0	2.5	0.02	0.0	3.7	0.1	0.1	0.0
6 20 78	0.1	0.00			24	0.0	0.00	0.0	2.2		8.9	0.0		3.0	0.01	0.0	3.4		0.0	0.0
7 19 78	0.1	0.00			20	0.1	0.02	0.0	2.2		7.1	0.0		2.9	0.03	0.1	3.9		0.1	0.0
8 16 78	0.1	0.00			14	0.1	0.02	0.1	1.8		5.9	0.0		2.8	0.03	0.1	3.5		0.0	0.0
10 3 78	0.1	0.00	0.0	0.00	24	0.0	0.01	0.1	1.9	0.10	7.7	0.0	0.0	2.4	0.02	0.1	2.7	0.1	0.1	0.0
11 15 78	0.1	0.00			24	0.0	0.00	0.0	1.6		7.4	0.0		2.8	0.01	0.1	2.6		0.0	0.1
12 12 78	0.1	0.00			20	0.0	0.01	0.0	2.1		7.1	0.0		3.2	0.02	0.0	4.0		0.1	0.0
1 25 79	0.1	0.00			18	0.0	0.01	0.0	1.6		7.6	0.3		2.5	0.04	0.0	3.9		0.0	0.0
2 22 79	0.1	0.01	0.0	0.00	14	0.0	0.01	0.1	2.1	0.20	5.8	0.3	0.0	2.2	0.07	0.1	3.4	0.1	0.2	0.0
3 29 79	0.1	0.00	0.0	0.00	14	0.0	0.00	0.0	1.6	0.15	6.0	0.1	0.0	2.2	0.02	0.0	3.5	0.1	0.0	0.0
5 10 79	0.0	0.00			14	0.0	0.01	0.0	1.8		6.1	0.0		2.5	0.00	0.0	4.0		0.0	0.0
6 15 79	0.0	0.00			15	0.0	0.01	0.0	2.0		5.9	0.0		2.8	0.00	0.0	3.7		0.0	0.1
7 20 79	0.1	0.00	0.0	0.00	15	0.0	0.01	0.0	2.0	0.15	5.6	0.0	0.0	2.5	0.00	0.0	3.4	0.1	0.0	0.0

TABLE 27. WATER QUALITY FOR SITE 8064 TAZEWELL COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID- ITY	ALKA- LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
NO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L			---------- MILLIGRAMS PER LITER ----------											
12 15 77	6	0.004	16*		15	97	48	2.76	6.9		16	20	0	2.1	13	0.0					
2 27 78	2	0.02	238		700	112	75	5.10	7.7		37	45	0	2.3	14	0.2					
8 16 78	22	0.001				168	95	4.86	8.1		66	80	1	0.4	15	0.0					
5 10 79	21	0.001			20	106	66	2.88	7.7	-36	38	46	0	0.4	17	0.3					

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
NO DA YR	---------- MILLIGRAMS PER LITER ----------																			
12 15 77	0.0	0.00			10	0.0	0.00	0.0	1.5		2.2	0.1		1.6	0.00	0.0	3.3		0.0	0.0
2 27 78	0.0	0.00			16	0.0	0.00	0.0	1.6		6.8	0.0		3.2	0.00	0.0	3.9		0.0	0.0
8 16 78	0.1	0.02			24	0.0	0.01	0.2	1.8		2.8	0.3		1.7	0.04	0.1	4.4		0.1	0.0
5 10 79	0.0	0.01			15	0.0	0.00	0.0	1.2		2.3	0.0		1.2	0.00	0.0	2.4		0.0	0.0

TABLE 28. WATER QUALITY FOR SITE 8065 TAZEWELL COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L					MILLIGRAMS PER LITER									
6 23 77	13	0.0000			20	207	107	1.03	7.0		11	14	0	0.7	54	3.0					

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
6 23 77	0.1	0.00			13	0.1	0.01	0.0	2.8		7.1	0.1		2.3	0.00	0.3	2.7		0.2	0.0

TABLE 29. WATER QUALITY FOR SITE 8067 TAZEWELL COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L					MILLIGRAMS PER LITER									
11 3 77	16	1.5	6		10	408	212	3.04	7.2		107	130	0	7.0	60	0.2					

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
11 3 77	0.1	0.03	0.0	0.03	38	0.0	0.00	0.1	3.8	0.15	17	0.0	0.0	15	0.02	0.0	2.6	0.6	0.0	0.0

TABLE 30. WATER QUALITY FOR SITE 8071 WISE COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L			---------- MILLIGRAMS PER LITER ----------											
9 1 77	18	0.1			8	28	19	3.14	6.5		9	11	0	0.5	3	0.2					
9 28 77	15	0.25			8	29	18	5.48	6.9		8	10	0	0.5	2	0.2					
10 28 77	12	1.0	23		4	19	16	2.18	6.8		5	6	0	0.7	4	0.1					
11 23 77	10	3	49		20	19	16	1.38	6.4		2	3	0	0.5	6	0.1					
12 21 77	4	0.6	0		2	19	18	1.59	6.4		2	2	0	0.8	5	0.2					
1 26 78	2	15	15		10	22	14	1.77	6.4		2	2	0	0.5	5	0.2					
3 9 78	3	2.0	7		10	26	18	1.50	6.1		4	5	0	1.4	5	0.2					
4 19 78	15	1.0	45*		10	27	21	1.26	6.6		3	4	0	2.3	5	0.3					
5 17 78	14	1.0	20*		15	17	15	1.07	6.4		1	1	0	0.5	7	0.2					
6 13 78	14	1.0				21	18	1.58	6.4		3	4	0	0.5	7	0.2					
7 11 78	17	0.06	44*		8	23	21	1.47	6.7		4	5	0	0.6	8	0.2					
8 16 78	19	0.25	30*		15	21	15	2.59	6.5		4	5	0	0.5	3	0.2					
10 4 78	13	0.005	30*		4	28	22	1.62	6.6		5	6	0	0.5	7	0.3					
11 8 78	8	0.02	5		7	30	24	1.61	7.0	-7	7	9	0	0.6	8	0.1					
12 13 78	4	0.15	1		1	17	14	1.34	6.3		2	3	0	0.3	5	0.0					
1 30 79	1	0.25	1		0	17	16	1.96	7.4		6	7	0	0.4	4	0.2					
3 13 79	4	0.15	2		1	17	15	1.36	6.3	4	2	2	0	0.7	6	0.1					
4 2 79	10	0.7			3	16	14	1.47	6.4	4	2	2	0	0.5	5	0.1					
5 8 79	13	1.0	22	0.00	15	17	15	2.04	6.7	1	4	5	0	1.0	3	0.1					
6 13 79	14	0.1	6		0	20	18	1.60	6.7	3	6	7	0	0.8	5	0.1					
7 23 79	18	0.1	5		15	24	21	1.16	6.6	-2	4	5	0	0.6	8	0.2	0.1	0.02	0.45	0.10	0.01

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	---------- MILLIGRAMS PER LITER ----------																			
9 1 77	0.0	0.05			2.2	0.0	0.01	0.1	0.5		0.8	0.1		0.9	0.03	0.1	1.8		0.2	0.0
9 28 77	0.0	0.00			2.7	0.0	0.00	0.0	0.6		0.7	0.0		1.1	0.01	0.0	2.2		0.0	0.0
10 28 77	0.1	0.02	0.1	0.00	2.2	0.0	0.00	0.0	0.6	0.03	0.7	0.0	0.0	0.8	0.00	0.1	1.6	0.0	0.0	0.0
11 23 77	0.0	0.00			1.8	0.0	0.00	0.0	0.4		0.8	0.0		0.8	0.00	0.0	1.6		0.0	0.0
12 21 77	0.2	0.00			2.2	0.1	0.00	0.4	0.9		0.6	0.0		0.8	0.03	0.1	2.3		0.2	0.0
1 26 78	0.1	0.02	0.0	0.00	2.0	0.0	0.00	0.1	0.6	0.00	0.8	0.0	0.0	1.0	0.00	0.0	0.8	0.0	0.0	0.0
3 9 78	0.1	0.00			2.1	0.0	0.01	0.1	0.6		0.8	0.1		0.7	0.02	0.0	1.5		0.0	0.0
4 19 78	0.0	0.00	0.0	0.00	2.0	0.0	0.00	0.0	0.6	0.01	0.9	0.0	0.0	0.8	0.01	0.0	2.8	0.0	0.0	0.0
5 17 78	0.0	0.00			1.6	0.0	0.00	0.0	0.5		0.7	0.0		0.7	0.00	0.0	1.3		0.0	0.0
6 13 78	0.0	0.00			2.2	0.0	0.00	0.0	0.8		0.9	0.0		1.0	0.01	0.0	1.4		0.0	0.0
7 11 78	0.0	0.00			2.8	0.0	0.00	0.0	0.6		1.2	0.0		0.7	0.00	0.0	1.8		0.0	0.0
8 16 78	0.0	0.00			2.0	0.0	0.00	0.1	0.5		0.7	0.0		0.7	0.01	0.0	2.0		0.0	0.0
10 4 78	0.0	0.00	0.0	0.00	3.0	0.0	0.00	0.0	0.6	0.00	0.9	0.0	0.0	0.8	0.00	0.0	2.1	0.0	0.0	0.0
11 8 78	0.0	0.00			3.3	0.0	0.00	0.0	0.7		1.0	0.0		0.8	0.00	0.0	1.9		0.0	0.0
12 13 78	0.0	0.00			1.6	0.0	0.00	0.0	0.4		0.5	0.0		0.5	0.00	0.0	1.7		0.0	0.0
1 30 79	0.1	0.00			1.8	0.0	0.01	0.1	0.4		0.8	0.0		0.7	0.00	0.0	1.5		0.0	0.4
3 13 79	0.0	0.00			1.8	0.0	0.01	0.1	0.5		0.6	0.1		0.8	0.00	0.0	1.4		0.0	0.0
4 2 79	0.0	0.00	0.0	0.00	1.7	0.0	0.00	0.0	0.5	0.03	0.7	0.0	0.0	0.6	0.00	0.0	1.4	0.0	0.0	0.0
5 8 79	0.0	0.01			1.8	0.0	0.00	0.0	0.4		0.7	0.0		0.5	0.01	0.1	1.7		0.1	0.0
6 13 79	0.0	0.00			2.3	0.0	0.00	0.0	0.5		0.7	0.0		0.5	0.00	0.0	1.8		0.0	0.2
7 23 79	0.0	0.00	0.0	0.00	2.2	0.0	0.00	0.1	0.6	0.02	0.9	0.0	0.0	0.7	0.03	0.1	2.0	0.0	0.1	0.0

TABLE 31. WATER QUALITY FOR SITE 8072 WISE COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID- ITY	ALKA- LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L			MILLIGRAMS PER LITER											
6 21 77	18	0.009			35	192	92	2.86	6.9		44	54	0	1.1	24	0.1					
8 25 77	18	0.007			65	235	109	1.76	7.4		39	47	0	1.5	45	0.6					
9 28 77	15	0.0025			30	203	115	3.16	7.8		62	75	0	1.9	30	0.1					
10 28 77	13	0.1	36		15	221	115	1.63	6.6		25	30	0	1.9	54	0.8					
11 23 77	11	0.25	38		30	196	120	1.41	6.2		23	28	0	1.7	61	0.9					
12 21 77	5	0.2	11		0	269	173	1.29	7.1		22	27	0	1.1	100	0.6					
1 26 78	2	3	156		180		28	1.07	6.8		10	12	0	1.8	8	1.1					
3 8 78	4	1.0	210		550	98	73	1.46	6.4		15	18	0	1.7	29	2.0					
4 19 78	17	0.06	39*		10	179	106	1.79	7.7		33	40	0	2.5	44	0.4					
5 17 78	18	0.09	17*		20	33	28	1.94	7.1		9	11	0	0.9	8	0.1					
6 13 78	20	0.07				56	31	4.79	7.2		17	21	0	0.9	5	0.1					
7 11 78		0.0000	50*		15	54	37	1.78	6.9		9	11	0	1.2	14	0.0					
8 16 78	21	0.005	22*		8	213	124	2.99	8.1		68	82	1	1.2	32	0.2					
10 4 78	14	0.0006	20*		10	233	137	4.46	8.2		88	105	1	1.7	26	0.1					
11 8 78			7		15	255	170	5.91	8.3	-51	108	129	2	2.2	25	0.0					
12 13 78	5	0.025	3		1	275	154	1.36	7.4		40	49	0	1.9	79	0.7					
1 30 79	6	0.05	4		0	18	17	1.36	6.0		2	3	0	0.9	6	0.1					
3 13 79	11	0.01	24		3	224	132	1.61	7.6		29	35	0	1.4	66	0.4					
4 2 79	13	0.07			15	152	92	1.70	7.4	-17	24	29	0	2.0	41	0.5					
5 9 79	18	0.25	9	0.00	30	139	85	1.79	7.6	-20	25	31	0	1.3	37	0.3					
6 13 79	17	0.01	13		9	230	130	1.48	7.8	-34	42	51	0	2.9	60	0.3					
7 23 79	22	0.002	4		20	199	105	2.23	7.9	-43	46	55	0	1.2	38	0.2	0.1	0.06	0.70	0.10	0.00

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
6 21 77	0.0	0.00			12	0.1	0.01	1.7	2.3		7.2	1.3		5.6	0.00	0.3	3.8		0.2	0.0
8 25 77	0.0	0.00			14	0.0	0.02	1.2	2.9		9.7	1.6		3.9	0.02	0.0	1.6		0.0	0.0
9 28 77	0.0	0.00			17	0.0	0.01	4.2	2.4		11	1.7		4.6	0.01	0.0	2.5		0.0	0.0
10 28 77	0.1	0.02	0.0	0.00	17	0.0	0.00	0.5	2.7	0.08	11	1.0	0.0	3.1	0.01	0.0	2.4	0.1	0.0	0.0
11 23 77	0.0	0.00			15	0.0	0.01	0.6	2.2		11	1.1		4.0	0.01	0.0	2.4		0.0	0.0
12 21 77	0.0	0.00			18	0.0	0.00	0.8	2.6		21	1.5		3.7	0.02	0.0	2.4		0.1	0.0
1 26 78	0.0	0.01	0.0	0.00	2.2	0.0	0.00	0.1	0.4	0.00	1.9	0.2	0.0	0.5	0.01	0.0	1.0	0.0	0.0	0.0
3 8 78	0.1	0.00			8.3	0.0	0.01	0.7	2.0		6.0	0.7		2.4	0.03	0.0	1.8		0.1	0.0
4 19 78	0.1	0.00	0.1	0.00	13	0.0	0.00	0.8	2.4	0.03	10	1.3	0.0	3.8	0.01	0.0	2.9	0.1	0.1	0.0
5 17 78	0.0	0.00			2.2	0.0	0.01	1.2	0.9		1.8	0.5		1.2	0.00	0.0	2.6		0.0	0.0
6 13 78	0.1	0.00			4.4	0.0	0.01	0.1	1.3		2.4	0.6		1.3	0.01	0.0	1.8		0.0	0.0
7 11 78	0.1	0.00	0.0	0.00	5.0	0.0	0.00	0.1	1.8	0.04	2.6	0.0	0.0	1.2	0.00	0.0	2.2	0.0	0.1	0.0
8 16 78	0.1	0.01			18	0.0	0.01	6.6	2.5		12	1.8		3.6	0.01	0.0	2.3		0.0	0.0
10 4 78	0.1	0.00	0.0	0.00	20	0.0	0.00	8.3	2.8	0.03	15	2.2	0.0	3.5	0.01	0.1	2.6	0.0	0.1	0.0
11 8 78	0.1	0.00			29	0.0	0.01	15	3.4		17	2.8		4.4	0.03	0.1	2.7		0.1	0.0
12 13 78	0.1	0.00			18	0.0	0.01	0.5	2.5		15	1.4		2.7	0.01	0.1	2.4		0.1	0.0
1 30 79	0.1	0.00	0.0	0.00	1.2	0.0	0.02	0.1	0.6	0.04	1.0	0.0	0.0	1.1	0.00	0.0	1.8	0.0	0.0	0.4
3 13 79	0.1	0.00			18	0.0	0.02	0.4	2.4		15	1.2		3.0	0.04	0.0	2.8		0.1	0.0
4 2 79	0.1	0.00	0.0	0.00	13	0.0	0.01	0.3	2.1	0.08	9.0	0.7	0.0	2.4	0.02	0.0	2.2	0.1	0.0	0.1
5 9 79	0.0	0.00			12	0.0	0.02	0.2	1.8		8.5	0.5		2.6	0.01	0.0	2.1		0.0	0.0
6 13 79	0.0	0.01			16	0.0	0.00	0.5	2.3		12	1.1		3.1	0.02	0.0	2.5		0.0	0.2
7 23 79	0.0	0.00	0.0	0.00	15	0.0	0.00	0.6	2.2	0.07	10	0.7	0.0	3.3	0.00	0.0	2.5	0.0	0.0	0.0

TABLE 32. WATER QUALITY FOR SITE 8073 WISE COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L					MILLIGRAMS PER LITER									
6 10 77	16	0.007			8	239	139	1.63	7.4		25	30	0	1.0	76						
8 25 77	20	0.01			10	265	140	1.47	7.5		31	38	0	0.7	73	0.3					
9 28 77	18	0.004			8	264	154	1.51	7.5		36	44	0	1.5	80	0.1					
10 28 77	13	0.015	18		4	170	93	1.76	6.8		20	25	0	1.0	43	0.2					
11 23 77	10	0.4	46		40	94	56	1.66	6.8		6	7	0	0.8	26	0.2					
12 21 77	4	0.08	5		6	178	87	1.50	7.3		8	10	0	0.3	47	0.3					
1 25 78	3	0.9			90	239	104	1.46	7.1		16	19	0	0.5	57	0.3					
3 9 78	6	0.5	21		55	101	63	1.47	6.6		11	14	0	0.8	30	0.3					
4 19 78	14	0.06	43*		8	181	114	1.44	7.6		21	26	0	1.0	58	0.2					
5 17 78	15	0.06	22*		40	125	74	1.57	7.2		18	22	0	0.8	34	0.2					
6 13 78	21	0.025				197	102	1.38	7.4		25	31	0	0.9	53	0.2					
7 11 78	21	0.02	89*		95	254	149	1.63	7.6		26	32	0	1.0	80	0.2					
8 16 78	23	0.005	63*		85	264	144	1.37	7.5		33	40	0	1.3	77	0.1					
10 3 78	15	0.002	32*		0	285	181	1.27	7.4		34	41	0	1.2	110	0.1					
11 8 78	8	0.0004	4		8	283	175	1.36	7.3		36	44	0	2.0	96	0.1					
12 13 78	2	0.01	4		15	188	103	1.62	7.8		26	32	0	0.9	49	0.4					
1 30 79	4	0.05	12		0	152	95	1.44	7.2	-16	16	19	0	0.7	50	0.2					
3 13 79	6	0.04	20		2	137	79	1.61	7.4	-14	16	20	0	0.8	38	0.2					
4 2 79	12	0.15			20	140	89	1.45	7.3	-12	18	22	0	1.1	45	0.1					
5 8 79	17	0.1	46	0.00	120	120	77	1.50	7.3	-13	18	22	0	0.6	37	0.1					
6 13 79	17	0.01	20		9	190	124	1.49	7.7	-18	30	36	0	1.2	63	0.1					
7 23 79	23	0.005	20		45	266	155	1.66	7.5	-30	33	40	0	1.2	80	0.1	0.0	0.02	0.55	0.05	0.00

* Suspended Solids values followed by an asterisk are believed to be 5 to 80 mg/l too high (most are 20 to 40 mg/l too high).

DATE	AL	B	BA	BE	CA	CD	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
6 10 77	0.1	0.00	0.1	0.01	15	0.0	0.00	0.1	2.6	0.25	18	0.0	0.0	4.9	0.02	0.0	2.7	0.3	0.1	0.0
8 25 77	0.1	0.03			18	0.0	0.00	0.1	3.0		13	0.0		5.0	0.00	0.0	3.1		0.0	0.0
9 28 77	0.0	0.00			19	0.0	0.01	0.0	3.2		15	0.0		6.6	0.01	0.0	3.1		0.0	0.0
10 28 77	0.0	0.01	0.0	0.00	13	0.0	0.00	0.0	2.3	0.09	8.8	0.0	0.0	4.0	0.01	0.0	3.6	0.1	0.0	0.0
11 23 77	0.0	0.00			6.8	0.0	0.00	0.0	1.4		5.0	0.0		3.4	0.01	0.0	3.6		0.0	0.0
12 21 77	0.0	0.00			11	0.0	0.00	0.1	2.0		9.1	0.0		3.6	0.02	0.0	3.7		0.2	0.0
1 25 78	0.1	0.04	0.0	0.00	13	0.0	0.00	0.1	2.2	0.00	11	0.1	0.0	3.3	0.01	0.0	3.1	0.1	0.0	0.0
3 9 78	0.0	0.00			7.1	0.0	0.00	0.3	1.3		5.4	0.1		2.8	0.00	0.0	3.3		0.0	0.0
4 19 78	0.1	0.00	0.0	0.00	13	0.0	0.01	0.1	2.5	0.03	11	0.0	0.0	4.3	0.01	0.0	4.7	0.0	0.1	0.0
5 17 78	0.0	0.00			8.6	0.0	0.00	0.1	1.6		6.6	0.0		3.1	0.00	0.0	3.6		0.0	0.0
6 13 78	0.0	0.00			12	0.0	0.02	0.0	2.5		9.1	0.1		3.7	0.01	0.0	2.4		0.0	0.0
7 11 78	0.1	0.00	0.0	0.00	18	0.0	0.00	0.1	3.2	0.09	19	0.0	0.0	4.2	0.00	0.0	3.4	0.1	0.1	0.0
8 16 78	0.1	0.00			17	0.0	0.00	0.1	3.3		13	0.0		4.5	0.01	0.0	3.4		0.0	0.0
10 3 78	0.1	0.00	0.0	0.00	21	0.0	0.00	0.1	3.6	0.07	18	0.0	0.0	5.1	0.01	0.0	2.8	0.1	0.0	0.0
11 8 78	0.1	0.00			20	0.0	0.01	0.0	3.7		18	0.0		6.0	0.03	0.0	3.2		0.1	0.0
12 13 78	0.1	0.00			14	0.0	0.01	0.1	2.3		10	0.0		3.0	0.02	0.0	3.0		0.0	0.0
1 30 79	0.1	0.00	0.0	0.00	13	0.0	0.00	0.1	1.8	0.10	9.0	0.0	0.0	2.7	0.02	0.1	3.3	0.0	0.2	0.2
3 13 79	0.1	0.00			10	0.0	0.01	0.1	1.9		7.3	0.0		3.2	0.01	0.0	3.3		0.0	0.0
4 2 79	0.0	0.00	0.0	0.00	11	0.0	0.00	0.0	1.9	0.07	8.0	0.0	0.0	2.8	0.01	0.0	3.4	0.1	0.0	0.0
5 8 79	0.1	0.01			9.2	0.0	0.01	0.1	1.8		6.7	0.0		2.7	0.02	0.1	3.5		0.1	0.0
6 13 79	0.0	0.00			16	0.0	0.00	0.0	2.5		12	0.0		3.7	0.00	0.0	3.5		0.0	0.0
7 23 79	0.1	0.00	0.0	0.00	18	0.1		0.0	3.2	0.15	19	0.0	0.0	4.7	0.01	0.1	3.9	0.1	0.0	0.0

TABLE 33. WATER QUALITY FOR SITE 8074 WISE COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L					MILLIGRAMS PER LITER									
6 10 77	12	0.0025			10		23	5.11	7.8		3	4	0	5.6	2						
8 25 77	18	0.015			4	31	19	1.49	7.6		2	3	0	1.0	6	0.2					

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
6 10 77	0.0	0.00	0.1	0.00	0.6	0.0	0.00	0.0	1.4	0.06	1.4	0.0	0.0	2.7	0.02	0.0	3.1	0.2	0.1	0.0
8 25 77	0.0	0.00			2.0	0.0	0.01	0.0	0.8		0.9	0.0		1.2	0.02	0.0	2.0		0.0	0.0

TABLE 34. WATER QUALITY FOR SITE 8075 WISE COUNTY, VIRGINIA

DATE	WATER TEMP	EST DISCH	SUSP SOL	SETT MATTER	TURB	SPEC COND	DIS SOLID	NEUT RATIO	LAB PH	ACID-ITY	ALKA-LINITY	HCO3	CO3	CL	SO4	NO3 AS N	%NO3 AS N	NH3 AS N	TOT N	TOT P	ORTH PO4
MO DA YR	DEG C	CFS	MG/L	ML/L	JTU	UM/CM	MG/L					MILLIGRAMS PER LITER									
6 8 77	18	0.004			20	517	317	1.17	7.5		34	41	0	0.8	200						

DATE	AL	B	BA	BE	CA	CO	CU	FE	K	LI	MG	MN	MO	NA	NI	PB	SI	SR	TI	ZN
MO DA YR	MILLIGRAMS PER LITER																			
6 8 77	0.1	0.00	0.0	0.00	38	0.0	0.01	0.2	2.8	0.20	32	0.4	0.0	9.1	0.02	0.1	4.3	0.1	0.1	0.0

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories are maintained at:

- Amherst, Massachusetts, in cooperation with the University of Massachusetts.
- Berea, Kentucky, in cooperation with Berea College.
- Burlington, Vermont, in cooperation with the University of Vermont.
- Delaware, Ohio.
- Durham, New Hampshire, in cooperation with the University of New Hampshire.
- Hamden, Connecticut, in cooperation with Yale University.
- Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.
- Orono, Maine, in cooperation with the University of Maine, Orono.
- Parsons, West Virginia.
- Princeton, West Virginia.
- Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.
- University Park, Pennsylvania, in cooperation with the Pennsylvania State University.
- Warren, Pennsylvania.