U.S. Department of the Interior
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Chemical and Isotopic Composition of Water from Springs, Wells, and Streams in Parts of Shenandoah National Park, Virginia, and Vicinity, 1995-1999

by L. Niel Plummer, Eurybiades Busenberg, John-Karl Böhlke, Rebecca W. Carmody, Gerolamo C. Casile, Tyler B. Coplen, Michael W. Doughten, Janet E. Hannon, Wandee Kirkland, Robert L. Michel, David L. Nelms, Brian C. Norton, Kathryn E. Plummer, Haiping Qi, Kinga Revesz, Peter Schlosser, Shane Spitzer, Julian E. Wayland, and Peggy K. Widman

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CONVERSION FACTORS AND ABREVIATED UNITS

Multiply	By	To obtain
Cubic centimeters (cm^3)	0.06102	Cubic inch
Gram (g)	0.03527	Ounce
Kilogram (kg)	2.205	Pound
Kilometer (km)	0.6215	Mile
Square kilometer (km^2)	0.3861	Square mile
Meter (m)	3.281	Foot
Millimeter (mm)	0.03937	Inch
Centimeter (cm)	0.3937	Inch
Becquerel per liter (Bq/L)	0.027	Picocuries per liter
Terra becquerels (TBq)	27	Curies
Tritium Units (TU)	3.19	Picocuries per liter
Kilopascal (kPa)	5.28	Atmosphere, standard
Picogram (pg)	$1x10^{-12}$	Gram
Femtogram (fg)	$1x10^{-15}$	Gram

For temperature, degrees Celsius (°C) can be converted to degrees Fahrenheit (°F) by using the formula °F=(1.8)(°C) + 32.

Stable isotope ratios are reported as δ values computed from the formula

$$\delta_x = \left(\frac{R_x}{R_{STD}} - 1 \right) 1000 \quad ,$$

where R_x is the ratio of the isotopes measured in the sample and R_{STD} is the isotope ratio in the reference standard. The value of δ_x is in parts per thousand (per mil).

Abbreviated units used in report: L (liter), mL (milliliter), kg (kilogram), pg (picogram), mol (mole), µmol (micromole), fmol (femtomol), fg (femtogram), pptv (parts per trillion by volume), mg/L (milligrams per liter), µg/L (micrograms per liter), STP (standard temperature and pressure, 0 degrees Celsius and 1 atmosphere pressure).

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ABSTRACT

The chemical and isotopic composition of water discharging from 44 springs and 32 wells in Shenandoah National Park (SNP) and vicinity were measured. The data include field measurements of water temperature, specific conductance, concentrations of dissolved oxygen (O_2), and pH, and laboratory measurements of major- minor- and trace-element chemistry, concentrations of dissolved gases (nitrogen (N_2), argon (Ar), helium (He), neon (Ne), oxygen (O_2), and carbon dioxide (CO_2)), tritium (^3H) of water, concentrations of dissolved trace atmospheric gases, including chlorofluorocarbons (CFC-11, CFC-12, and CFC-113), and sulfur hexafluoride (SF_6), the $^3He/^4He$ isotope ratio (δ^3He) of dissolved He, stable $^2H/^1H$ and $^{18}O/^{16}O$ isotope ratios (δ^2H and $\delta^{18}O$) of water, the stable $^{34}S/^{32}S$ isotope ratio ($\delta^{34}S$) of dissolved sulfate, the stable $^{15}N/^{14}N$ isotope ratio ($\delta^{15}N$) of dissolved nitrate, and the activity of radioactive sulfur-35 (^{35}S) of dissolved sulfate. Water from selected springs and wells was sampled in April 1996, August-September 1997, and August-September 1999. Additional data on the atmospheric mixing ratios of CFC-11, CFC-12, CFC-113 and SF_6 in air from the Big Meadows Air Monitoring Station, SNP are given approximately weekly for the period September 1995 through March 2000.

Five springs (Lewis Spring, Furnace Spring, Byrd's Nest 3, Browntown Valley Overlook Spring, and Hudson Spring) were sampled monthly between March 1999 and September 1999. Measurements were also made of ^3H, $\delta^{18}O$, and δ^2H of water from 30 streams near the base of the east and west flanks of the Blue Ridge Mountains that encompass Shenandoah National Park, Virginia, in April 1996 and September 1997.

INTRODUCTION

Shenandoah National Park (SNP) covers an area of approximately 800 km^2 in the Blue Ridge Mountains of Virginia (fig. 1). Water from springs and wells is the sole source of public and staff supply for SNP, which receives more than 1.5 million visitors annually. Little is actually known about the quality of ground water in the Park, its susceptibility to contamination, the response times of springs and wells to transient chemical inputs, and lag times (ground-water ages, ground-water residence times) necessary for flushing of contaminants from ground water.

Approximately 850 springs and seeps have been identified throughout the Park, but most of these have discharges of less than several liters per second, and most occur at elevations significantly below Park facilities, limiting their usefulness as water supplies to Park facilities (DeKay, 1972). Approximately 70 springs are known to occur above or near Skyline Drive, the principal route of travel in the Park that traverses 170 km along the crest of the Blue Ridge Mountains (fig. 1).

The potential for contamination of water supplies in SNP is compounded by several factors. First, water discharged from shallow, unconfined springs can be easily contaminated from surficial sources, and water pumped from wells in dense, fractured rock is difficult to protect from contamination because of the multiplicity and unknown connections of flow paths available to waters infiltrating from the land surface. The problem of connectivity of flow paths in the fractured-rock aquifers is further compounded when the aquifer is hydraulically stressed during pumping of wells, which can cause rapid transport of contaminants over relatively large distances. Secondly, the potential for contamination of water supplies is increased by the location of facilities in the Park.

In the original development and construction of SNP in the 1930s, buildings, campgrounds and other facilities were located and constructed in near proximity to the largest springs that occur in the higher-altitude, more scenic parts of the Park. In later years, water supply wells were drilled near Park facilities to supplement these springs. The result is that most public water supplies are located in the most populated parts of the Park, and at higher altitudes that lack surface-water sources. The shallow springs and fractured-rock aquifers can be easily contaminated by improperly functioning waste disposal (septic) systems or run-off from facilities operations in the Park.

Springs used for public water supply were modified by sub-surface construction in the 1930s to enhance discharge and collection. In some cases, the development was fairly extensive, with underground construction of "wing walls", gravel packs, and terra cotta pipes that channel water, often from multiple subsurface sources, to a weir box and then to a central collection and distribution system where the water is chlorinated. Construction records indicate that some springs combine discharge from shallow fractures in bedrock with water draining from shallow colluvium and residuum that overlies the bedrock.

The measurement of the concentrations of atmospheric environmental tracers and other chemical and isotopic substances in water from springs and wells gives information on ground-water quality, ground-water age and travel time. Environmental tracers (chlorofluorocarbons (CFCs), tritium (^3H), tritiogenic helium-3 (^3He), sulfur hexafluoride (SF_6), and sulfur-35 (^{35}S)) have known historical atmospheric concentrations (Plummer and Busenberg, 1999), and for tritium and sulfur-35, known half-lives (Plummer and others, 1993; Sueker, Turk and Michel, 1999; Michel, and others, 2000). Elevated concentrations of chlorofluorocarbons (Plummer and Busenberg, 1999) and ^{15}N (Kendall and Aravena, 1999) can be used to identify water supplies that are being affected by human activities.

During the period October, 1995 through September, 1999, the USGS completed several synoptic samplings of selected springs and wells in SNP, along with other studies of air and precipitation chemistry. This report tabulates the chemical and isotopic data obtained by the USGS for water from shallow springs and wells in SNP and vicinity. Additional data are given on the chemical and isotopic composition of water samples from selected surface waters at the base of the Blue Ridge Mountains surrounding SNP, and for trace gases (chlorofluorocarbons and sulfur hexafluoride) in air from the Big Meadows Air Monitoring Station, SNP.

For samples from springs and wells, the data include field measurements of water temperature, specific conductance, concentrations of dissolved oxygen (O_2), and pH, and laboratory measurements of major- and minor-element chemistry, concentrations of dissolved gases (nitrogen (N_2), argon (Ar), helium (He), neon (Ne), oxygen (O_2), carbon dioxide (CO_2)), tritium (^3H) of water, concentrations of dissolved trace atmospheric gases, including chlorofluorocarbons (CFC-11, CFC-12, and CFC-113), and sulfur hexafluoride (SF_6), the $^3He/^4He$ isotope ratio (as δ^3He) of dissolved helium, $^2H/^1H$ and $^{18}O/^{16}O$ isotope ratios (δ^2H and $\delta^{18}O$) of water, the $^{34}S/^{32}S$ isotope ratio ($\delta^{34}S$) of dissolved sulfate, the $^{15}N/^{14}N$ isotope ratio ($\delta^{15}N$) of dissolved nitrate, and the activity of radioactive sulfur-35 (^{35}S) of dissolved sulfate. Surface-water samples include measurements of δ^2H, $\delta^{18}O$, ^3H activity. Air samples include analyses of CFC-11, CFC-12, and CFC-113, and SF_6.

Climatic Data for Shenandoah National Park

Precipitation at Big Meadows in the central part of the Park (fig. 1) averaged about 114 cm annually over the period 1962 through 1971 (DeKay, 1972), and 145 cm annually during the period 1988 to 1999 (National Atmospheric Deposition Program (NADP) data). Annual precipitation for the years 1994, 1995, 1996, 1997, 1998, and 1999 was 138, 194, 171, 126, 132, and 141 cm, respectively (NADP data). The mean annual temperature was 7.8 °C at Big Meadows (elevation 1070 m) and 11.2 °C at Park Headquarters (elevation 340 m) between 1962 and 1971 (DeKay, 1972). The mean annual temperature at Big Meadows was 8.5 °C during the period 1988 through 1999 (National Park Service Air Resources Division (ARD) data). Mean annual temperatures for the years 1994, 1995, 1996, 1997, 1998 and 1999 were 8.5, 7.8, 7.4, 7.7, 9.5, and 8.5 °C, respectively at Big Meadows (ARD data).

Sample Locations

All spring, well, and surface-water sample sites are located by Site ID number on figure 2 and identified in the tables by Site ID. The Site ID numbers from figure 2 are used throughout this report. A separate SNP number was assigned to each sample to distinguish multiple samples from a single site. Samples may also be distinguished by Site name, sample date and sample time from the tables.

A total of 44 springs and 32 wells were sampled (Tables 1 and 2). Water from selected springs and wells was sampled in April 1996, August-September 1997, and August-September 1999. Five springs (Lewis Spring, Furnace Spring, Byrd's Nest 3, Browntown Valley Overlook Spring, and Hudson Spring) were sampled monthly between March 1999 and September 1999. Table 3 gives the location and elevation of all 32 surface-water sample sites (fig. 2). Thirty streams near the base of the east and west flanks of the Blue Ridge Mountains were sampled for ^{3}H, $\delta^{18}O$, and $\delta^{2}H$ in April 1996 and September 1997. Weekly air samples from the Big Meadows Air Monitoring Station were analyzed for CFC-11, CFC-12, CFC-113, and SF_6 from October 1995 through December 1999.

Table 1 includes the Site ID number (fig. 2), latitude, longitude, elevation, watershed area, and the principal geologic formation for the springs. Table 2 gives locations of all wells sampled, along with land-surface elevation, principal geologic formation, total depth, depth to bedrock, depth of casing, casing diameter, and depths of water-bearing zones. Additional well-construction data are given in DeKay (1972). Latitude and longitude were determined using the NAVSTAR Global Positioning System (GPS) Precise Positioning Service (PPS) equipment. Site locations are based on averages of approximately 1000 readings from the GPS/PPS in "Continuous Mode" operation and are accurate to within approximately 0.01 seconds (Table 1).

Watershed area was estimated from traces of drainage divides on 7.5-minute USGS topographic maps. The principal geologic formation was based on data of Gathright (1976) and DeKay (1972). All samples from within the boundaries of Shenandoah National Park are located on the surficial geologic map (Gathright, 1976) in figure 3.

Acknowledgments

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The primary responsibilities of the authors of this report were as follows: Eurybiades Busenberg, sulfur hexafluoride analyses, air analyses, and age interpretation; John-Karl Böhlke, nitrogen isotope ratio analyses; Rebecca W. Carmody, stable sulfur isotope ratio analyses; Gerolamo C. Casile, field sampling, chlorofluorocarbon analyses, sulfur-35

laboratory processing; Tyler B. Coplen, stable hydrogen, oxygen and sulfur isotope ratio analyses; Michael W. Doughten, field sampling and water chemistry; Janet E. Hannon, nitrogen isotope ratio analyses and sulfur-35 laboratory processing; Wandee Kirkland, sulfur hexafluoride analyses; Robert L. Michel, sulfur-35 analyses; David L. Nelms (U.S. Geological Survey, Richmond, VA), field sampling and project planning; Brian C. Norton, database management and computer graphics; Kathryn E. Plummer, stable hydrogen and oxygen isotope ratio analyses; Haiping Qi, stable sulfur isotope ratio analyses; Kinga Revesz, stable sulfur isotope ratio analyses; Peter Schlosser (Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY), tritium/helium-3 analyses and age interpretation; Shane Spitzer (National Park Service, Shenandoah National Park, Luray, VA), collection of air samples; Julian E. Wayland, field sampling, chlorofluorocarbon analyses, sulfur-35 laboratory processing; and Peggy K. Widman, field sampling and analysis of major dissolved gases.

Additional field assistance was provided by Anne Burton (USGS, Reston, VA), Steve Richards (NPS, SNP), Vanessa Fox (Institute of Geological and Nuclear Sciences, Lower Hutt, New Zealand), and John Weaver (CSIR, Stellenbosch, South Africa). Computer assistance from Sarah Parnes (USGS, Reston, VA) is gratefully acknowledged. The report was improved by review comments from Stephanie D. Shapiro and Michael J. Focazio (USGS, Reston, Virginia). Lamont-Doherty Earth Observatory of Columbia University contribution No. 6134.

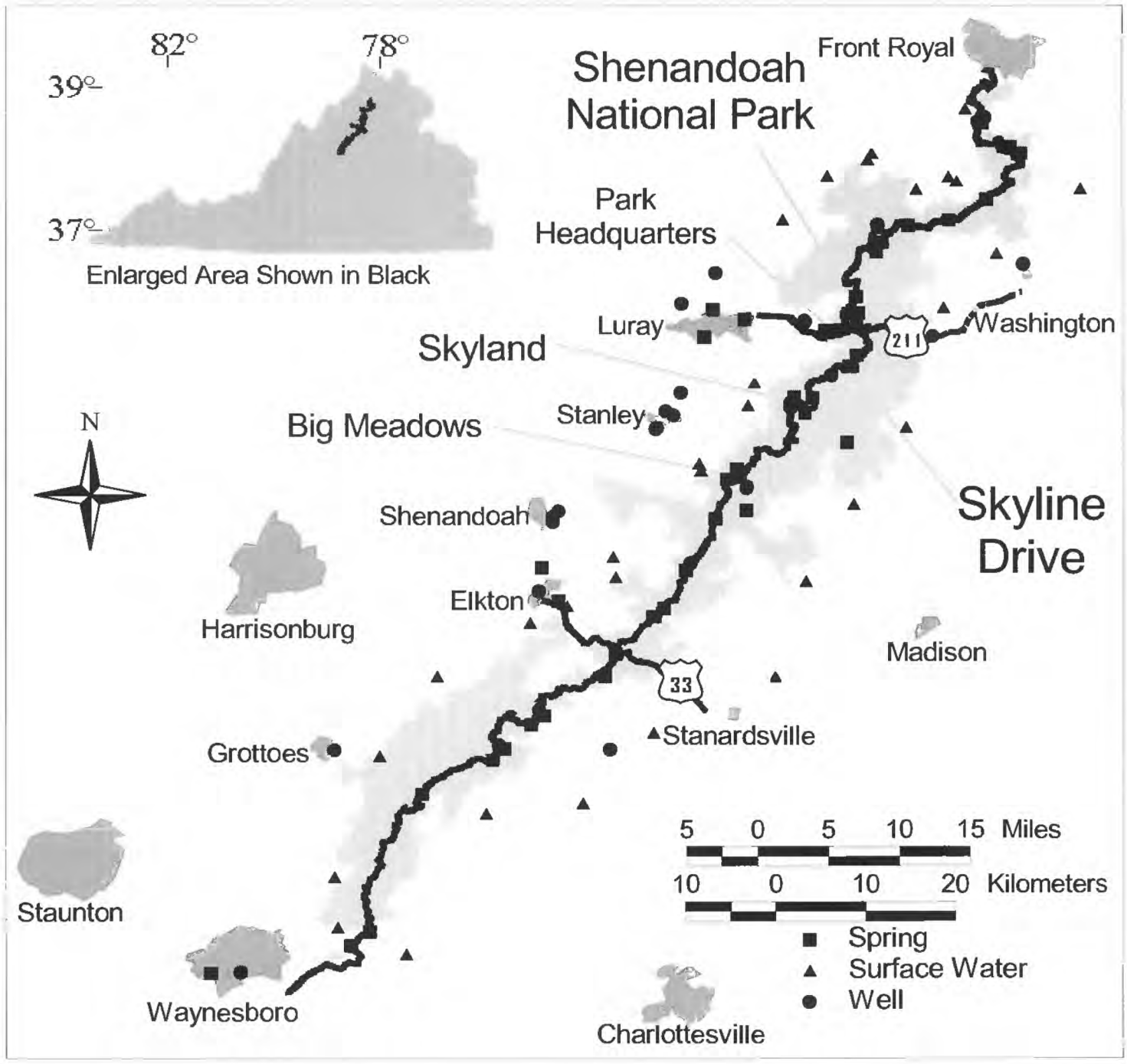

Figure 1. Location of Shenandoah National Park and vicinity.

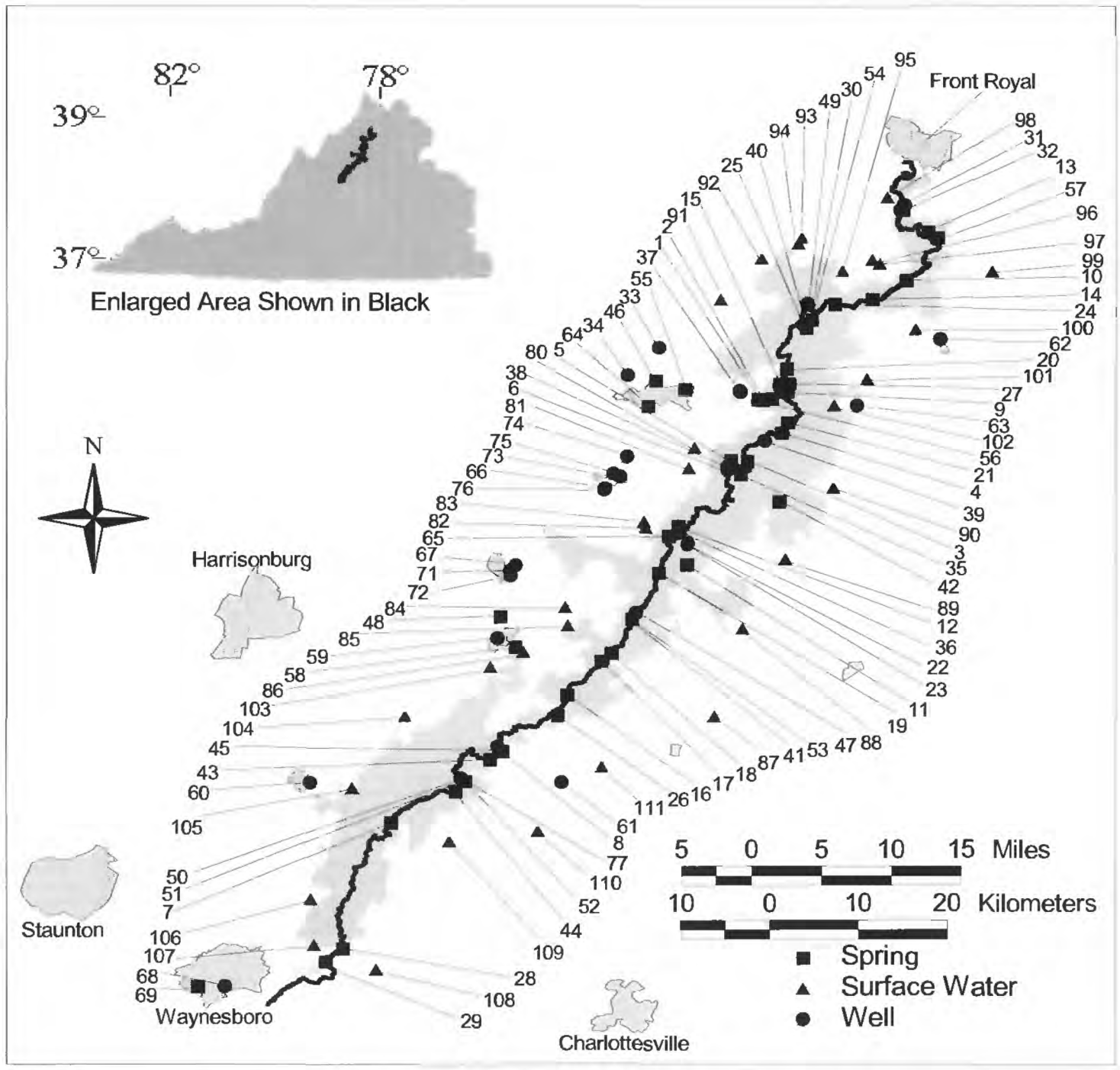

Figure 2. Location of wells, springs and surface-water sampling sites in and near Shenandoah National Park. Numbers are site identification numbers referred to in the tables of this report.

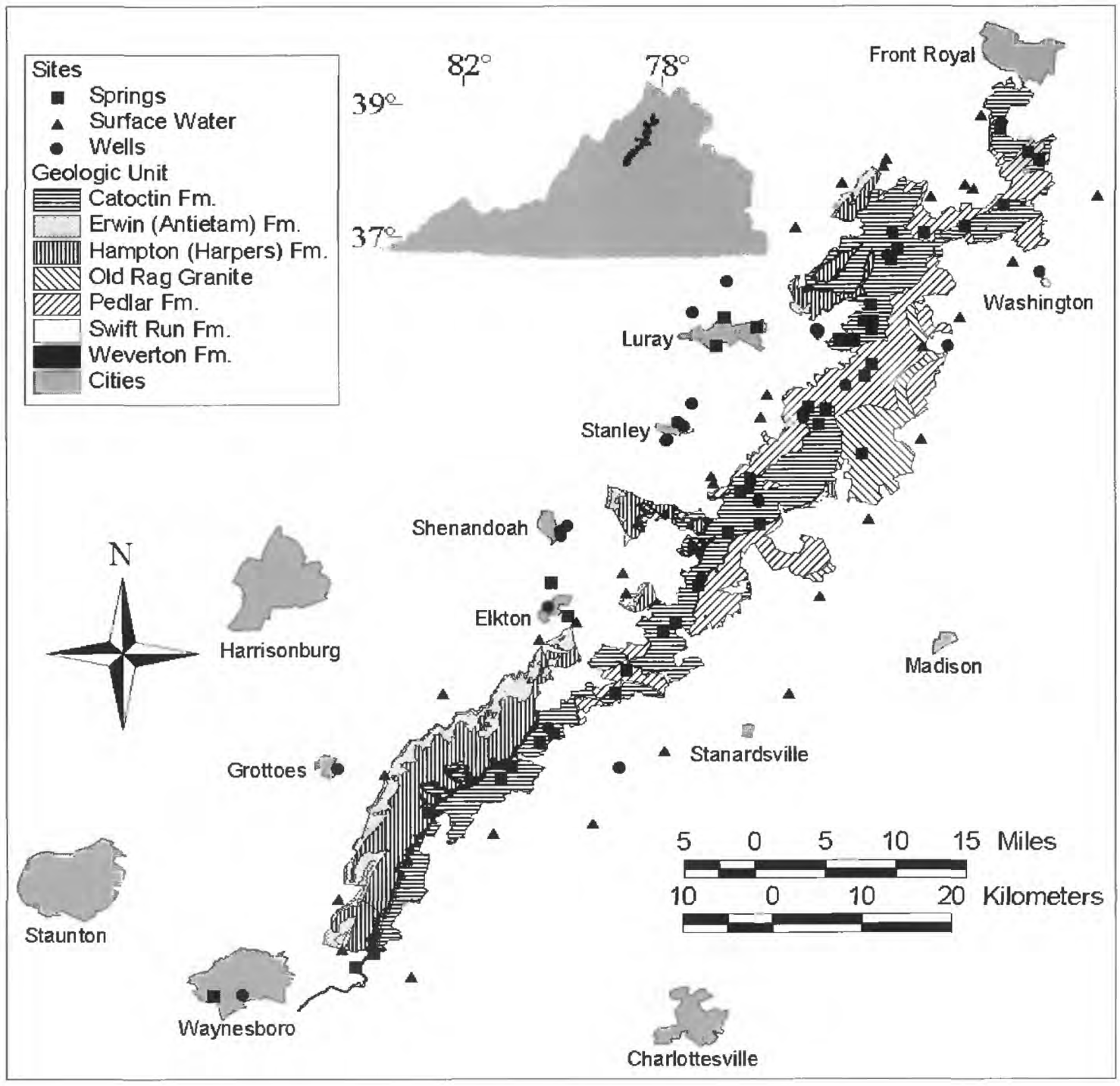

Figure 3. Relation of wells, springs and surface-water sampling sites in and near Shenandoah National Park to geologic units within the Park (Gathright, 1976).

SAMPLE COLLECTION AND ANALYTICAL PROCEDURES

The methods used to sample springs and wells were selected to minimize or eliminate contact with air. For developed springs, a stainless-steel piston displacement pump (Bennett pump) was inserted in the discharge pipe for the spring. If possible, flow from the spring was then blocked, flooding the below-land-surface construction. A closed path from the pump to the sample container prevented subsequent contact with air. Spring discharge was measured by capturing timed flow in a calibrated bucket. Wells were purged of at least 3 casing volumes prior to sampling. Stability in field parameters including water temperature, specific conductance, pH and dissolved oxygen provided additional guidelines in determining when to sample wells. A closed path was established between the well and sampling equipment to prevent contact of the sample with air. Containers for surface-water samples were filled by submerging the containers directly in the source.

Air Samples

Ambient air samples were collected in 800 cc stainless steel flasks with electro-polished internal surfaces using an ultra-pure diaphram-type pump and analyzed for CFCs and SF_6. The flasks were prepared in the laboratory by pressurizing with ultra-pure nitrogen. At the Big Meadows Air Monitoring Station, the nitrogen was released and the flask flushed with air for 15 minutes prior to filling. Total sample pressure was typically 2 atmospheres. Air samples were pumped through 3.1 mm (O.D.) refrigeration-grade stainless steel tubing from a point approximately 30 m above land surface. The gas samples were analyzed by electron capture dector (ECD) gas chromatography, with a precision of approximately 5 percent.

Water Chemistry

The procedures and guidelines established by the USGS were followed in the collection and preservation of the water samples. Samples for analysis of cations were filtered (0.45µm) and collected in acid-rinsed 250-mL polyethylene bottles. The samples were acidified with 1 mL of Ultrex nitric acid. The samples for analysis of anions were filtered and collected in 250-mL polypropylene containers. The containers, filters, and acid were obtained from USGS National Water Quality Laboratory in Lakewood, Colorado. Further details of field collection procedures are described elsewhere (Busenberg and Plummer, 1992; Dunkle and others, 1994; Plummer and others, 1998a, 1998b; Busenberg and others, 1998, 2000).

Samples were analyzed for major cations and silica at the USGS Water Chemistry Laboratory in Reston, Virginia using the ARL SpectraSpan V, a multi-element direct-current plasma spectrometer (DCP). The instrument is equipped with the Adam analytical manager and background corrector. The detection limits for Ca, Mg, Sr, SiO_2, Na, K, Fe, Mn, and Al by DCP were less than 0.1, 0.01, 0.005, 0.1, 0.05, 0.1, 0.01, 0.005, and 0.005 parts per million (ppm), respectively. Precision for measurement of Ca, Mg, Sr, SiO_2, Na, K, Fe, Mn, and Al concentrations by DCP was 3 to 5, 3 to 5, 3 to 5, 5, 3 to 5, 5 to 10, 5 to 10, 5, and 10 to 15 percent, respectively.

Samples were analyzed for trace cations using a Perkin Elmer ELAN6000 inductively coupled plasma-mass spectrometer (ICP-MS) with a Scott-type cross flow nebulizer for sample introduction and a quadrupole mass separator. The detection limits for Cu, Ni, Rb, and V were 0.1 parts per billion (ppb). The detection limits for Ba, Li, and Zn were 1 ppb. The detection limits for Pb and B were 0.05 and 20 ppb, respectively. Precision was generally 3 to 5 percent for all elements analyzed by ICP-MS.

A Dionex series 4000i ion chromatograph (IC) equipped with a Dionex AS4 column (1996 data), and a Dionex DX-120 equipped with a Dionex AS14 column (1997 and 1999 data) were used for the analysis of samples for fluoride, chloride, nitrate, and sulfate. Bromide was measured with a Dionex DX-120 ion chromatograph. Detection limits for chloride, sulfate, nitrate, and fluoride were less than 1, 2, 0.1, and 0.05 ppm, respectively. The bromide detection limit depended on the volume of the sampling loop used to inject the sample into the ion chromatograph and ranged from less than 0.005 to less than 0.02 ppm. The precisions for measurements of chloride, sulfate,

nitrate, fluoride, and bromide were 3, 3 to 5, 3 to 5, 3, and 10 percent, respectively.

Major Dissolved Gases

Water samples for analysis of major dissolved gases were collected in 150 cc septum bottles without headspace. Concentrations of N_2, Ar, O_2, and CO_2 were measured in the USGS Dissolved Gas Laboratory, Reston, Virginia using gas chromatography procedures (See http://water.usgs.gov/lab/cfc/). Replicate analyses of N_2 and Ar in laboratory standards prepared by equilibrating water samples with air were typically within 1 percent and yielded calculated equilibration temperatures within ± 0.5 °C (See Busenberg and others, 1998 for further details). The dissolved O_2 and CO_2 analyses have uncertainties similar to dissolved N_2 and Ar, but can deviate as much as 20 percent between replicate samples because of varying extents of microbiological processes occurring in the sample bottles.

Chlorofluorocarbons

Water samples for analysis of CFCs were fused into borosilicate ampoules in the field using collection procedures that exclude contact with air (Busenberg and Plummer, 1992). Concentrations of the CFCs, CFC-11 (trichlorofluoromethane, $CFCl_3$), CFC-12 (dichlorodifluoromethane, CF_2Cl_2), and CFC-113, (trichlorotrifluoroethane, $C_2F_3Cl_3$), were determined at the USGS Chlorofluorocarbon Laboratory, Reston, Virginia using purge and trap gas chromatography with an electron-capture detector (Busenberg and Plummer, 1992; http://water.usgs.gov/lab/cfc/). The CFC concentrations are referenced to average air compositions measured at Niwot Ridge, CO (Climate Monitoring and Diagnostics Laboratory (CMDL) of the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce (see http://www.cmdl.noaa.gov/). The detection limit for CFC-11 and CFC-12 is near 0.3 picograms per kilogram of water (pg kg^{-1}), and approximately 1.0 pg/kg for CFC-113.

Sulfur Hexafluoride

Water samples for analysis of SF_6 were collected in 2.5 L plastic-coated glass bottles. The tube carrying water from the sample pump was placed in the bottom of the bottle, displacing the air above the water. After at least 3 L of over-flow, the tube was slowly removed. The bottles were sealed with screw caps with conical liners without headspace. The cone liners in the caps allowed for some expansion of the water on warming. However, caps were slightly loosened periodically to prevent the glass bottles from breaking when the ground-water temperatures were significantly lower than the ambient air temperature. The SF_6 analyses were performed in the USGS laboratory in Reston, Virginia, by purge and trap gas-chromatographic procedures (Busenberg and Plummer, 2000). The SF_6 detection limit was approximately 1.5 femtograms per liter (fgL^{-1}).

Tritium

Water samples for analysis of ^3H were collected in 500 cc glass bottles. The bottles were sealed with screw caps with conical liners. Approximately 10 cc air space was left in the bottles during filling to accommodate expansion on warming. The samples were enriched electrolytically and analyzed by liquid scintillation counting in the low-level tritium laboratory of the USGS, in Menlo Park, California, following procedures modified from those described by Thatcher and others (1977). Additional ^3H measurements were made at the Noble Gas Laboratory at Lamont-Doherty Earth Observatory of Columbia University, Palisades, New York, using the He ingrowth technique (Clarke and others, 1976; Bayer and others, 1989). The ^3H results based on liquid scintillation counting and He ingrowth were identical within the uncertainties of the measurements (generally < 0.1 TU for He ingrowth measurements and 0.3 to 0.4 TU for low-level counting).

Tritium/Helium-3 and Noble Gases

Samples for $^3H/^3He$ age determination (^3H, δ^3He, ^4He, and Ne analyses) were collected in 80 cm long copper tubes with pinch-off clamps, and

analyzed at the Noble Gas Laboratory, Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY, using mass-spectrometric procedures (Ekwurzel and others, 1994; Ludin and others, 1998). An additional 500 cc water sample was collected in a glass bottle for ^3H determination by ^3He ingrowth. Gases were extracted quantitatively (>99.9 percent) from the water sample in the copper sample tubes using a vacuum extraction line and transferred into flame-sealed glass ampoules. After separation of water vapor and dissolved gases in several cryogenic traps, He isotopes were measured on a VG 5400 mass spectrometer. Analyses of duplicate samples agreed within the analytical error of about ± 2 percent for the ^4He concentration and ±1 percent for the $^3He/^4He$ ratio. Neon was measured in parallel to the He isotopes in a quadrupole mass spectrometer with a precision of ≤ ± 4 percent. The analytical errors assigned to the He and Ne concentrations, as well as the $^3He/^4He$ ratios were based on factors affecting both the extraction procedures and the mass spectrometric measurements. The term δ^3He expresses the deviation of the $^3He/^4He$ ratio of the sample from that of air in percent:

$$\delta^3 He = \left(\frac{\left(\frac{^3He}{^4He} \right)_{sample}}{\left(\frac{^3He}{^4He} \right)_{air}} - 1 \right) 100 \quad , \quad (1)$$

where the $^3He/^4He$ ratio of air is equal to 1.384×10^{-6} (Clark and others, 1976).

Sulfur Isotopes

Samples for analysis of $^{34}S/^{32}S$ and ^{35}S were collected as sulfate on anion exchange resins from approximately 20 L water samples using methods described by Carmody and others (1998).

Sulfur-35 in Sulfate

Water samples for analysis of ^{35}S were collected in plastic carboys and returned to the laboratory where the samples were weighed. The water samples were spiked with approximately 100 mg of ^{35}S-free Na_2SO_4, which helped to improve recovery of sulfur from the original sample. The total dissolved sulfate was then collected on the anion exchange resin, eluted in the laboratory and precipitated as $BaSO_4$.

The ^{35}S activity was determined by beta-decay counting procedures at the USGS Laboratory, Menlo Park, California (Sueker and others, 1999; Michel and others, 2000). Data on the total dissolved sulfate, the amount of sulfate recovered in laboratory processing to $BaSO_4$, and weight of the sample were used to correct the ^{35}S activity relative to 1 L of sample. The ^{35}S activity was then corrected to the date of sample collection using the half-life of 87 days. Depending on the initial ^{35}S activity in the sample and the biogeochemical behavior of the sulfate, the detection limit of beta-counting procedures for ^{35}S permits recognition of waters younger than about 1.5 years (approximately 5 half-lives) or mixtures of younger waters with waters older than 1.5 years. The ^{35}S activity is reported as milli-Becquerels per liter of sample ($mBq\ L^{-1}$).

Stable Sulfur Isotope Ratios in Sulfate

Water samples for analysis of ^{34}S were collected in the field on anion exchange resin. The dissolved sulfate (without Na_2SO_4 spike) was eluted in the laboratory and precipitated as $BaSO_4$. The S isotopic composition of dissolved sulfate is reported as $\delta^{34}S$ on the Vienna Canyon Diablo Triolite (VCDT) scale (Coplen and Krouse, 1998) with a typical 2σ uncertainty of ± 0.4 per mil. The term $\delta^{34}S$ is defined as:

$$\delta^{34} S = \left(\frac{\left(\frac{^{34}S}{^{32}S} \right)_{sample}}{\left(\frac{^{34}S}{^{32}S} \right)_{VCDT}} - 1 \right) 1000 \quad . \quad (2)$$

Stable Isotope Ratios of Oxygen and Hydrogen in Water

Water samples for determination of the stable isotope ratios of oxygen and hydrogen were untreated and collected in 60 cc glass bottles with polycone-seal liner caps. The stable isotopes of oxygen and hydrogen (expressed as $\delta^{18}O$ and $\delta^{2}H$) were determined on water samples at the USGS Stable Isotope Laboratory, Reston, Virginia. The terms $\delta^{18}O$ and $\delta^{2}H$ are expressed as the per mil (parts per thousand) deviation from the Vienna SMOW (VSMOW, Vienna Standard Mean Ocean Water; Coplen, 1996) standard:

$$\delta^{18}O = \left(\frac{\left(\frac{^{18}O}{^{16}O} \right)_{sample}}{\left(\frac{^{18}O}{^{16}O} \right)_{VSMOW}} - 1 \right) 1000 \quad , \quad (3)$$

and

$$\delta^{2}H = \left(\frac{\left(\frac{^{2}H}{^{1}H} \right)_{sample}}{\left(\frac{^{2}H}{^{1}H} \right)_{VSMOW}} - 1 \right) 1000 \quad . \quad (4)$$

The $\delta^{18}O$ and $\delta^{2}H$ values were normalized (Coplen, 1988) on scales such that the $\delta^{18}O$ and $\delta^{2}H$ values of SLAP (Standard Light Antarctic Precipitation) are -55.5 and -428 per mil, respectively. The 2σ precisions of O- and H-isotope results were 0.2 and 1.5 per mil, respectively.

Isotope Ratios of Nitrogen in Nitrate

Water samples for determination of isotope ratios of nitrogen in dissolved nitrate were filtered through 0.45µm filters in the field, collected in field-rinsed 1-L plastic bottles without preservative, and stored under refrigeration until analyzed. Nitrogen isotope analyses were performed on N_2 gas produced from nitrate (plus trace amounts of nitrite and organic N, if present). A split from each sample containing approximately 10-20 µmole of nitrate was titrated with KOH to a pH value of 9-10, freeze-dried in a polyethylene Erlenmayer flask, redissolved in 1-2 mL of de-ionized water, then freeze-dried again in a quartz tube open at one end. Combustion reagents (0.2 g of CaO plus 2.0 g of a $Cu\text{-}Cu_2O$ mixture) were added to the tube, which was then evacuated, sealed, and baked (held at 850°C for 2 hours, then cooled at 40°C per hour to room temperature). N_2 gas was admitted to the mass spectrometer by breaking the tube under vacuum at the inlet with no further purification. The nitrogen isotope analyses were calibrated by interspersed analyses of laboratory standard nitrate solutions whose values are known with respect to the normalized scale provisionally defined by IAEA-N1 (+0.43 ‰) and USGS-32 (+180.0 ‰) (Böhlke and Coplen, 1995), with average 1 σ uncertainties of less than ± 0.1 per mil (average deviation from the mean for sample aliquots prepared and analyzed separately). Concentrations of total N determined from the mass spectrometer signals for freeze-dried, combusted samples generally were in excellent agreement with concentrations of nitrate determined from IC measurements. See Böhlke and Denver (1995) for additional information on N isotope sample collection and analysis.

TABLES OF ANALYTICAL DATA

Air Samples

Concentrations of gases in air samples are reported as mixing ratios in dry air in units of parts per trillion by volume (pptv). Concentrations of CFC-11, CFC-12, CFC-113, and SF_6 in air from the Big Meadows Air Monitoring Station, Shenandoah National Park are summarized in Table 4.

Well and Spring Samples

Dissolved N_2, Ar, Ne, He, O_2, CO_2, Recharge Temperature and Excess Air

Table 5 summarizes concentrations of dissolved N_2, Ar, Ne, He, O_2, and CO_2. The table also includes calculation of the recharge temperature (°C), and excess air (ccSTP/kg) based on the dissolved N_2 and Ar data and the land-surface elevation of the spring discharge area or

well head. This procedure leads to a minimum estimate of the average elevation of recharge for springs in SNP. Based on traces of watershed area on topographic maps (Table 1), recharge elevations of some of the sampled springs could be as much as 500 feet higher than that of the discharge point. The elevation of recharge for water pumped from wells is even less certain due to the unknown nature of ground-water flow in the fractured rocks of SNP. However, as most of the spring and well samples are from the higher elevations in SNP and located near the Skyline Drive, the elevation of recharge cannot be significantly underestimated. Plummer and Busenberg (1999) discuss uncertainties in calculated gas partial pressures and apparent CFC-based ages resulting from uncertainties in recharge elevation. Generally, uncertainties of 500 feet in recharge elevation can be ignored.

The recharge temperature is the temperature at the water table during recharge and was determined by assuming that the dissolved N_2 and Ar concentrations were in solubility equilibrium during recharge with possible dissolution of excess air. Excess air refers to air trapped below a rising water table with subsequent dissolution under increased hydrostatic pressure. Recharge temperatures were determined for individual samples using data on dissolved N_2 and Ar concentrations with correction for excess air (Heaton, 1981; Heaton and Vogel, 1981; Heaton and others, 1983; Busenberg and others, 1993; Stute and Schlosser, 1999). The calculation of recharge temperature and excess air used data on the vapor pressure of water from Wexler (1976) and the Henry's law solubilities of N_2 and Ar in water compiled by Wilhelm and others (1977). The calculation was based on the assumption that excess air dissolves completely, that is, without being fractionated during dissolution. Values of excess air were also estimated from the dissolved helium and dissolved neon concentrations using Henry's law solubility data for He and Ne from Weiss (1971) (Table 5).

Table 6 summarizes selected/and(or) averaged values of recharge temperature and excess air based on the dissolved N_2 and Ar data of Table 5. The last column of Table 6 indicates the number of dissolved gas analyses included in the averaged recharge temperature and excess air. In some cases there were no valid N_2 and Ar data and a recharge temperature of 9 °C was assumed. In this case, the excess air was based on dissolved Ne, if available, or assumed to be zero if Ne data were not available. Negative values of excess air are included in Table 6 as calculated. Negative values of excess air can be attributed to uncertainty in recharge elevation, analytical error and/(or) sample degassing.

Dissolved oxygen concentrations from the field and laboratory gas chromatographic measurements are compared in Table 5. In most cases the laboratory dissolved oxygen content is less than the field value as a result of aerobic microbial processes occurring in the serum bottle between collection and analysis (serum bottles for dissolved gas analysis were refrigerated for periods of several weeks during storage prior to analysis). Several samples have laboratory O_2 concentrations that are greater than the field O_2 analysis (Table 5), which is an indication of an air leak into the sample container following collection and/(or) during laboratory analysis. Table 5 also includes the gas chromatographic analyses of dissolved CO_2. Many of the samples, especially those collected after 1996, were collected and analyzed in duplicate for dissolved N_2, Ar, O_2, and CO_2. All duplicate analyses are included in Table 5.

Chlorofluorocarbon Concentrations and CFC Age

Table 7 summarizes average concentrations of CFC-11, CFC-12, and CFC-113 measured in water from springs and wells in pg/kg. The average is typically based on 3 separate analyses (3 separate ampoules of water collected sequentially from the spring or well). Table 7 also includes the recharge temperature and site elevation used to calculate the tabulated CFC partial pressures in pptv. The recharge temperature used in the calculation was that of Table 6. All CFC partial pressures are expressed as dry air mixing ratios at sea level, and can be compared directly with North American (N.A.) air values for dating purposes (Plummer and Busenberg, 1999).

Table 8 summarizes the apparent (piston flow) recharge dates and ages based on CFC-11, CFC-12 and CFC-113. The recharge date is based on the N.A. air curves tabulated in Table 9. Considering the uncertainty in recharge elevation and precision of the dissolved N_2 and Ar analyses, the uncertainty

in recharge temperature was estimated to be approximately ± 1.0 °C. An uncertainty of ± 1.0 °C in recharge temperature was applied to the CFC data to estimate age errors. Because of the leveling off or turn over in atmospheric CFC concentrations in recent years (Plummer and Busenberg, 1999), many samples can only be designated as modern (M), indicating water recharged since about 1993. Other samples have CFC concentrations that are greater than those possible for water in equilibrium with modern air at the recharge temperature. Such apparent over-saturation of CFCs can occur if the recharge temperature is over-estimated (too high relative to the actual recharge temperature) or if there are additional sources of CFCs in addition to that of air, such as anthropogenic contamination sources. Samples with over-saturation of CFCs are denoted as "contaminated" (C). Some samples can have dual recharge dates based on the recent turn-over in CFC-11 and CFC-113 atmospheric mixing ratios. For these, the assigned CFC-11 or CFC-113 age was arbitrarily taken as the younger of the two ages. The atmospheric mixing ratio of CFC-12 rose slowly through the period of sampling, permitting assignment of a single CFC-12-based age.

Sulfur Hexafluoride Concentrations and SF_6 Age

Table 10 summarizes the measured sulfur hexafluoride (SF_6) concentrations in fg/L and the calculated SF_6 partial pressure in the sample based on Henry's law solubilities from Busenberg and Plummer (2000). Also included in Table 10 is the modeled SF_6 mixing ratio. The modeled SF_6 mixing ratio was corrected for SF_6 that was introduced with excess air in the sample. The modeled SF_6 mixing ratio was calculated iteratively by removing excess air from the sample corresponding to the apparent recharge date and composition of N.A. air for that date as given in Table 9 (Busenberg and Plummer, 2000). The model recharge date was based on the modeled SF_6 partial pressure (column labeled "Remove Ex Air") and the local (SNP) air concentrations of SF_6. The local SNP air curve for SF_6 is that of Table 9 with 5 percent enrichment. The SF_6 age errors were estimated by assuming ± 5 percent uncertainty in local SNP air composition (L.N. Plummer, E. Busenberg, J.K. Böhlke, D.L. Nelms, R.L. Michel, and P. Schlosser, unpublished data, 2000).

Tritium, Helium, and Neon Data, and Tritium/Helium-3 Age

Table 11 summarizes the tritium and noble gas data used to calculate the tritium/helium-3 ($^3H/^3He$) apparent age. The ^3H concentration is given in Tritium Units (TU) with 1σ uncertainty in TU. The He and Ne concentrations are given in ccSTP/g, and as the percent excess He and Ne above the solubility equilibrium concentrations (Δ^4He and ΔNe). Percent terrigenic helium is the excess He, after subtraction of He from equilibrium with air during recharge and He from excess air, given in percent of the total He. Most samples have small negative percentages of terrigenic He, which are within the measurement uncertainties of samples and indicate that most of the dissolved He is from solubility equilibrium with air during recharge and from excess air.

Table 12 summarizes the calculated $^3H/^3He$ ages and the age uncertainties. The "uncorrected" ages were calculated without correction for terrigenic He sources, assuming all He was derived from solubility equilibrium, excess air, and ^3H decay. The "corrected" ages were calculated after subtracting terrigenic He from the analyses. The column with "Y" (yes) or "N" (no) indicates whether the sample contains sufficient terrigenic He to warrant correction; that is, whether the sample contains enough terrigenic helium to separate the uncorrected and corrected ages by more than approximately 0.5 years. The "Final Age" and associated error is the uncorrected value (if terrigenic He was not considered), or the corrected value (if terrigenic He was present). As with the chlorofluorocarbons and sulfur hexafluoride data, all $^3H/^3He$ ages are apparent ages and do not account for dispersion or other mixing processes. Details of $^3H/^3He$ dating are given in Schlosser and others (1988, 1989), Poreda, and others (1988), Solomon and Sudicky (1991), Solomon and others (1993), Ekwurzel and others (1994), and Solomon and Cook (1999).

Other Isotope Data

Table 13 summarizes analyses of δ^2H and $\delta^{18}O$ of water, ^3H in water, $\delta^{34}S$ of dissolved sulfate, the ^{35}S activity and associated dissolved sulfate concentration, and $\delta^{15}N$ of dissolved nitrate. The uncertainty in ^{35}S activity is the 1σ counting error.

Water Chemistry

Table 14 summarizes the field parameters (water temperature, dissolved O_2, pH, and specific conductance), and major element composition (dissolved calcium, magnesium, sodium, potassium, chloride, sulfate, and titration alkalinity as bicarbonate) of the water samples. Limited discharge data are also tabulated. Table 15 summarizes selected concentrations of minor elements, including dissolved strontium, silica (as SiO_2), iron, nitrate (as N), and manganese. Table 16 summarizes selected concentrations of trace elements including aluminum (Al), boron (B), barium (Ba), lithium, (Li), zinc (Zn), lead (Pb), copper (Cu), nickel (Ni), rubidium (Rb), and vanadium (V).

Surface-Water Samples

Table 17 summarizes field measurements of specific conductance and water temperature of streams sampled at the base of the Blue Ridge Mountains. Also given in Table 17 are the measured ^3H activity, the associated 1σ tritium error, and values of δ^2H and $\delta^{18}O$ of water.

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Table 1. Identification of spring samples from Shenandoah National Park and vicinity

[Elev., elevation of the land surface, datum is sea level; ND, not determined]

Site ID	Site Name	Latitude[1]	Longitude[1]	Elev (feet)	Watershed Area (acres)	Geologic Unit
2	HQ Spring #14-3 - above HQ on Rt 211	383939.43	782014.21	1760	3.2	Catoctin
3	Hemlock Spring	383546.43	782147.15	3440	8.6	Catoctin
4	Pinnacles Spring #16	383733.88	781938.63	3480	9.3	Pedlar
5	Furnace Spring at Skyland	383550.11	782246.90	3430	5.4	Pedlar
7	Dundo Spring #29	381318.13	784355.01	2880	1.3	Hampton
8	Simmons Gap Spring	381742.54	783723.61	2360	193.3	Catoctin
9	Panorama Spring #13-3	384007.09	781915.46	2560	40.2	Catoctin
10	Browntown Valley Overlook Spring	384701.41	781154.25	2900	15.7	Catoctin
11	Camp Hoover Spring #2	382923.02	782531.00	2580	57.6	Catoctin
12	Davids Spring	383145.46	782603.73	3400	53.6	Catoctin
13	Dickeys Ridge Spring	385000.16	781034.04	2400	32.3	Pedlar
14	Gravel Spring NE	384550.65	781401.27	2490	7.1	Catoctin
15	Pass Mountain Overlook Spring	384035.04	781943.40	2580	17.0	Catoctin
16	Swift Run Gap Spring #27	382115.53	783257.11	2640	6.1	Pedlar
17	Dean Mountain/South River Spring	382323.19	783051.61	3110	39.7	Catoctin
18	Baldface Mountain Spring	382351.87	783013.32	3560	5.7	Catoctin
19	Hazeltop Ridge Overlook Spring	382853.66	782716.86	3300	8.6	Catoctin
20	Byrds Nest #4/Beahms Gap Spring	384131.69	781918.11	2200	201.0	Catoctin
21	Byrds Nest #3 Spring	383811.28	781913.59	3000	14.7	Pedlar
24	Hogback Spring #5	384531.92	781621.42	3240	18.0	Pedlar
26	Hightop Hut Spring	381959.52	783334.85	3120	8.6	Catoctin
27	Pass Mountain Hut Spring	384036.44	781909.43	2700	9.8	Catoctin
28	Spring at mile 97.3 (D/O-18 3H only)	380531.00	784654.00	2340	3.6	Catoctin
29	Spring at mile 98.7 (D/O-18 3H only)	380444.00	784757.00	2540	5.4	Catoctin
30	Mathews Arm Stream (D/O-18 3H only)	384530.00	781802.00	2580	8.9	Catoctin
32	Sneads Farm Spring (D/O-18 3H only)	385121.00	781207.00	2130	8.9	Catoctin
35	White Oak Cabin Spring	383454.98	782212.89	3370	0.0	Catoctin
40	Mathews Arm Spring Range View Cabin	384434.68	781748.15	2880	14.3	Catoctin
41	Lewis Mountain Spring #25-2	382558.66	782857.37	2920	15.7	Catoctin
42	Old Rag Shelter Spring	383315.57	781947.39	2035	10.5	Old Rag Granite
43	Loft Mountain Overlook Spring	381714.58	783746.74	2460	3.6	Catoctin
44	Loft Mountain Spring	381514.85	783954.96	3000	5.2	Catoctin
46	Yeager's Spring (Luray)	384048.11	782726.51	778	ND	Beekmantown
48	Bear Lithia Spring	382607.79	783707.66	866	ND	Elbrook
52	Ivy Creek Shelter Spring	381553.40	783916.51	2920	21.3	Catoctin
53	Lewis Mountain Spring #25	382558.95	782857.33	2920	15.7	Catoctin
54	Elkwallow Spring #8	384403.12	781809.49	2500	14.1	Catoctin
55	Hite Spring (Luray)	384014.93	782537.14	837	ND	Conocoheague
56	HQ Spring #14-1	383937.88	782104.28	1460	3.2	Catoctin
57	Indian Run Shelter Spring	384938.66	780957.60	2290	27.9	Pedlar
58	Town of Elkton Spring	382415.84	783612.61	1078	ND	Waynesboro
64	Hudson Spring (Luray)	383913.78	782754.62	765	ND	Conocoheague
65	Lewis Spring	383109.57	782637.88	3320	116.5	Catoctin
69	Coyner Spring	380310.01	785554.36	1320	ND	Elbrook

[1] Latitude and longitude are given in degrees-minutes-seconds, and decimal fraction of a second. For example, 384531.52 is 38°45'31.52".

Table 2. Identification of well samples from Shenandoah National Park and vicinity

[Elev., elevation of the land surface, datum is sea level; ND, not determined]

Site ID	Site Name	Latitude[1]	Longitude[1]	Elev (feet)	Geology	Well Depth (feet)	Depth to Bedrock (feet)	Depth of Casing (feet)	Casing Diameter (inches)	Depth of Water Bearing Zones
1	HQ #1 Well (W-855)	384005.76	782210.60	1120	Catoctin	220	20	52	6	60, 189
6	Skyland #2 (W-1033)	383514.22	782258.98	3560	Swift Run	500	30	52	7	64,99
22	Big Meadows #9 Well	383042.32	782529.72	3460	Catoctin	350	67	67, 79	14, 6	80-85,100,235
23	Big Meadows #14 Well	383037.19	782531.43	3510	Catoctin	450	85	36, 85, 300	14, 10, 6	310-315,350-360,385-387,450
25	Elkwallow Well (W-1703)	384413.90	781820.65	2570	Catoctin	363	35	43	6	70-75,140-145
31	Dickeys Ridge Well (W-1346)	385138.85	781158.50	1840	Catoctin	650	23	52	6.25	600-605, 625-630
33	Domestic well #1	384250	782717	850	Beekmantown	ND	ND	ND	ND	ND
34	Domestic well #2	384107	782912	845	Beekmantown	ND	ND	ND	ND	ND
36	Big Meadows #1 Well (W-1701)	383121.62	782604.59	3504	Catoctin	100	60	68	6	70-80
37	HQ #2 Well (W-851)	384008.39	782214.48	1135	Weverton	280	11	52	6.44	56-56.5,89-89.5,107-107.5,117-117.5,150-150.5
38	Skyland #5	383527.78	782300.11	3670	Pedlar	500	34	34, 53	14,6	75, 114, 344
39	Pinnacles Well (W-3288)	383702.57	782041.38	3280	Pedlar	145	56	60.5	6	50-51, 67-68
45	Simmons Gap Well (W-1704)	381802.25	783717.45	2230	Catoctin	205	30	43	6	190-195
47	Lewis Mountain Well (W-1072)	382622.22	782842.50	3390	Catoctin	300	15	52	7	54-55,104-105
49	Mathews Arm Well (W-856)	384533.38	781804.02	2590	Catoctin	200	15	26.25	6	42, 47, 73, 109, 164
50	Loft Mountain Well #1 (W-715)	381559.85	783932.04	2740	Weverton	303	14	65	6	123-123.5, 134-134.5
51	Loft Mountain Well #2 (W-754)	381603.90	783933.57	2680	Weverton	320	14	34.75	6	46-47, 50-51, 53-54, 56-57, 115-116
59	Town of Elkton well	382447.79	783718.24	917	Elbrook	352	71	48,120	16,12	ND
60	Town of Grottoes #2	381547.28	784854.59	1191	Elbrook	445	355.5	338,414	10,8	424-427,434-435,442-445
61	Blue Ridge School #5	381549.67	783317.14	733	Layered pyroxene	495	ND	68	6	ND
62	Town of Washington #3	384320.98	780948.13	663	Layered pyroxene	205	8	56	8	65-70,160-165
63	Mountain side Market	383914.55	781457.81	817	Layered pyroxene	ND	ND	ND	ND	ND
66	Town of Stanley # 3	383359.54	783039.38	1175	Rome	653	494	500	6	526,540-547,574-578
67	Town of Shenandoah # 5	382919.58	783611.38	1170	Conocoheague	447	111	340	8	429.5-431
68	Wanyesboro Jefferson Rd # 1	380311.50	785413.87	1360	Rome	432	180	191,432	10,6	191-235,245-305,340-400
71	Town of Shenandoah # 2	382900.65	783631.09	1080	Conocoheague	460	122	121,258	12,8	364-366
72	Town of Shenandoah # 3	382842.61	783630.76	1070	Conocoheague	660	173	89,175,395	12,10,6	648-649
73	Town of Stanley # 6	383459.76	783005.34	1050	Conocoheague	482	157	167	10	461-462,464-467
74	Town of Stanley # 5	383602.29	782914.63	970	Conocoheague	300	20	169	6	203-300
75	Town of Stanley # 4	383447.40	782940.93	1070	Elbrook	372	145	147,257	10,8	272-287,311-322,340-343,346-350
76	Town of Stanley # 2	383403.47	783035.76	1140	Rome	490	293	317	6.5	333,345,360,380,430

[1] Latitude and longitude are given in degrees-minutes-seconds, and decimal fraction of a second. For example, 384531.52 is 38°45'31.52".

Table 3. Identification of surface-water samples from Shenandoah National Park and vicinity

[Elev., elevation of the land surface, datum is sea level]

Site ID	Site Name	Latitude[1]	Longitude[1]	Elev (feet)
80	(C01) Tributary of East Hawksbill Creek	383636.85	782504.60	1060
81	(C02) East Hawksbill Creek (Hollow Run)	383520.99	782527.14	1250
82	(C03) Hawksbill Creek	383139.00	782807.00	1601
83	(C03b) Hawksbill Creek @ Rt 737	383202.16	782813.14	1263
84	(C04) Naked Creek	382644.24	783306.02	1086
85	(C05) South Branch Naked Run	382543.80	783300.47	1194
86	(C06) Elk Run	382357.70	783543.94	1056
87	(C07) Conway River	381958.39	782352.70	584
88	(C08) Rapidan River	382524.50	782207.64	794
89	(C09) Robinson River	382942.73	781925.51	689
90	(C10) Hughes River	383407.28	781628.45	781
91	(N01) Jeremys Run	384549.48	782327.96	636
92	(N02) Overall Run	384821.80	782055.33	584
93	(N03) Flint Run	384939.25	781826.16	709
94	(N03b) Flint Run	384916.24	781838.19	696
95	(N04) Greasy Run	384735.00	781555.00	1129
96	(N05) Broad Run	384816.75	781402.64	971
97	(N05b) Broad Run (up Rt 632 0.7 mi from SNP-N05)	384802.80	781336.07	1043
98	(N06) Dry Run	385207.28	781306.44	935
99	(N07) Hittles Mill Stream	384735.92	780637.35	640
100	(N08) Rush River	384358.33	781120.42	771
101	(N09) Piney River	384053.48	781419.92	781
102	(N10) Thornton River	383914.59	781624.60	955
103	(S01) Hawksbill Creek 340 Bridge	382300.32	783748.05	971
104	(S02) Big Run	381958.45	784305.52	1020
105	(S02b) Madison Run	381527.60	784621.73	1371
106	(S03) Mine Branch	380835.67	784855.12	1516
107	(S04) Sawmill Run	380545.39	784843.13	1519
108	(S05) Lickinghole Creek	380413.34	784451.87	896
109	(S06) Doyles River	381210.13	784018.73	942
110	(S07) Buck Mountain Creek	381246.09	783449.84	571
111	(S08) Haneytown Creek	381646.90	783048.89	630

[1] Latitude and longitude are given in degrees-minutes-seconds, and decimal fraction of a second. For example, 384531.52 is 38°45'31.52".

Table 4. Summary of chlorofluorocarbon and sulfur hexafluoride concentrations in air from the Big Meadows Air Monitoring Station, Shenandoah National Park ([1])

[CFC-11, (trichlorofluoromethane, $CFCl_3$); CFC-12, (dichlorodifluoromethane, CF_2Cl_2); CFC-113, (trichlorotrifluoroethane, $C_2F_3Cl_3$); SF_6, sulfur hexafluoride; pptv, parts per trillion by volume; ND, not determined]

Date	CFC-11 (pptv)	CFC-12 (pptv)	CFC-113 (pptv)	SF6 (pptv)	Date	CFC-11 (pptv)	CFC-12 (pptv)	CFC-113 (pptv)	SF6 (pptv)	Date	CFC-11 (pptv)	CFC-12 (pptv)	CFC-113 (pptv)	SF6 (pptv)
8/6/1995	ND	ND	ND	4.18	3/4/1997	266.8	534.1	79.4	4.17	5/11/1998	ND	ND	ND	4.74
9/18/1995	ND	ND	ND	3.74	3/18/1997	269.9	535.3	84.2	4.13	5/21/1998	258.6	535.7	79.3	4.17
9/27/1995	ND	ND	ND	3.73	3/27/1997	276.9	562.8	85.9	ND	6/11/1998	265.0	549.7	82.9	ND
9/28/1995	273.8	550.6	83.2	3.73	4/2/1997	266.7	543.3	82.3	4.06	6/12/1998	261.1	551.3	83.5	4.27
11/3/1995	270.7	544.3	84.4	3.57	4/8/1997	265.2	539.1	82.1	4.05	6/16/1998	259.8	536.5	80.2	4.37
11/3/1995	271.4	546.8	83.5	ND	4/16/1997	264.4	538.1	81.9	4.14	6/16/1998	260.0	549.2	80.8	ND
11/7/1995	273.0	547.1	84.5	3.99	4/29/1997	269.0	550.5	83.1	4.08	6/29/1998	ND	ND	ND	4.49
11/13/1995	263.5	534.6	84.1	ND	5/6/1997	264.7	544.8	80.6	4.32	6/30/1998	ND	ND	ND	4.13
11/28/1995	264.7	536.6	82.4	3.84	5/15/1997	260.7	540.7	81.5	4.04	7/7/1998	265.0	554.6	81.6	4.60
12/5/1995	322.5	529.2	80.5	3.65	5/27/1997	273.1	553.8	85.2	4.39	7/15/1998	ND	ND	ND	4.34
12/12/1995	244.9	512.9	78.6	3.46	6/3/1997	272.5	554.5	83.4	4.51	7/21/1998	260.4	549.0	84.3	4.27
1/13/1996	262.8	536.3	84.6	3.71	6/3/1997	264.9	541.9	81.0	ND	7/28/1998	265.0	548.0	83.7	4.42
1/23/1996	272.1	548.9	81.3	ND	6/9/1997	265.9	543.3	81.3	4.56	7/28/1998	263.8	539.0	83.1	ND
1/30/1996	269.8	540.6	82.3	4.00	6/9/1997	268.1	544.7	82.2	ND	8/18/1998	267.7	555.4	81.0	4.39
2/6/1996	259.4	546.7	80.9	4.13	6/16/1997	261.9	534.8	82.0	ND	9/1/1998	261.5	549.2	80.7	4.52
2/27/1996	259.7	534.7	81.7	3.81	6/24/1997	266.3	536.7	83.5	4.07	10/13/1998	264.4	549.5	82.6	4.42
3/5/1996	269.2	536.4	83.6	3.84	6/24/1997	256.8	535.3	80.9	ND	10/21/1998	270.6	544.4	79.7	ND
3/12/1996	272.4	542.8	84.2	ND	7/1/1997	269.5	550.7	82.5	4.04	10/27/1998	ND	ND	ND	5.05
3/19/1996	282.1	553.4	83.8	4.36	7/1/1997	264.0	542.6	81.0	ND	11/19/1998	274.8	551.0	79.9	4.46
4/8/1996	286.3	545.8	82.3	3.88	7/8/1997	265.5	543.2	82.5	4.09	12/8/1998	332.2	551.4	84.3	4.52
4/9/1996	263.8	531.8	82.8	3.86	7/8/1997	257.6	534.3	80.8	ND	12/22/1998	263.2	548.7	81.5	4.54
4/11/1996	282.7	549.1	81.6	3.86	7/15/1997	280.7	578.5	85.8	4.17	1/9/1999	262.4	560.3	82.0	ND
4/11/1996	275.2	543.8	82.3	3.92	7/15/1997	273.3	551.5	84.0	ND	1/12/1999	263.0	546.9	81.9	4.60
4/11/1996	ND	ND	ND	4.00	7/24/1997	269.6	551.8	82.4	4.16	1/21/1999	263.8	545.3	81.9	4.58
4/17/1996	382.4	545.7	83.7	3.81	7/24/1997	ND	ND	ND	3.85	2/9/1999	ND	ND	ND	4.63
4/17/1996	262.6	532.0	80.2	3.85	8/6/1997	256.1	526.7	77.5	4.00	2/9/1999	ND	ND	ND	4.82
4/17/1996	387.1	548.4	78.7	ND	8/12/1997	259.3	543.9	81.2	4.43	2/16/1999	262.7	546.2	80.7	4.42
4/19/1996	348.3	548.4	83.2	3.93	8/20/1997	258.4	537.4	78.7	5.24	4/9/1999	263.1	548.0	79.6	ND
4/24/1996	328.4	543.4	81.2	3.78	9/6/1997	261.4	528.4	79.9	ND	4/19/1999	ND	ND	ND	4.46
4/25/1996	302.6	555.3	82.3	3.86	9/11/1997	261.7	543.5	80.9	4.20	4/20/1999	262.7	547.6	79.7	ND
4/26/1996	309.8	542.2	85.9	ND	9/16/1997	268.2	543.1	83.9	4.26	4/27/1999	262.6	547.1	81.1	4.31
4/30/1996	262.0	532.8	82.3	4.00	9/16/1997	ND	ND	ND	4.38	5/10/1999	262.0	549.0	80.9	4.47
5/14/1996	268.0	534.9	83.8	3.80	9/17/1997	263.8	553.0	81.5	4.57	5/26/1999	262.6	550.4	82.1	4.48
5/21/1996	268.8	551.7	86.3	4.91	9/18/1997	263.5	547.9	82.1	4.47	6/2/1999	262.2	547.7	81.1	4.67
5/30/1996	265.1	536.4	83.6	3.76	9/25/1997	267.4	546.8	82.0	4.20	6/29/1999	262.1	546.9	81.3	ND
6/4/1996	269.0	539.5	84.9	3.91	9/30/1997	262.7	535.2	81.8	ND	7/16/1999	262.4	542.2	81.1	4.57
7/16/1996	265.3	560.2	81.7	3.92	10/7/1997	266.0	545.9	85.3	4.89	7/22/1999	ND	ND	ND	4.89
8/6/1996	269.4	551.1	82.4	ND	10/14/1997	264.2	546.8	81.1	4.19	7/24/1999	265.3	551.9	82.1	ND
8/13/1996	268.6	550.6	81.8	4.26	10/21/1997	ND	ND	ND	4.27	8/3/1999	ND	ND	ND	4.53
8/20/1996	271.2	555.1	81.7	4.39	11/18/1997	261.2	543.4	81.0	4.23	8/10/1999	266.2	543.3	82.0	4.34
8/29/1996	267.3	550.8	83.9	4.12	11/18/1997	261.2	543.4	81.0	ND	8/24/1999	270.3	547.0	83.4	4.61
9/17/1996	261.4	539.1	82.0	4.33	11/24/1997	246.8	531.2	87.0	4.08	9/14/1999	265.2	541.7	83.7	4.54
9/24/1996	263.1	545.3	83.8	4.10	11/24/1997	240.7	537.7	85.4	ND	9/30/1999	264.0	543.6	81.7	4.38
10/1/1996	265.5	545.1	83.3	3.96	12/2/1997	258.8	545.8	83.7	4.26	10/5/1999	263.2	545.3	80.8	4.44
10/7/1996	267.6	552.6	82.1	ND	12/2/1997	259.6	555.2	80.4	ND	10/19/1999	265.4	554.8	83.1	4.69
10/22/1996	286.1	564.9	80.8	4.09	12/9/1997	272.1	557.9	80.6	5.05	10/26/1999	270.8	556.5	82.5	4.31
11/5/1996	263.0	534.2	82.8	4.09	12/16/1997	265.8	547.2	82.2	4.09	11/12/1999	266.5	560.9	81.6	4.83
12/3/1996	260.3	546.6	82.2	4.09	1/6/1998	264.3	546.2	82.4	4.10	11/23/1999	266.9	549.9	81.7	4.38
12/10/1996	261.7	536.4	82.1	4.08	1/13/1998	262.1	551.1	79.5	4.49	1/11/2000	265.1	542.6	81.8	4.46
1/3/1997	256.4	528.3	81.7	3.94	2/3/1998	267.2	552.0	81.7	4.56	2/11/2000	266.3	538.3	82.2	ND
1/21/1997	265.6	536.5	81.3	4.31	2/24/1998	264.6	551.2	82.6	4.34	2/25/2000	264.4	536.4	81.0	4.59
2/25/1997	266.9	542.2	82.3	4.18	3/17/1998	269.8	558.0	82.0	4.39	3/1/2000	266.6	557.2	83.9	4.56
2/25/1997	266.9	542.2	82.3	4.18	4/28/1998	257.6	542.7	79.6	4.14	ND	ND	ND	ND	ND

[1] The air measurements are referenced to average air compositions measured at Niwot Ridge, CO (Climate Monitoring and Diagnostics Laboratory (CMDL) of the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce--http://www.cmdl.noaa.gov/).

Table 5. Summary of dissolved gases (nitrogen, argon, neon, helium, oxygen, and carbon dioxide)

[W, well; S, spring; Elev., elevation of the land surface, datum is sea level; N_2, nitrogen; Ar, argon; °C, degrees Celsius; Ex Air, excess air; mg/L, milligrams per liter; cc STP/g, cubic centimeters at standard temperature and pressure per gram; kg, kilogram; Ne, neon; He, helium; O_2, oxygen; CO_2, carbon dioxide; ND, not determined]

SNP No.	Site ID	Site Name	W/S	Date	Elev (feet)	N_2 (mg/L)	Ar (mg/L)	N_2/Ar Recharge Temp (°C)	N_2/Ar Ex Air (cc STP/L)	Neon x10^8 (ccSTP/g)	Excess air Ne (cc/kg)	Helium x10^8 (ccSTP/g)	Excess air He (cc/kg)	Lab O_2 (mg/L)	Field O_2 (mg/l)	Lab CO_2 (mg/L)
SNP-001	1	HQ #1 Well (W-855)	W	4/1/1996	1120	23.96	0.7178	16.7	8.9	28.46	4.9	6.84	4.5	2.9	4.7	21.0
SNP-090	1	HQ #1 Well (W-855)	W	8/27/1997	1120	24.37	0.7892	8.8	6.6	31.38	6.5	7.67	6.1	2.7	5.1	24.8
SNP-090	1	HQ #1 Well (W-855)	W	8/27/1997	1120	24.22	0.7856	8.9	6.5	31.38	6.5	7.67	6.1	2.6	5.1	24.7
SNP-227	1	HQ #1 Well (W-855)	W	8/16/1999	1120	22.53	0.7587	8.7	4.7	ND	ND	ND	ND	2.0	6.1	23.4
SNP-002	2	HQ Spring #14-3 - above HQ on Rt 211	S	4/1/1996	1760	17.38	0.6634	8.6	-0.2	19.40	0.1	4.59	0.4	5.0	8.9	32.8
SNP-003	3	Hemlock Spring	S	4/1/1996	3440	16.50	0.6323	7.9	-0.3	ND	ND	ND	ND	8.0	9.4	5.7
SNP-108	3	Hemlock Spring	S	9/4/1997	3440	16.26	0.6221	8.5	-0.3	ND	ND	ND	ND	6.9	10.2	5.0
SNP-108	3	Hemlock Spring	S	9/4/1997	3440	16.35	0.6272	8.2	-0.3	ND	ND	ND	ND	7.4	10.2	4.7
SNP-231	3	Hemlock Spring	S	8/17/1999	3440	16.68	0.6319	8.2	0.0	ND	ND	ND	ND	6.4	10.8	10.1
SNP-004	4	Pinnacles Spring #16	S	4/2/1996	3480	16.31	0.6129	9.7	0.2	18.84	0.6	4.26	0.3	9.2	9.6	10.1
SNP-112	4	Pinnacles Spring #16	S	9/4/1997	3480	15.55	0.5899	10.9	-0.2	18.18	0.3	4.20	0.2	6.7	9.1	6.2
SNP-112	4	Pinnacles Spring #16	S	9/4/1997	3480	15.61	0.6024	9.5	-0.6	18.18	0.3	4.20	0.2	8.4	9.1	5.1
SNP-006	5	Furnace Spring at Skyland	S	4/2/1996	3430	16.92	0.6474	7.0	-0.2	18.48	0.1	4.24	0.2	7.7	10.0	12.2
SNP-089	5	Furnace Spring at Skyland	S	8/27/1997	3430	16.74	0.6412	7.4	-0.3	18.75	0.3	4.24	0.2	7.4	9.6	9.4
SNP-089	5	Furnace Spring at Skyland	S	8/27/1997	3430	16.42	0.6372	7.2	-0.7	18.75	0.3	4.24	0.2	7.7	9.6	9.2
SNP-125	5	Furnace Spring at Skyland	S	9/11/1997	3430	16.55	0.6215	9.2	0.2	18.52	0.3	4.25	0.3	8.1	10.1	12.7
SNP-125	5	Furnace Spring at Skyland	S	9/11/1997	3430	16.42	0.6236	8.7	-0.1	18.52	0.3	4.25	0.3	7.7	10.1	13.0
SNP-169	5	Furnace Spring at Skyland	S	9/18/1997	3430	19.87	0.7001	6.8	2.7	18.60	0.5	4.26	0.3	9.3	10.9	12.7
SNP-169	5	Furnace Spring at Skyland	S	9/18/1997	3430	16.50	0.6119	10.3	0.6	18.60	0.5	4.26	0.3	8.0	10.9	11.8
SNP-182	5	Furnace Spring at Skyland	S	3/2/1999	3430	16.82	0.6411	7.5	-0.1	ND	ND	ND	ND	7.3	10.0	9.5
SNP-187	5	Furnace Spring at Skyland	S	4/2/1999	3430	17.11	0.6490	7.2	0.0	ND	ND	ND	ND	8.1	9.8	12.1
SNP-192	5	Furnace Spring at Skyland	S	4/27/1999	3430	16.85	0.6381	7.9	0.1	ND	ND	ND	ND	8.4	10.6	12.1
SNP-197	5	Furnace Spring at Skyland	S	5/26/1999	3430	16.71	0.6319	8.3	0.1	ND	ND	ND	ND	8.4	10.0	9.1
SNP-202	5	Furnace Spring at Skyland	S	6/23/1999	3430	16.88	0.6399	7.7	0.0	ND	ND	ND	ND	4.4	9.7	12.8
SNP-221	5	Furnace Spring at Skyland	S	7/15/1999	3430	17.04	0.6433	7.7	0.2	ND	ND	ND	ND	6.7	10.1	10.7
SNP-224	5	Furnace Spring at Skyland	S	8/11/1999	3430	16.72	0.6325	8.3	0.1	ND	ND	ND	ND	7.6	9.9	9.5
SNP-260	5	Furnace Spring at Skyland	S	9/7/1999	3430	16.60	0.6270	8.7	0.1	ND	ND	ND	ND	8.1	10.1	12.0
SNP-266	5	Furnace Spring at Skyland	S	9/9/1999	3430	16.66	0.6317	8.3	0.0	ND	ND	ND	ND	8.4	10.5	11.7
SNP-271	5	Furnace Spring at Skyland	S	9/22/1999	3430	16.77	0.6330	8.3	0.1	ND	ND	ND	ND	8.2	9.6	14.9
SNP-008	6	Skyland #2 (W-1033)	W	4/2/1996	3560	17.10	0.6486	7.0	0.1	19.96	0.9	4.72	1.1	6.5	9.0	22.4
SNP-094	6	Skyland #2 (W-1033)	W	8/28/1997	3560	17.06	0.6241	9.7	1.0	19.87	1.1	4.66	1.1	7.0	9.8	17.3
SNP-094	6	Skyland #2 (W-1033)	W	8/28/1997	3560	16.92	0.6251	9.3	0.7	19.87	1.1	4.66	1.1	7.0	9.8	17.3
SNP-232	6	Skyland #2 (W-1033)	W	8/17/1999	3560	17.42	0.6295	9.8	1.4	ND	ND	ND	ND	5.3	9.9	19.0
SNP-232	6	Skyland #2 (W-1033)	W	8/17/1999	3560	17.40	0.6290	9.8	1.4	ND	ND	ND	ND	5.5	9.9	18.6
SNP-009	7	Dundo Spring #29	S	4/3/1996	2880	17.39	0.6593	7.4	0.1	19.60	0.5	4.44	0.4	9.3	9.4	9.3
SNP-120	7	Dundo Spring #29	S	9/10/1997	2880	15.72	0.5906	12.1	0.1	18.39	0.3	4.26	0.2	6.2	9.2	13.5
SNP-120	7	Dundo Spring #29	S	9/10/1997	2880	15.86	0.5939	12.0	0.2	18.39	0.3	4.26	0.2	6.3	9.2	13.8
SNP-014	8	Simmons Gap Spring	S	4/4/1996	2360	17.38	0.6523	8.9	0.3	18.71	0.0	4.30	0.0	6.2	10.5	18.3
SNP-014	8	Simmons Gap Spring	S	4/4/1996	2360	16.61	0.6381	9.0	-0.4	18.71	0.0	4.30	0.0	6.2	10.5	18.1
SNP-131	8	Simmons Gap Spring	S	9/16/1997	2360	16.75	0.6366	9.4	-0.1	19.16	0.3	4.43	0.3	7.7	10.0	19.9
SNP-131	8	Simmons Gap Spring	S	9/16/1997	2360	16.52	0.6276	10.0	-0.2	19.16	0.3	4.43	0.3	7.3	10.0	19.9
SNP-238	8	Simmons Gap Spring	S	8/18/1999	2360	16.75	0.6348	9.7	-0.1	ND	ND	ND	ND	5.6	11.0	18.0
SNP-017	9	Panorama Spring #13-3	S	4/5/1996	2560	16.85	0.6292	10.2	0.4	18.72	0.2	4.30	0.1	6.4	9.9	19.9
SNP-107	9	Panorama Spring #13-3	S	9/3/1997	2560	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.7	ND

Table 5. Summary of dissolved gases (nitrogen, argon, neon, helium, oxygen, and carbon dioxide)--Continued

SNP No.	Site ID	Site Name	W/S	Date	Elev (feet)	N_2 (mg/L)	Ar (mg/L)	N_2/Ar Recharge Temp (°C)	N_2/Ar Ex Air (cc STP/L)	Neon x10^8 (ccSTP/g)	Excess air Ne (cc/kg)	Helium x10^8 (ccSTP/g)	Excess air He (cc/kg)	Lab O_2 (mg/L)	Field O_2 (mg/l)	Lab CO_2 (mg/L)
SNP-018	10	Browntown Valley Overlook Spring	S	4/5/1996	2900	20.12	0.7369	4.2	1.5	22.94	2.0	5.22	1.8	8.9	10.2	19.6
SNP-103	10	Browntown Valley Overlook Spring	S	9/2/1997	2900	17.68	0.6639	7.4	0.4	20.02	0.8	4.58	0.7	6.5	9.9	23.4
SNP-103	10	Browntown Valley Overlook Spring	S	9/2/1997	2900	17.43	0.6622	7.1	0.0	20.02	0.8	4.58	0.7	6.7	9.9	23.2
SNP-123	10	Browntown Valley Overlook Spring	S	9/11/1997	2900	17.51	0.6504	8.6	0.6	19.86	0.8	4.58	0.7	6.6	8.0	24.7
SNP-123	10	Browntown Valley Overlook Spring	S	9/11/1997	2900	17.51	0.6469	8.9	0.8	19.86	0.8	4.58	0.7	6.9	8.0	24.3
SNP-139	10	Browntown Valley Overlook Spring	S	9/18/1997	2900	17.55	0.6602	7.6	0.3	20.15	0.9	4.57	0.7	7.0	9.3	23.1
SNP-184	10	Browntown Valley Overlook Spring	S	3/3/1999	2900	17.61	0.6681	6.8	0.1	ND	ND	ND	ND	8.5	9.1	21.0
SNP-189	10	Browntown Valley Overlook Spring	S	4/2/1999	2900	18.40	0.6803	7.0	0.9	ND	ND	ND	ND	8.2	9.6	20.9
SNP-193	10	Browntown Valley Overlook Spring	S	4/28/1999	2900	18.00	0.6718	7.1	0.6	ND	ND	ND	ND	8.7	9.3	20.3
SNP-193	10	Browntown Valley Overlook Spring	S	4/28/1999	2900	18.09	0.6716	7.3	0.8	ND	ND	ND	ND	8.4	9.3	20.5
SNP-198	10	Browntown Valley Overlook Spring	S	5/27/1999	2900	17.85	0.6680	7.3	0.5	ND	ND	ND	ND	8.5	8.7	20.4
SNP-204	10	Browntown Valley Overlook Spring	S	6/24/1999	2900	17.98	0.6679	7.5	0.7	ND	ND	ND	ND	4.9	8.1	22.4
SNP-219	10	Browntown Valley Overlook Spring	S	7/14/1999	2900	17.84	0.6656	7.5	0.6	ND	ND	ND	ND	6.1	9.1	22.3
SNP-219	10	Browntown Valley Overlook Spring	S	7/14/1999	2900	17.81	0.6636	7.7	0.6	ND	ND	ND	ND	5.8	9.1	22.7
SNP-225	10	Browntown Valley Overlook Spring	S	8/12/1999	2900	17.78	0.6624	7.7	0.6	ND	ND	ND	ND	6.6	10.3	21.8
SNP-262	10	Browntown Valley Overlook Spring	S	9/7/1999	2900	19.34	0.6923	7.4	2.1	ND	ND	ND	ND	8.2	10.2	28.1
SNP-268	10	Browntown Valley Overlook Spring	S	9/10/1999	2900	27.48	0.8349	7.0	10.3	ND	ND	ND	ND	10.6	9.3	26.1
SNP-268	10	Browntown Valley Overlook Spring	S	9/10/1999	2900	19.20	0.6869	7.7	2.1	ND	ND	ND	ND	8.1	9.3	26.0
SNP-273	10	Browntown Valley Overlook Spring	S	9/22/1999	2900	19.86	0.7031	7.2	2.5	ND	ND	ND	ND	8.1	8.9	25.6
SNP-021	11	Camp Hoover Spring #2	S	4/8/1996	2580	17.92	0.6586	8.9	1.0	21.80	1.8	5.12	1.7	7.5	8.8	18.5
SNP-116	11	Camp Hoover Spring #2	S	9/9/1997	2580	17.24	0.6279	11.1	1.1	20.47	1.3	4.76	1.1	7.0	9.5	18.0
SNP-234	11	Camp Hoover Spring #2	S	8/17/1999	2580	17.28	0.6371	10.1	0.8	ND	ND	ND	ND	6.0	10.6	19.1
SNP-234	11	Camp Hoover Spring #2	S	8/17/1999	2580	17.41	0.6401	10.0	0.9	ND	ND	ND	ND	5.3	10.6	19.9
SNP-022	12	Davids Spring	S	4/8/1996	3400	18.30	0.6654	7.6	1.4	19.23	0.6	4.32	0.3	5.1	8.5	40.0
SNP-110	12	Davids Spring	S	9/4/1997	3400	14.43	0.5314	16.4	0.4	20.08	1.8	4.65	1.3	4.4	8.5	23.3
SNP-110	12	Davids Spring	S	9/4/1997	3400	13.97	0.5213	16.8	0.0	20.08	1.8	4.65	1.3	4.5	8.5	22.7
SNP-243	12	Davids Spring	S	8/20/1999	3400	17.84	0.6491	8.6	1.3	ND	ND	ND	ND	4.6	8.4	35.6
SNP-243	12	Davids Spring	S	8/20/1999	3400	17.79	0.6507	8.3	1.2	ND	ND	ND	ND	4.8	8.4	35.6
SNP-024	13	Dickeys Ridge Spring	S	4/10/1996	2400	ND	ND	ND	ND	19.38	-0.7	4.43	-0.1	ND	9.9	ND
SNP-129	13	Dickeys Ridge Spring	S	9/12/1997	2400	16.75	0.6270	10.5	0.3	19.14	0.4	4.38	0.3	7.3	8.8	17.7
SNP-129	13	Dickeys Ridge Spring	S	9/12/1997	2400	16.70	0.6244	10.7	0.3	19.14	0.4	4.38	0.3	7.5	8.8	17.5
SNP-130	13	Dickeys Ridge Spring	S	9/12/1997	2400	15.85	0.5906	13.1	0.3	ND	ND	ND	ND	6.6	8.5	37.6
SNP-130	13	Dickeys Ridge Spring	S	9/12/1997	2400	15.83	0.5940	12.6	0.1	ND	ND	ND	ND	6.2	8.5	38.3
SNP-246	13	Dickeys Ridge Spring (pipe 2)	S	8/20/1999	2400	16.75	0.6306	10.1	0.1	ND	ND	ND	ND	5.7	10.8	17.5
SNP-025	14	Gravel Spring NE	S	4/10/1996	2490	17.24	0.6500	8.7	0.2	19.39	0.4	4.43	0.3	6.3	9.3	25.8
SNP-101	14	Gravel Spring NE	S	9/2/1997	2490	17.15	0.6533	8.1	-0.1	20.28	0.8	4.94	1.3	5.4	9.0	27.6
SNP-101	14	Gravel Spring NE	S	9/2/1997	2490	16.84	0.6467	8.3	-0.4	20.28	0.8	4.94	1.3	6.2	9.0	26.7
SNP-026	15	Pass Mountain Overlook Spring	S	4/10/1996	2580	17.38	0.6529	8.5	0.3	18.79	0.1	4.30	0.1	9.4	9.1	15.1
SNP-100	15	Pass Mountain Overlook Spring	S	9/2/1997	2580	15.85	0.6016	11.4	-0.2	18.44	0.2	4.28	0.2	7.3	8.7	21.1
SNP-100	15	Pass Mountain Overlook Spring	S	9/2/1997	2580	15.75	0.5994	11.5	-0.3	18.44	0.2	4.28	0.2	7.1	8.7	21.3
SNP-027	16	Swift Run Gap Spring #27	S	4/11/1996	2640	17.68	0.6482	9.5	1.0	20.08	0.9	4.63	0.8	4.6	8.8	15.4
SNP-133	16	Swift Run Gap Spring #27	S	9/16/1997	2640	16.75	0.6220	10.7	0.5	20.03	1.0	4.60	0.8	5.9	8.4	14.7
SNP-133	16	Swift Run Gap Spring #27	S	9/16/1997	2640	16.88	0.6294	10.1	0.4	20.03	1.0	4.60	0.8	6.0	8.4	14.7
SNP-239	16	Swift Run Gap Spring #27	S	8/19/1999	2640	16.73	0.6249	10.4	0.4	ND	ND	ND	ND	4.3	9.4	15.5
SNP-028	17	Dean Mountain/South River Spring	S	4/11/1996	3110	17.83	0.6767	6.0	0.1	19.11	0.2	4.31	0.2	7.1	9.9	26.2
SNP-115	17	Dean Mountain/South River Spring	S	9/5/1997	3110	17.36	0.6414	9.0	0.8	18.65	0.3	4.27	0.2	7.2	9.3	19.1
SNP-115	17	Dean Mountain/South River Spring	S	9/5/1997	3110	16.65	0.6190	10.2	0.5	18.65	0.3	4.27	0.2	7.0	9.3	17.5
SNP-240	17	Dean Mountain/South River Spring	S	8/19/1999	3110	16.96	0.6308	9.4	0.5	ND	ND	ND	ND	6.4	10.0	16.9

Table 5. Summary of dissolved gases (nitrogen, argon, neon, helium, oxygen, and carbon dioxide)--Continued

SNP No.	Site ID	Site Name	W/S	Date	Elev (feet)	N_2 (mg/L)	Ar (mg/L)	N_2/Ar Recharge Temp (°C)	N_2/Ar Ex Air (cc STP/L)	Neon $x10^8$ (ccSTP/g)	Excess air Ne (cc/kg)	Helium $x10^8$ (ccSTP/g)	Excess air He (cc/kg)	Lab O_2 (mg/L)	Field O_2 (mg/l)	Lab CO_2 (mg/L)
SNP-029	18	Baldface Mountain Spring	S	4/11/1996	3560	17.36	0.6625	6.0	-0.1	18.55	0.1	4.22	0.1	6.5	10.6	7.0
SNP-030	19	Hazeltop Ridge Overlook Spring	S	4/11/1996	3300	16.49	0.6299	8.3	-0.2	16.61	-1.0	4.24	0.1	6.1	10.4	13.3
SNP-032	20	Byrds Nest #4/Beahms Gap Spring	S	4/12/1996	2200	10.79	0.4153	28.2	-1.3	19.25	-0.8	4.43	-0.2	4.0	10.6	12.4
SNP-104	20	Byrds Nest #4/Beahms Gap Spring	S	9/3/1997	2200	14.12	0.5265	18.3	-0.1	19.13	0.2	4.39	0.2	6.0	9.8	13.8
SNP-104	20	Byrds Nest #4/Beahms Gap Spring	S	9/3/1997	2200	16.67	0.6384	9.3	-0.4	19.13	0.2	4.39	0.2	7.5	9.8	19.8
SNP-242	20	Byrds Nest #4/Beahms Gap Spring	S	8/20/1999	2200	16.66	0.6305	10.2	-0.1	ND	ND	ND	ND	6.1	10.2	17.0
SNP-034	21	Byrds Nest #3 Spring	S	4/12/1996	3000	ND	ND	ND	ND	20.14	0.0	4.67	0.5	ND	10.1	ND
SNP-109	21	Byrds Nest #3 Spring	S	9/4/1997	3000	14.03	0.5185	18.0	0.2	19.47	1.4	4.58	1.0	5.8	9.7	13.3
SNP-109	21	Byrds Nest #3 Spring	S	9/4/1997	3000	14.08	0.5256	17.1	0.0	19.47	1.4	4.58	1.0	6.1	9.7	13.3
SNP-127	21	Byrds Nest #3 Spring	S	9/11/1997	3000	16.95	0.6312	9.5	0.5	19.28	0.6	4.54	0.7	7.8	9.2	19.2
SNP-127	21	Byrds Nest #3 Spring	S	9/11/1997	3000	17.01	0.6277	10.0	0.7	19.28	0.6	4.54	0.7	7.3	9.2	19.7
SNP-138	21	Byrds Nest #3 Spring	S	9/18/1997	3000	17.98	0.6498	9.4	1.5	19.83	1.0	4.57	0.8	8.2	9.7	20.0
SNP-138	21	Byrds Nest #3 Spring	S	9/18/1997	3000	17.05	0.6245	10.5	1.0	19.83	1.0	4.57	0.8	7.5	9.7	19.4
SNP-183	21	Byrds Nest #3 Spring	S	3/2/1999	3000	17.18	0.6361	9.4	0.7	ND	ND	ND	ND	7.1	9.7	19.5
SNP-188	21	Byrds Nest #3 Spring	S	4/2/1999	3000	17.07	0.6328	9.6	0.6	ND	ND	ND	ND	8.6	9.5	18.4
SNP-194	21	Byrds Nest #3 Spring	S	4/28/1999	3000	17.22	0.6370	9.4	0.7	ND	ND	ND	ND	8.5	9.3	18.6
SNP-199	21	Byrds Nest #3 Spring	S	5/27/1999	3000	17.32	0.6430	8.9	0.6	ND	ND	ND	ND	8.6	9.5	18.8
SNP-199	21	Byrds Nest #3 Spring	S	5/27/1999	3000	17.19	0.6359	9.4	0.7	ND	ND	ND	ND	8.9	9.5	18.5
SNP-203	21	Byrds Nest #3 Spring	S	6/24/1999	3000	17.46	0.6464	8.8	0.7	ND	ND	ND	ND	6.1	9.5	20.7
SNP-218	21	Byrds Nest #3 Spring	S	7/14/1999	3000	17.56	0.6471	8.9	0.9	ND	ND	ND	ND	6.6	9.6	20.1
SNP-218	21	Byrds Nest #3 Spring	S	7/14/1999	3000	17.41	0.6427	9.1	0.8	ND	ND	ND	ND	6.5	9.6	20.0
SNP-226	21	Byrds Nest #3 Spring	S	8/12/1999	3000	17.37	0.6390	9.4	0.9	ND	ND	ND	ND	7.1	10.3	19.4
SNP-261	21	Byrds Nest #3 Spring	S	9/7/1999	3000	17.30	0.6366	9.6	0.9	ND	ND	ND	ND	8.3	9.9	19.5
SNP-267	21	Byrds Nest #3 Spring	S	9/9/1999	3000	17.35	0.6398	9.3	0.8	ND	ND	ND	ND	9.1	10.2	18.9
SNP-272	21	Byrds Nest #3 Spring	S	9/22/1999	3000	17.42	0.6436	9.0	0.8	ND	ND	ND	ND	8.6	10.2	19.5
SNP-272	21	Byrds Nest #3 Spring	S	9/22/1999	3000	17.33	0.6378	9.5	0.9	ND	ND	ND	ND	9.0	9.3	18.9
SNP-035	22	Big Meadows #9 Well	W	4/15/1996	3460	17.57	0.6445	9.2	1.0	ND	ND	ND	ND	9.1	9.3	18.9
SNP-096	22	Big Meadows #9 Well	W	8/28/1997	3460	16.88	0.6392	7.8	0.1	18.32	0.1	4.08	-0.1	6.0	8.7	15.8
SNP-096	22	Big Meadows #9 Well	W	8/28/1997	3460	16.14	0.6097	9.7	0.0	18.57	0.4	4.27	0.3	7.3	10.1	12.3
SNP-036	23	Big Meadows #14 Well	W	4/15/1996	3510	16.13	0.6076	10.0	0.1	18.57	0.4	4.27	0.3	7.2	10.1	12.2
SNP-092	23	Big Meadows #14 Well	W	8/28/1997	3510	19.23	0.6708	8.7	2.9	23.75	3.2	5.62	2.9	6.4	8.9	10.5
SNP-233	23	Big Meadows #14 Well	W	8/17/1999	3510	16.70	0.6303	8.4	0.1	19.15	0.6	4.44	0.6	6.4	9.3	11.3
SNP-233	23	Big Meadows #14 Well	W	8/17/1999	3510	23.51	0.7592	7.0	6.6	ND	ND	ND	ND	6.7	12.1	7.1
SNP-038	24	Hogback Spring #5	S	4/16/1996	3240	23.20	0.7497	7.4	6.4	ND	ND	ND	ND	2.6	12.1	10.5
SNP-039	25	Elkwallow Well (W-1703)	W	4/16/1996	2570	16.41	0.6272	8.6	-0.3	18.84	0.4	4.33	0.3	8.0	10.2	8.1
SNP-086	25	Elkwallow Well (W-1703)	W	8/26/1997	2570	23.66	0.7617	8.3	6.7	30.80	6.7	7.67	6.5	7.2	9.4	17.5
SNP-086	25	Elkwallow Well (W-1703)	W	8/26/1997	2570	21.38	0.7197	8.7	4.4	28.22	5.3	7.02	5.3	7.2	9.7	14.8
SNP-228	25	Elkwallow Well (W-1703)	W	8/16/1999	2570	21.31	0.7119	9.4	4.7	28.22	5.3	7.02	5.3	7.3	9.7	14.7
SNP-041	26	Hightop Hut Spring	S	4/17/1996	3120	16.94	0.6407	9.0	0.0	ND	ND	ND	ND	5.5	9.1	11.5
SNP-132	26	Hightop Hut Spring	S	9/16/1997	3120	17.62	0.6528	8.2	0.8	19.58	0.7	4.51	0.6	5.6	8.8	32.0
SNP-132	26	Hightop Hut Spring	S	9/16/1997	3120	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.5	ND
SNP-043	27	Pass Mountain Hut Spring	S	4/18/1996	2700	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.5	ND
SNP-105	27	Pass Mountain Hut Spring	S	9/3/1997	2700	17.90	0.6584	8.7	1.0	20.08	0.9	4.62	0.7	7.6	8.2	26.1
SNP-105	27	Pass Mountain Hut Spring	S	9/3/1997	2700	33.83	0.8921	13.3	18.9	19.09	1.1	4.38	0.6	12.5	9.2	14.1
SNP-048	31	Dickeys Ridge Well (W-1346)	W	4/19/1996	1840	18.67	0.6013	18.0	4.7	19.09	1.1	4.38	0.6	7.8	9.2	13.2
SNP-084	31	Dickeys Ridge Well (W-1346)	W	8/26/1997	1840	21.02	0.7196	9.1	3.7	22.39	2.2	5.36	2.2	3.0	5.9	2.3
SNP-084	31	Dickeys Ridge Well (W-1346)	W	8/26/1997	1840	21.55	0.7328	8.6	4.1	28.09	4.9	7.38	5.7	3.6	6.7	2.2
SNP-230	31	Dickeys Ridge Well (W-1346)	W	8/16/1999	1840	21.59	0.7418	7.7	3.8	28.09	4.9	7.38	5.7	4.3	6.7	1.7
						22.18	0.7494	8.0	4.5	ND	ND	ND	ND	4.0	7.4	2.6

Table 5. Summary of dissolved gases (nitrogen, argon, neon, helium, oxygen, and carbon dioxide)--Continued

SNP No.	Site ID	Site Name	W/S	Date	Elev (feet)	N_2 (mg/L)	Ar (mg/L)	N_2/Ar Recharge Temp (°C)	N_2/Ar Ex Air (cc STP/L)	Neon $x10^8$ (ccSTP/g)	Excess air Ne (cc/kg)	Helium $x10^8$ (ccSTP/g)	Excess air He (cc/kg)	Lab O_2 (mg/L)	Field O_2 (mg/l)	Lab CO_2 (mg/L)
SNP-050	33	Domestic well 1	W	4/24/1996	850	23.56	0.7900	7.7	5.1	30.14	5.6	7.29	5.2	3.0	5.4	39.5
SNP-051	34	Domestic well 2	W	4/24/1996	845	29.17	0.8635	10.0	11.8	ND	ND	ND	ND	4.7	5.2	24.4
SNP-051	34	Domestic well 2	W	4/24/1996	845	29.02	0.8629	9.8	11.6	ND	ND	ND	ND	5.1	5.2	23.9
SNP-052	35	White Oak Cabin Spring	S	4/25/1996	3370	16.91	0.6315	8.8	0.4	18.16	0.0	4.44	0.6	9.3	9.7	7.4
SNP-052	35	White Oak Cabin Spring	S	4/25/1996	3370	16.22	0.6267	8.1	-0.6	18.16	0.0	4.44	0.6	8.9	9.7	7.6
SNP-111	35	White Oak Cabin Spring	S	9/4/1997	3370	14.66	0.5613	12.8	-0.5	17.86	0.3	4.25	0.4	5.8	8.8	5.5
SNP-111	35	White Oak Cabin Spring	S	9/4/1997	3370	14.69	0.5581	13.3	-0.3	17.86	0.3	4.25	0.4	5.9	8.8	5.5
SNP-053	36	Big Meadows #1 Well (W-1701)	W	4/25/1996	3504	20.86	0.7162	6.7	3.8	25.82	4.1	6.05	3.6	4.9	8.1	16.8
SNP-083	36	Big Meadows #1 Well (W-1701)	W	9/17/1997	3504	20.46	0.6988	7.9	3.8	25.52	4.1	6.06	3.7	5.7	8.1	16.7
SNP-083	36	Big Meadows #1 Well (W-1701)	W	9/17/1997	3504	20.53	0.6992	8.0	3.9	25.52	4.1	6.06	3.7	5.5	8.1	16.9
SNP-037	37	HQ #2 Well (W-851)	W	4/16/1996	1135	24.52	0.7697	11.2	7.7	32.93	7.6	8.09	7.0	0.9	1.9	99.2
SNP-087	37	HQ #2 Well (W-851)	W	8/27/1997	1135	20.11	0.6878	12.0	3.5	24.28	2.6	5.88	2.7	2.3	4.3	77.2
SNP-087	37	HQ #2 Well (W-851)	W	8/27/1997	1135	19.59	0.7018	9.4	1.9	24.28	2.6	5.88	2.7	1.7	4.3	83.7
SNP-007	38	Skyland #5	W	4/2/1996	3670	24.99	0.7880	6.4	7.9	33.67	8.5	8.18	7.7	7.7	9.2	25.4
SNP-088	38	Skyland #5	W	8/27/1997	3670	16.28	0.6180	8.7	-0.1	18.67	0.5	4.31	0.4	6.0	8.6	26.6
SNP-088	38	Skyland #5	W	8/27/1997	3670	16.41	0.6170	9.1	0.2	18.67	0.5	4.31	0.4	5.8	8.6	26.5
SNP-005	39	Pinnacles Well (W-3288)	W	4/2/1996	3280	16.64	0.6159	10.3	0.6	19.36	0.8	4.48	0.7	6.4	8.8	27.6
SNP-091	39	Pinnacles Well (W-3288)	W	8/27/1997	3280	ND	ND	ND	ND	61.59	23.0	16.64	23.5	ND	9.1	ND
SNP-019	40	Mathews Arm Spring Range View Cabin	S	4/5/1996	2880	17.88	0.6837	5.7	-0.1	19.85	0.6	4.51	0.5	7.4	10.0	27.2
SNP-019	40	Mathews Arm Spring Range View Cabin	S	4/5/1996	2880	17.65	0.6667	7.1	0.2	19.85	0.6	4.51	0.5	6.6	10.0	27.7
SNP-102	40	Mathews Arm Spring Range View Cabin	S	9/2/1997	2880	15.98	0.6173	9.4	-0.6	19.26	0.5	4.32	0.3	5.8	8.3	29.2
SNP-102	40	Mathews Arm Spring Range View Cabin	S	9/2/1997	2880	18.12	0.6498	9.8	1.7	19.26	0.5	4.32	0.3	6.4	8.3	28.4
SNP-031	41	Lewis Mountain Spring #25-2	S	4/11/1996	2920	16.69	0.6373	8.4	-0.2	18.70	0.3	4.25	0.2	7.7	7.5	4.8
SNP-114	41	Lewis Mountain Spring #25-2	S	9/5/1997	2920	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.8	ND
SNP-054	42	Old Rag Shelter Spring	S	4/26/1996	2035	17.12	0.6442	9.8	0.2	19.86	0.6	4.43	0.2	7.0	9.8	13.3
SNP-054	42	Old Rag Shelter Spring	S	4/26/1996	2035	16.76	0.6381	9.8	-0.2	19.86	0.6	4.43	0.2	6.8	9.8	13.4
SNP-118	42	Old Rag Shelter Spring	S	9/9/1997	2035	15.50	0.5806	14.2	0.0	21.91	2.2	5.31	2.1	5.6	5.8	20.7
SNP-118	42	Old Rag Shelter Spring	S	9/9/1997	2035	15.42	0.5702	15.4	0.3	21.91	2.2	5.31	2.1	5.5	5.8	20.4
SNP-015	43	Loft Mountain Overlook Spring	S	4/4/1996	2460	17.66	0.6613	8.3	0.4	18.67	0.0	4.27	0.0	6.8	10.3	28.7
SNP-121	43	Loft Mountain Overlook Spring	S	9/10/1997	2460	15.32	0.5811	13.1	-0.3	18.44	0.3	4.26	0.1	5.5	6.8	27.0
SNP-016	44	Loft Mountain Spring	S	4/4/1996	3000	18.37	0.6016	16.6	4.2	18.12	-0.1	4.16	-0.1	6.6	10.0	15.6
SNP-016	44	Loft Mountain Spring	S	4/4/1996	3000	16.53	0.6345	8.3	-0.4	18.12	-0.1	4.16	-0.1	5.8	10.0	19.4
SNP-122	44	Loft Mountain Spring	S	9/10/1997	3000	15.60	0.5824	12.7	0.2	19.30	0.9	4.32	0.4	6.7	9.2	18.8
SNP-122	44	Loft Mountain Spring	S	9/10/1997	3000	15.71	0.5911	11.8	0.0	19.30	0.9	4.32	0.4	6.6	9.2	19.0
SNP-013	45	Simmons Gap Well (W-1704)	W	4/4/1996	2230	19.80	0.6815	10.5	3.3	24.39	3.2	5.95	3.2	4.3	6.6	7.3
SNP-099	45	Simmons Gap Well (W-1704)	W	8/29/1997	2230	18.71	0.6633	10.4	2.1	22.52	2.2	5.51	2.4	5.8	8.0	5.3
SNP-099	45	Simmons Gap Well (W-1704)	W	8/29/1997	2230	18.49	0.6627	10.0	1.8	22.52	2.2	5.51	2.4	5.5	8.0	5.5
SNP-137	46	Yeager's Spring (Luray)	S	9/17/1997	778	19.20	0.6701	12.8	2.6	59.21	22.2	17.38	24.7	4.3	5.6	9.6
SNP-137	46	Yeager's Spring (Luray)	S	9/17/1997	778	18.18	0.6323	15.4	2.4	59.21	22.2	17.38	24.7	4.0	5.6	9.3
SNP-248	46	Yeager's Spring (Luray)	S	8/23/1999	778	19.36	0.6808	11.9	2.4	ND	ND	ND	ND	1.7	5.6	10.6
SNP-248	46	Yeager's Spring (Luray)	S	8/23/1999	778	19.23	0.6779	11.9	2.3	ND	ND	ND	ND	2.1	5.6	10.2
SNP-042	47	Lewis Mountain Well (W-1072)	W	4/17/1996	3390	17.24	0.6406	8.4	0.6	20.03	1.1	4.75	1.2	7.4	9.3	17.6
SNP-095	47	Lewis Mountain Well (W-1072)	W	8/28/1997	3390	27.15	0.7674	13.7	12.6	ND	ND	ND	ND	10.4	12.0	12.3
SNP-095	47	Lewis Mountain Well (W-1072)	W	8/28/1997	3390	26.82	0.7676	12.9	12.0	ND	ND	ND	ND	9.4	12.0	12.8
SNP-140	47	Lewis Mountain Well (W-1072)	W	9/19/1997	3390	17.61	0.6552	7.5	0.7	ND	ND	ND	ND	9.1	9.7	21.3
SNP-140	47	Lewis Mountain Well (W-1072)	W	9/19/1997	3390	17.53	0.6387	9.2	1.2	ND	ND	ND	ND	9.3	9.7	20.9
SNP-170	48	Bear Lithia Spring	S	9/8/1997	866	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SNP-255	48	Bear Lithia Spring	S	9/2/1999	866	20.91	0.7309	9.1	3.0	ND	ND	ND	ND	6.6	7.4	2.6
SNP-255	48	Bear Lithia Spring	S	9/2/1999	866	21.03	0.7343	8.9	3.1	ND	ND	ND	ND	6.9	7.4	2.5

Table 5. Summary of dissolved gases (nitrogen, argon, neon, helium, oxygen, and carbon dioxide)--Continued

SNP No.	Site ID	Site Name	W/S	Date	Elev (feet)	N_2 (mg/L)	Ar (mg/L)	N_2/Ar Recharge Temp (°C)	N_2/Ar Ex Air (cc STP/L)	Neon $x10^8$ (ccSTP/g)	Excess air Ne (cc/kg)	Helium $x10^8$ (ccSTP/g)	Excess air He (cc/kg)	Lab O_2 (mg/L)	Field O_2 (mg/l)	Lab CO_2 (mg/L)
SNP-046	49	Mathews Arm Well (W-856)	W	4/19/1996	2590	18.19	0.6543	9.9	1.7	ND	ND	ND	ND	5.5	8.1	29.8
SNP-046	49	Mathews Arm Well (W-856)	W	4/19/1996	2590	18.31	0.6656	8.8	1.4	ND	ND	ND	ND	5.5	8.1	29.8
SNP-085	49	Mathews Arm Well (W-856)	W	8/26/1997	2590	20.88	0.7147	8.2	3.8	25.71	3.9	6.23	3.8	6.0	8.5	25.5
SNP-085	49	Mathews Arm Well (W-856)	W	8/26/1997	2590	21.12	0.7188	8.3	4.0	25.71	3.9	6.23	3.8	6.0	8.5	25.9
SNP-229	49	Mathews Arm Well (W-856)	W	8/16/1999	2590	22.51	0.7481	7.6	5.2	ND	ND	ND	ND	5.1	9.1	26.8
SNP-011	50	Loft Mountain Well #1 (W-715)	W	4/3/1996	2740	20.03	0.7085	7.1	2.6	24.51	3.2	5.80	3.0	3.4	7.8	6.6
SNP-098	50	Loft Mountain Well #1 (W-715)	W	8/29/1997	2740	20.15	0.6965	8.7	3.3	24.58	3.4	5.88	3.2	6.0	8.6	4.7
SNP-098	50	Loft Mountain Well #1 (W-715)	W	8/29/1997	2740	19.79	0.6898	8.7	3.0	24.58	3.4	5.88	3.2	5.3	8.6	5.3
SNP-235	50	Loft Mountain Well #1 (W-715)	W	8/17/1999	2740	20.28	0.7037	8.1	3.2	ND	ND	ND	ND	3.9	9.5	6.2
SNP-010	51	Loft Mountain Well #2 (W-754)	W	4/3/1996	2680	21.29	0.7489	5.3	3.0	24.51	2.9	5.80	2.9	7.0	9.5	12.2
SNP-097	51	Loft Mountain Well #2 (W-754)	W	8/29/1997	2680	27.74	0.8544	5.8	9.8	54.81	19.7	13.94	18.4	8.7	11.6	11.6
SNP-097	51	Loft Mountain Well #2 (W-754)	W	8/29/1997	2680	27.89	0.8547	6.0	10.1	54.81	19.7	13.94	18.4	9.1	11.6	11.3
SNP-236	51	Loft Mountain Well #2 (W-754)	W	8/18/1999	2680	21.24	0.7247	7.7	4.0	ND	ND	ND	ND	6.3	9.9	2.5
SNP-012	52	Ivy Creek Shelter Spring	S	4/3/1996	2920	18.37	0.6976	5.1	0.1	20.24	0.7	4.64	0.7	6.0	9.6	13.3
SNP-119	52	Ivy Creek Shelter Spring	S	9/10/1997	2920	17.46	0.6428	9.3	0.9	19.41	0.6	4.44	0.5	6.9	9.9	21.0
SNP-119	52	Ivy Creek Shelter Spring	S	9/10/1997	2920	22.61	0.7357	8.7	5.9	19.41	0.6	4.44	0.5	8.4	9.9	21.4
SNP-237	52	Ivy Creek Shelter Spring	S	8/18/1999	2920	17.16	0.6407	8.9	0.5	ND	ND	ND	ND	5.1	10.2	19.5
SNP-113	53	Lewis Mountain Spring #25	S	9/5/1997	2920	16.34	0.6193	9.8	-0.1	19.06	0.4	4.38	0.4	7.3	9.8	11.3
SNP-113	53	Lewis Mountain Spring #25	S	9/5/1997	2920	16.51	0.6318	8.7	-0.3	19.06	0.4	4.38	0.4	7.3	9.8	11.4
SNP-241	53	Lewis Mountain Spring #25	S	8/19/1999	2920	16.90	0.6318	9.5	0.4	ND	ND	ND	ND	6.3	10.4	11.7
SNP-033	54	Elkwallow Spring #8	S	4/12/1996	2500	16.46	0.6235	10.2	-0.1	19.96	0.9	4.63	0.8	5.5	9.4	29.6
SNP-106	54	Elkwallow Spring #8	S	9/3/1997	2500	17.48	0.6426	10.0	0.9	20.05	0.9	4.63	0.7	5.8	8.3	28.3
SNP-106	54	Elkwallow Spring #8	S	9/3/1997	2500	17.19	0.6423	9.4	0.4	20.05	0.9	4.63	0.7	5.6	8.3	28.1
SNP-244	54	Elkwallow Spring #8	S	8/20/1999	2500	17.51	0.6461	9.6	0.8	ND	ND	ND	ND	7.3	9.7	24.3
SNP-136	55	Hite Spring (Luray)	S	9/17/1997	837	19.47	0.6858	11.4	2.4	ND	ND	ND	ND	5.2	6.1	4.0
SNP-136	55	Hite Spring (Luray)	S	9/17/1997	837	19.55	0.6847	11.7	2.6	ND	ND	ND	ND	4.8	6.1	4.3
SNP-247	55	Hite Spring (Luray)	S	8/23/1999	837	20.55	0.7191	9.7	2.9	ND	ND	ND	ND	5.0	7.7	4.5
SNP-040	56	HQ Spring #14-1	S	4/17/1996	1460	18.34	0.7128	5.7	-0.7	20.82	0.5	4.83	0.6	6.4	10.2	28.1
SNP-117	56	HQ Spring #14-1	S	9/9/1997	1460	15.08	0.5709	15.5	-0.3	29.26	6.1	8.19	7.4	6.6	9.5	26.8
SNP-117	56	HQ Spring #14-1	S	9/9/1997	1460	15.58	0.5812	15.2	0.1	29.26	6.1	8.19	7.4	6.0	9.5	16.1
SNP-249	56	HQ Spring #14-1	S	8/23/1999	1460	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.5	ND
SNP-023	57	Indian Run Shelter Spring	S	4/9/1996	2290	29.19	0.8453	10.0	12.8	19.36	0.4	4.48	0.4	10.9	9.8	23.9
SNP-128	57	Indian Run Shelter Spring	S	9/12/1997	2290	16.95	0.6337	10.3	0.3	19.46	0.6	4.51	0.5	7.1	9.5	29.0
SNP-128	57	Indian Run Shelter Spring	S	9/12/1997	2290	17.06	0.6314	10.8	0.6	19.46	0.6	4.51	0.5	6.8	9.5	29.3
SNP-251	57	Indian Run Shelter Spring	S	8/23/1999	2290	17.09	0.6407	9.7	0.3	ND	ND	ND	ND	5.9	10.0	23.5
SNP-251	57	Indian Run Shelter Spring	S	8/23/1999	2290	17.11	0.6436	9.4	0.2	ND	ND	ND	ND	6.4	10.0	23.1
SNP-252	58	Town of Elkton Spring	S	9/1/1999	1078	21.49	0.7371	9.2	3.8	ND	ND	ND	ND	5.9	8.0	6.4
SNP-252	58	Town of Elkton Spring	S	9/1/1999	1078	19.36	0.6937	9.9	1.9	ND	ND	ND	ND	5.4	8.0	5.3
SNP-253	59	Town of Elkton well	W	9/1/1999	917	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.2	ND
SNP-254	60	Town of Grottoes #2	W	9/1/1999	1191	22.90	0.7711	8.0	4.8	ND	ND	ND	ND	6.3	8.9	3.5
SNP-254	60	Town of Grottoes #2	W	9/1/1999	1191	23.13	0.7792	7.5	4.8	ND	ND	ND	ND	6.7	8.9	3.1
SNP-256	61	Blue Ridge School #5	W	9/2/1999	733	18.15	0.6691	10.9	0.8	ND	ND	ND	ND	3.7	4.6	18.4
SNP-256	61	Blue Ridge School #5	W	9/2/1999	733	18.30	0.6734	10.7	0.9	ND	ND	ND	ND	3.7	4.6	18.3
SNP-257	62	Town of Washington #3	W	9/2/1999	663	21.02	0.7055	12.5	4.3	ND	ND	ND	ND	0.1	0.2	9.0
SNP-257	62	Town of Washington #3	W	9/2/1999	663	20.87	0.7030	12.5	4.1	ND	ND	ND	ND	0.1	0.2	9.2
SNP-263	63	Mountain side Market	W	9/8/1999	817	20.10	0.7001	11.0	2.9	ND	ND	ND	ND	1.2	2.4	29.7
SNP-134	64	Hudson Spring (Luray)	S	9/17/1997	765	18.76	0.6820	10.6	1.3	22.80	1.8	11.32	13.0	5.6	7.2	7.2
SNP-134	64	Hudson Spring (Luray)	S	9/17/1997	765	19.07	0.6950	9.7	1.3	22.80	1.8	11.32	13.0	5.3	7.2	7.8
SNP-180	64	Hudson Spring (Luray)	S	3/2/1999	765	19.09	0.6919	10.1	1.5	ND	ND	ND	ND	5.3	6.8	7.3

Table 5. Summary of dissolved gases (nitrogen, argon, neon, helium, oxygen, and carbon dioxide)--Continued

SNP No.	Site ID	Site Name	W/S	Date	Elev (feet)	N_2 (mg/L)	Ar (mg/L)	N_2/Ar Recharge Temp (°C)	N_2/Ar Ex Air (cc STP/L)	Neon x10^8 (ccSTP/g)	Excess air Ne (cc/kg)	Helium x10^8 (ccSTP/g)	Excess air He (cc/kg)	Lab O_2 (mg/L)	Field O_2 (mg/l)	Lab CO_2 (mg/L)
SNP-180	64	Hudson Spring (Luray)	S	3/2/1999	765	19.12	0.6933	10.0	1.5	ND	ND	ND	ND	6.1	6.8	6.8
SNP-185	64	Hudson Spring (Luray)	S	4/2/1999	765	19.35	0.6987	9.8	1.6	ND	ND	ND	ND	4.8	6.5	7.8
SNP-185	64	Hudson Spring (Luray)	S	4/2/1999	765	19.17	0.6927	10.2	1.6	ND	ND	ND	ND	4.6	6.5	7.9
SNP-190	64	Hudson Spring (Luray)	S	4/27/1999	765	19.40	0.7012	9.7	1.6	ND	ND	ND	ND	5.1	6.9	7.2
SNP-190	64	Hudson Spring (Luray)	S	4/27/1999	765	19.39	0.6998	9.8	1.7	ND	ND	ND	ND	5.1	6.9	7.1
SNP-195	64	Hudson Spring (Luray)	S	5/26/1999	765	19.22	0.6966	9.8	1.5	ND	ND	ND	ND	4.9	6.9	7.8
SNP-200	64	Hudson Spring (Luray)	S	6/23/1999	765	19.40	0.7006	9.7	1.6	ND	ND	ND	ND	0.5	6.8	10.9
SNP-200	64	Hudson Spring (Luray)	S	6/23/1999	765	19.52	0.7024	9.8	1.8	ND	ND	ND	ND	1.5	6.8	10.2
SNP-217	64	Hudson Spring (Luray)	S	7/14/1999	765	19.35	0.6987	9.9	1.6	ND	ND	ND	ND	3.1	6.8	8.9
SNP-222	64	Hudson Spring (Luray)	S	8/11/1999	765	19.06	0.6863	10.7	1.7	ND	ND	ND	ND	2.9	6.7	9.2
SNP-258	64	Hudson Spring (Luray)	S	9/7/1999	765	19.24	0.6921	10.4	1.7	ND	ND	ND	ND	4.6	6.9	7.8
SNP-264	64	Hudson Spring (Luray)	S	9/9/1999	765	19.28	0.6964	10.0	1.6	ND	ND	ND	ND	5.3	7.0	7.3
SNP-269	64	Hudson Spring (Luray)	S	9/22/1999	765	19.16	0.6933	10.1	1.5	ND	ND	ND	ND	5.0	6.6	7.7
SNP-269	64	Hudson Spring (Luray)	S	9/22/1999	765	19.35	0.7005	9.7	1.6	ND	ND	ND	ND	5.3	6.6	7.5
SNP-020	65	Lewis Spring	S	4/8/1996	3320	17.06	0.6377	8.5	0.4	18.83	0.4	4.33	0.4	6.6	9.9	17.9
SNP-093	65	Lewis Spring	S	8/28/1997	3320	16.09	0.6101	9.8	-0.1	18.45	0.3	4.22	0.2	7.1	10.1	20.5
SNP-093	65	Lewis Spring	S	8/28/1997	3320	16.26	0.6181	9.2	-0.1	18.45	0.3	4.22	0.2	7.2	10.1	20.5
SNP-124	65	Lewis Spring	S	9/11/1997	3320	16.20	0.6075	10.3	0.2	18.74	0.5	4.40	0.6	6.8	8.9	20.9
SNP-124	65	Lewis Spring	S	9/11/1997	3320	15.96	0.6064	10.0	-0.2	18.74	0.5	4.40	0.6	7.2	8.9	20.6
SNP-126	65	Lewis Spring	S	9/11/1997	3320	15.88	0.6029	10.2	-0.1	ND	ND	ND	ND	7.4	10.0	21.3
SNP-126	65	Lewis Spring	S	9/11/1997	3320	15.82	0.6046	9.9	-0.3	ND	ND	ND	ND	7.6	10.0	21.3
SNP-135	65	Lewis Spring	S	9/17/1997	3320	16.17	0.6111	9.8	0.0	18.35	0.2	4.25	0.3	7.6	9.9	20.0
SNP-135	65	Lewis Spring	S	9/17/1997	3320	16.20	0.6125	9.7	0.0	18.35	0.2	4.25	0.3	6.9	9.9	20.8
SNP-181	65	Lewis Spring	S	3/2/1999	3320	16.43	0.6251	8.7	-0.1	ND	ND	ND	ND	6.8	9.6	19.1
SNP-186	65	Lewis Spring	S	4/2/1999	3320	16.77	0.6327	8.5	0.1	ND	ND	ND	ND	7.9	9.9	18.5
SNP-191	65	Lewis Spring	S	4/27/1999	3320	16.66	0.6271	8.9	0.2	ND	ND	ND	ND	7.7	9.8	20.0
SNP-196	65	Lewis Spring	S	5/26/1999	3320	16.43	0.6212	9.2	0.0	ND	ND	ND	ND	8.4	10.2	19.6
SNP-201	65	Lewis Spring	S	6/23/1999	3320	16.80	0.6303	8.8	0.3	ND	ND	ND	ND	4.6	9.8	22.7
SNP-201	65	Lewis Spring	S	6/23/1999	3320	16.71	0.6302	8.7	0.1	ND	ND	ND	ND	4.6	9.8	22.5
SNP-220	65	Lewis Spring	S	7/15/1999	3320	16.57	0.6275	8.7	0.0	ND	ND	ND	ND	4.9	9.7	21.7
SNP-223	65	Lewis Spring	S	8/11/1999	3320	16.32	0.6182	9.3	0.0	ND	ND	ND	ND	6.3	10.4	20.8
SNP-259	65	Lewis Spring	S	9/7/1999	3320	16.58	0.6232	9.2	0.2	ND	ND	ND	ND	7.8	10.8	19.7
SNP-265	65	Lewis Spring	S	9/9/1999	3320	16.65	0.6233	9.4	0.3	ND	ND	ND	ND	8.6	10.1	19.5
SNP-270	65	Lewis Spring	S	9/22/1999	3320	16.52	0.6218	9.3	0.2	ND	ND	ND	ND	8.9	9.9	18.3
VR-01	66	Town of Stanley # 3	W	7/6/1999	1175	24.98	0.8073	7.9	6.9	34.27	8.0	8.55	7.8	9.3	7.7	3.3
VR-01	66	Town of Stanley # 3	W	7/6/1999	1175	24.42	0.7992	7.8	6.2	34.27	8.0	8.55	7.8	7.2	7.7	4.5
VR-02	67	Town of Shenandoah # 5	W	7/6/1999	1170	18.98	0.6875	9.8	1.5	22.32	1.6	5.25	1.5	5.9	7.4	10.4
VR-03	68	Wanyesboro Jefferson Rd # 1	W	7/7/1999	1360	22.20	0.7417	9.6	4.8	26.14	3.8	7.48	5.8	6.1	6.9	1.7
VR-03	68	Wanyesboro Jefferson Rd # 1	W	7/7/1999	1360	21.03	0.7235	9.4	3.6	26.14	3.8	7.48	5.8	5.9	6.9	1.6
VR-04	69	Coyner Spring	S	7/7/1999	1320	21.84	0.7416	9.0	4.2	130.15	60.9	34.11	56.7	7.3	7.4	1.6
VR-04	69	Coyner Spring	S	7/7/1999	1320	22.34	0.7546	8.5	4.5	130.15	60.9	34.11	56.6	7.5	7.4	1.6
VR-06	71	Town of Shenandoah # 2	W	7/8/1999	1080	24.94	0.8046	8.3	6.9	32.83	7.2	7.98	6.7	7.5	7.3	9.9
VR-06	71	Town of Shenandoah # 2	W	7/8/1999	1080	24.51	0.7948	8.5	6.6	32.83	7.2	7.98	6.7	0.1	7.3	15.9
VR-07	72	Town of Shenandoah # 3	W	7/8/1999	1070	23.31	0.7879	7.2	4.8	29.89	5.5	7.45	5.6	5.4	6.3	8.2
VR-08	72	Town of Stanley # 6	W	7/9/1999	1050	19.70	0.7034	9.6	2.1	22.69	1.8	16.99	23.9	4.0	5.7	6.2
VR-08	73	Town of Stanley # 6	W	7/9/1999	1050	19.64	0.7062	9.1	1.8	22.69	1.7	16.99	23.9	3.7	5.7	6.4
VR-09	74	Town of Stanley # 5	W	7/9/1999	970	20.61	0.7200	9.6	2.9	24.76	2.9	15.97	21.9	5.9	7.0	4.4
VR-10	75	Town of Stanley # 4	W	7/9/1999	1070	19.06	0.6928	9.5	1.4	22.64	1.7	10.66	11.8	4.7	6.1	6.4
VR-11	76	Town of Stanley # 2	W	7/9/1999	1140	21.93	0.7448	9.1	4.2	28.29	4.8	7.05	4.9	6.6	7.4	5.4

Table 6. Summary of recharge temperatures and quantities of excess air

[W, well; S, spring; Elev., elevation of the land surface, datum is sea level; Rech. Temp., recharge temperature; cc STP/L, cubic centimeters at standard temperature and pressure per liter; ND, not determined]

SNP No.	Site ID	Site Name	W/S	Date	Time	Elev (feet)	Rech. Temp. (°C)	Excess Air (cc STP/L)	Number of Samples Averaged
SNP-001	1	HQ #1 Well (W-855)	W	4/1/1996	10:30	1120	9.0	4.9	0
SNP-090	1	HQ #1 Well (W-855)	W	8/27/1997	8:40	1120	8.9	6.6	2
SNP-227	1	HQ #1 Well (W-855)	W	8/16/1999	9:00	1120	8.7	4.7	1
SNP-002	2	HQ Spring #14-3 - above HQ on Rt 211	S	4/1/1996	13:00	1760	8.6	-0.2	1
SNP-003	3	Hemlock Spring	S	4/1/1996	15:00	3440	7.9	-0.3	1
SNP-108	3	Hemlock Spring	S	9/4/1997	12:00	3440	8.4	-0.3	2
SNP-231	3	Hemlock Spring	S	8/17/1999	9:45	3440	8.2	0.0	1
SNP-004	4	Pinnacles Spring #16	S	4/2/1996	9:30	3480	9.7	0.2	1
SNP-112	4	Pinnacles Spring #16	S	9/4/1997	10:00	3480	10.2	-0.4	2
SNP-006	5	Furnace Spring at Skyland	S	4/2/1996	14:30	3430	7.0	-0.2	1
SNP-089	5	Furnace Spring at Skyland	S	8/27/1997	18:35	3430	7.3	-0.5	2
SNP-125	5	Furnace Spring at Skyland	S	9/11/1997	12:25	3430	9.0	0.1	2
SNP-169	5	Furnace Spring at Skyland	S	9/18/1997	9:15	3430	8.7	0.0	0
SNP-182	5	Furnace Spring at Skyland	S	3/2/1999	14:35	3430	7.5	-0.1	1
SNP-187	5	Furnace Spring at Skyland	S	4/2/1999	11:20	3430	7.2	0.0	1
SNP-192	5	Furnace Spring at Skyland	S	4/27/1999	14:40	3430	7.9	0.1	1
SNP-197	5	Furnace Spring at Skyland	S	5/26/1999	14:50	3430	8.3	0.1	1
SNP-202	5	Furnace Spring at Skyland	S	6/23/1999	13:40	3430	7.7	0.0	1
SNP-221	5	Furnace Spring at Skyland	S	7/15/1999	11:45	3430	7.7	0.2	1
SNP-224	5	Furnace Spring at Skyland	S	8/11/1999	13:30	3430	8.3	0.1	1
SNP-260	5	Furnace Spring at Skyland	S	9/7/1999	12:45	3430	8.7	0.1	1
SNP-266	5	Furnace Spring at Skyland	S	9/9/1999	12:30	3430	8.3	0.0	1
SNP-271	5	Furnace Spring at Skyland	S	9/22/1999	12:09	3430	8.3	0.1	1
SNP-008	6	Skyland #2 (W-1033)	W	4/2/1996	17:30	3560	7.0	0.1	1
SNP-094	6	Skyland #2 (W-1033)	W	8/28/1997	9:45	3560	9.5	0.9	2
SNP-232	6	Skyland #2 (W-1033)	W	8/17/1999	11:25	3560	9.8	1.4	2
SNP-009	7	Dundo Spring #29	S	4/3/1996	12:15	2880	7.4	0.1	1
SNP-120	7	Dundo Spring #29	S	9/10/1997	10:30	2880	12.1	0.2	2
SNP-014	8	Simmons Gap Spring	S	4/4/1996	12:40	2360	9.0	-0.1	2
SNP-131	8	Simmons Gap Spring	S	9/16/1997	13:00	2360	9.7	-0.2	2
SNP-238	8	Simmons Gap Spring	S	8/18/1999	10:45	2360	9.7	-0.1	1
SNP-017	9	Panorama Spring #13-3	S	4/5/1996	9:00	2560	10.2	0.4	1
SNP-018	10	Browntown Valley Overlook Spring	S	4/5/1996	12:40	2900	4.2	1.5	1
SNP-103	10	Browntown Valley Overlook Spring	S	9/2/1997	9:30	2900	7.3	0.2	2
SNP-123	10	Browntown Valley Overlook Spring	S	9/11/1997	16:30	2900	8.8	0.7	2
SNP-139	10	Browntown Valley Overlook Spring	S	9/18/1997	13:30	2900	7.6	0.3	1
SNP-184	10	Browntown Valley Overlook Spring	S	3/3/1999	10:00	2900	6.8	0.1	1
SNP-189	10	Browntown Valley Overlook Spring	S	4/2/1999	15:00	2900	7.0	0.9	1
SNP-193	10	Browntown Valley Overlook Spring	S	4/28/1999	10:30	2900	7.2	0.7	2
SNP-198	10	Browntown Valley Overlook Spring	S	5/27/1999	9:05	2900	7.3	0.5	1
SNP-204	10	Browntown Valley Overlook Spring	S	6/24/1999	11:55	2900	7.5	0.7	1
SNP-219	10	Browntown Valley Overlook Spring	S	7/14/1999	14:35	2900	7.6	0.6	2
SNP-225	10	Browntown Valley Overlook Spring	S	8/12/1999	9:20	2900	7.7	0.6	1
SNP-262	10	Browntown Valley Overlook Spring	S	9/7/1999	16:30	2900	7.4	2.1	1
SNP-268	10	Browntown Valley Overlook Spring	S	9/10/1999	8:25	2900	7.7	2.1	1
SNP-273	10	Browntown Valley Overlook Spring	S	9/22/1999	15:45	2900	7.2	2.5	1
SNP-021	11	Camp Hoover Spring #2	S	4/8/1996	14:30	2580	8.9	1.0	1
SNP-116	11	Camp Hoover Spring #2	S	9/9/1997	14:00	2580	11.3	1.1	2
SNP-234	11	Camp Hoover Spring #2	S	8/17/1999	14:35	2580	10.1	0.9	2
SNP-022	12	Davids Spring	S	4/8/1996	17:15	3400	7.6	1.4	1
SNP-110	12	Davids Spring	S	9/4/1997	18:00	3400	9.0	1.8	0
SNP-243	12	Davids Spring	S	8/20/1999	11:05	3400	8.5	1.3	2
SNP-024	13	Dickeys Ridge Spring	S	4/10/1996	11:30	2400	9.0	0.0	0
SNP-129	13	Dickeys Ridge Spring	S	9/12/1997	10:00	2400	10.6	0.3	2
SNP-130	13	Dickeys Ridge Spring	S	9/12/1997	9:45	2400	12.9	0.2	2
SNP-246	13	Dickeys Ridge Spring (pipe 2)	S	8/20/1999	17:00	2400	10.1	0.1	1
SNP-025	14	Gravel Spring NE	S	4/10/1996	14:30	2490	8.7	0.2	1
SNP-101	14	Gravel Spring NE	S	9/2/1997	11:00	2490	8.2	-0.3	2
SNP-026	15	Pass Mountain Overlook Spring	S	4/10/1996	17:50	2580	8.5	0.3	1
SNP-100	15	Pass Mountain Overlook Spring	S	9/2/1997	16:00	2580	11.5	-0.3	2
SNP-027	16	Swift Run Gap Spring #27	S	4/11/1996	10:00	2640	9.5	1.0	1
SNP-133	16	Swift Run Gap Spring #27	S	9/16/1997	10:30	2640	10.4	0.5	2
SNP-239	16	Swift Run Gap Spring #27	S	8/19/1999	13:45	2640	10.4	0.4	1
SNP-028	17	Dean Mountain/South River Spring	S	4/11/1996	12:00	3110	6.0	0.1	1

Table 6. Summary of recharge temperatures--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	Elev (feet)	Rech. Temp. (°C)	Excess Air (cc STP/L)	Number of Samples Averaged
SNP-115	17	Dean Mountain/South River Spring	S	9/5/1997	14:00	3110	9.6	0.7	2
SNP-240	17	Dean Mountain/South River Spring	S	8/19/1999	15:40	3110	9.4	0.5	1
SNP-029	18	Baldface Mountain Spring	S	4/11/1996	14:00	3560	6.0	-0.1	1
SNP-030	19	Hazeltop Ridge Overlook Spring	S	4/11/1996	18:30	3300	8.3	-0.2	1
SNP-032	20	Byrds Nest #4/Beahms Gap Spring	S	4/12/1996	9:40	2200	9.0	0.0	0
SNP-104	20	Byrds Nest #4/Beahms Gap Spring	S	9/3/1997	12:00	2200	9.3	-0.4	1
SNP-242	20	Byrds Nest #4/Bealms Gap Spring	S	8/20/1999	8:45	2200	10.2	-0.1	1
SNP-034	21	Byrds Nest #3 Spring	S	4/12/1996	15:20	3000	9.0	0.0	0
SNP-109	21	Byrds Nest #3 Spring	S	9/4/1997	8:30	3000	9.0	1.4	0
SNP-127	21	Byrds Nest #3 Spring	S	9/11/1997	14:30	3000	9.8	0.6	2
SNP-138	21	Byrds Nest #3 Spring	S	9/18/1997	11:00	3000	10.0	1.3	2
SNP-183	21	Byrds Nest #3 Spring	S	3/2/1999	16:50	3000	9.4	0.7	1
SNP-188	21	Byrds Nest #3 Spring	S	4/2/1999	12:50	3000	9.6	0.6	1
SNP-194	21	Byrds Nest #3 Spring	S	4/28/1999	17:25	3000	9.4	0.7	1
SNP-199	21	Byrds Nest #3 Spring	S	5/27/1999	11:22	3000	9.2	0.7	2
SNP-203	21	Byrds Nest #3 Spring	S	6/24/1999	9:05	3000	8.8	0.7	1
SNP-218	21	Byrds Nest #3 Spring	S	7/14/1999	11:34	3000	9.0	0.9	2
SNP-226	21	Byrds Nest #3 Spring	S	8/12/1999	12:00	3000	9.4	0.9	1
SNP-261	21	Byrds Nest #3 Spring	S	9/7/1999	14:20	3000	9.6	0.9	1
SNP-267	21	Byrds Nest #3 Spring	S	9/9/1999	14:30	3000	9.2	0.8	2
SNP-272	21	Byrds Nest #3 Spring	S	9/22/1999	13:45	3000	9.4	1.0	2
SNP-035	22	Big Meadows #9 Well	W	4/15/1996	11:20	3460	7.8	0.1	1
SNP-096	22	Big Meadows #9 Well	W	8/28/1997	13:30	3460	9.9	0.1	2
SNP-036	23	Big Meadows #14 Well	W	4/15/1996	14:00	3510	8.7	2.9	1
SNP-092	23	Big Meadows #14 Well	W	8/28/1997	11:30	3510	8.4	0.1	1
SNP-233	23	Big Meadows #14 Well	W	8/17/1999	12:50	3510	7.2	6.5	2
SNP-038	24	Hogback Spring #5	S	4/16/1996	11:45	3240	8.6	-0.3	1
SNP-039	25	Elkwallow Well (W-1703)	W	4/16/1996	16:00	2570	8.3	6.7	1
SNP-086	25	Elkwallow Well (W-1703)	W	8/26/1997	18:30	2570	9.1	4.6	2
SNP-228	25	Elkwallow Well (W-1703)	W	8/16/1999	11:45	2570	9.0	0.0	1
SNP-041	26	Hightop Hut Spring	S	4/17/1996	15:15	3120	8.2	0.8	1
SNP-132	26	Hightop Hut Spring	S	9/16/1997	15:45	3120	9.0	0.0	0
SNP-043	27	Pass Mountain Hut Spring	S	4/18/1996	9:15	2700	8.7	1.0	1
SNP-105	27	Pass Mountain Hut Spring	S	9/3/1997	14:10	2700	9.0	1.1	0
SNP-048	31	Dickeys Ridge Well (W-1346)	W	4/19/1996	14:40	1840	9.1	3.7	1
SNP-084	31	Dickeys Ridge Well (W-1346)	W	8/26/1997	10:50	1840	8.2	4.0	2
SNP-230	31	Dickeys Ridge Well (W-1346)	W	8/16/1999	16:15	1840	8.0	4.5	1
SNP-050	33	Domestic well #1	W	4/24/1996	9:50	850	7.7	5.1	1
SNP-051	34	Domestic well #2	W	4/24/1996	14:55	845	9.9	11.7	2
SNP-052	35	White Oak Cabin Spring	S	4/25/1996	10:35	3370	8.5	-0.1	2
SNP-111	35	White Oak Cabin Spring	S	9/4/1997	15:55	3370	13.1	-0.4	2
SNP-053	36	Big Meadows #1 Well (W-1701)	W	4/25/1996	16:30	3504	6.7	3.8	1
SNP-083	36	Big Meadows #1 Well (W-1701)	W	9/17/1997	16:30	3504	8.0	3.9	2
SNP-037	37	HQ #2 Well (W-851)	W	4/16/1996	9:45	1135	11.2	7.7	1
SNP-087	37	HQ #2 Well (W-851)	W	8/27/1997	10:30	1135	10.7	2.7	2
SNP-007	38	Skyland #5	W	4/2/1996	16:00	3670	6.4	7.9	1
SNP-088	38	Skyland #5	W	8/27/1997	17:10	3670	8.9	0.1	2
SNP-005	39	Pinnacles Well (W-3288)	W	4/2/1996	12:00	3280	10.3	0.6	1
SNP-091	39	Pinnacles Well (W-3288)	W	8/27/1997	12:45	3280	9.0	0.8	0
SNP-019	40	Mathews Arm Spring Range View Cabin	S	4/5/1996	14:35	2880	6.4	0.1	2
SNP-102	40	Mathews Arm Spring Range View Cabin	S	9/2/1997	13:30	2880	9.6	0.6	2
SNP-031	41	Lewis Mountain Spring #25-2	S	4/11/1996	16:30	2920	8.4	-0.2	1
SNP-114	41	Lewis Mountain Spring #25-2	S	9/5/1997	11:00	2920	9.0	0.0	0
SNP-054	42	Old Rag Shelter Spring	S	4/26/1996	14:30	2035	9.8	0.0	2
SNP-118	42	Old Rag Shelter Spring	S	9/9/1997	18:00	2035	14.8	0.2	2
SNP-015	43	Loft Mountain Overlook Spring	S	4/4/1996	15:30	2460	8.3	0.4	1
SNP-121	43	Loft Mountain Overlook Spring	S	9/10/1997	17:00	2460	13.1	-0.3	1
SNP-016	44	Loft Mountain Spring	S	4/4/1996	17:30	3000	8.3	-0.4	1
SNP-122	44	Loft Mountain Spring	S	9/10/1997	15:00	3000	12.3	0.1	2
SNP-013	45	Simmons Gap Well (W-1704)	W	4/4/1996	9:30	2230	10.5	3.3	1
SNP-099	45	Simmons Gap Well (W-1704)	W	8/29/1997	10:00	2230	10.2	2.0	2
SNP-137	46	Yeager's Spring (Luray)	S	9/17/1997	13:10	778	12.8	2.6	1
SNP-248	46	Yeager's Spring (Luray)	S	8/23/1999	11:20	778	11.9	2.4	2
SNP-042	47	Lewis Mountain Well (W-1072)	W	4/17/1996	18:20	3390	8.4	0.6	1
SNP-095	47	Lewis Mountain Well (W-1072)	W	8/28/1997	15:45	3390	9.0	1.1	0
SNP-140	47	Lewis Mountain Well (W-1072)	W	9/19/1997	9:30	3390	8.4	1.0	2
SNP-170	48	Bear Lithia Spring	S	9/8/1997	17:15	866	9.0	0.0	0
SNP-255	48	Bear Lithia Spring	S	9/2/1999	10:20	866	9.0	3.1	2
SNP-046	49	Mathews Arm Well (W-856)	W	4/19/1996	10:40	2590	9.4	1.6	2
SNP-085	49	Mathews Arm Well (W-856)	W	8/26/1997	15:05	2590	8.3	3.9	2

Table 6. Summary of recharge temperatures--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	Elev (feet)	Rech. Temp. (°C)	Excess Air (cc STP/L)	Number of Samples Averaged
SNP-229	49	Mathews Arm Well (W-856)	W	8/16/1999	13:10	2590	7.6	5.2	1
SNP-011	50	Loft Mountain Well #1 (W-715)	W	4/3/1996	15:45	2740	7.1	2.6	1
SNP-098	50	Loft Mountain Well #1 (W-715)	W	8/29/1997	14:00	2740	8.7	3.2	2
SNP-235	50	Loft Mountain Well #1 (W-715)	W	8/17/1999	18:15	2740	8.1	3.2	1
SNP-010	51	Loft Mountain Well #2 (W-754)	W	4/3/1996	14:30	2680	5.3	3.0	1
SNP-097	51	Loft Mountain Well #2 (W-754)	W	8/29/1997	12:30	2680	5.9	10.0	2
SNP-236	51	Loft Mountain Well #2 (W-754)	W	8/18/1999	8:35	2680	7.7	4.0	1
SNP-012	52	Ivy Creek Shelter Spring	S	4/3/1996	18:00	2920	5.1	0.1	1
SNP-119	52	Ivy Creek Shelter Spring	S	9/10/1997	12:00	2920	9.0	3.4	2
SNP-237	52	Ivy Creek Shelter Spring	S	8/18/1999	10:20	2920	8.9	0.5	1
SNP-113	53	Lewis Mountain Spring #25	S	9/5/1997	9:30	2920	9.3	-0.2	2
SNP-241	53	Lewis Mountain Spring #25	S	8/19/1999	18:05	2920	9.5	0.4	1
SNP-033	54	Elkwallow Spring #8	S	4/12/1996	12:30	2500	10.2	-0.1	1
SNP-106	54	Elkwallow Spring #8	S	9/3/1997	9:00	2500	9.7	0.7	2
SNP-244	54	Elkwallow Spring #8	S	8/20/1999	13:50	2500	9.6	0.8	1
SNP-136	55	Hite Spring (Luray)	S	9/17/1997	11:40	837	11.6	2.5	2
SNP-247	55	Hite Spring (Luray)	S	8/23/1999	8:56	837	9.7	2.9	1
SNP-040	56	HQ Spring #14-1	S	4/17/1996	9:15	1460	5.7	-0.7	1
SNP-117	56	HQ Spring #14-1	S	9/9/1997	9:10	1460	9.0	0.0	0
SNP-023	57	Indian Run Shelter Spring	S	4/9/1996	13:00	2290	10.0	0.5	1
SNP-128	57	Indian Run Shelter Spring	S	9/12/1997	13:30	2290	10.6	0.5	2
SNP-251	57	Indian Run Shelter Spring	S	8/23/1999	18:15	2290	9.6	0.3	2
SNP-252	58	Town of Elkton Spring	S	9/1/1999	10:25	1078	9.6	2.9	2
SNP-254	60	Town of Grottoes #2	W	9/1/1999	15:00	1191	7.8	4.8	2
SNP-256	61	Blue Ridge School #5	W	9/2/1999	12:30	733	10.8	0.9	2
SNP-257	62	Town of Washington #3	W	9/2/1999	15:45	663	12.5	4.2	2
SNP-263	63	Mountain side Market	W	9/8/1999	9:00	817	11.0	2.9	1
SNP-134	64	Hudson Spring (Luray)	S	9/17/1997	9:45	765	10.2	1.3	2
SNP-180	64	Hudson Spring (Luray)	S	3/2/1999	10:10	765	10.1	1.5	2
SNP-185	64	Hudson Spring (Luray)	S	4/2/1999	8:40	765	10.0	1.6	2
SNP-190	64	Hudson Spring (Luray)	S	4/27/1999	9:40	765	9.8	1.7	2
SNP-195	64	Hudson Spring (Luray)	S	5/26/1999	10:00	765	9.8	1.5	1
SNP-200	64	Hudson Spring (Luray)	S	6/23/1999	9:30	765	9.8	1.7	2
SNP-217	64	Hudson Spring (Luray)	S	7/14/1999	9:30	765	9.9	1.6	1
SNP-222	64	Hudson Spring (Luray)	S	8/11/1999	9:15	765	10.7	1.7	1
SNP-258	64	Hudson Spring (Luray)	S	9/7/1999	9:30	765	10.4	1.7	1
SNP-264	64	Hudson Spring (Luray)	S	9/9/1999	9:05	765	10.0	1.6	1
SNP-269	64	Hudson Spring (Luray)	S	9/22/1999	9:00	765	9.9	1.6	2
SNP-020	65	Lewis Spring	S	4/8/1996	10:30	3320	8.5	0.4	1
SNP-093	65	Lewis Spring	S	8/28/1997	17:05	3320	9.5	-0.1	2
SNP-124	65	Lewis Spring	S	9/11/1997	9:35	3320	10.2	0.0	2
SNP-126	65	Lewis Spring	S	9/11/1997	10:50	3320	10.1	-0.2	2
SNP-135	65	Lewis Spring	S	9/17/1997	16:00	3320	9.8	0.0	2
SNP-181	65	Lewis Spring	S	3/2/1999	12:30	3320	8.7	-0.1	1
SNP-186	65	Lewis Spring	S	4/2/1999	10:10	3320	8.5	0.1	1
SNP-191	65	Lewis Spring	S	4/27/1999	13:00	3320	8.9	0.2	1
SNP-196	65	Lewis Spring	S	5/26/1999	12:55	3320	9.2	0.0	1
SNP-201	65	Lewis Spring	S	6/23/1999	11:50	3320	8.8	0.2	2
SNP-220	65	Lewis Spring	S	7/15/1999	9:25	3320	8.7	0.0	1
SNP-223	65	Lewis Spring	S	8/11/1999	11:35	3320	9.3	0.0	1
SNP-259	65	Lewis Spring	S	9/7/1999	11:00	3320	9.2	0.2	1
SNP-265	65	Lewis Spring	S	9/9/1999	10:40	3320	9.4	0.3	1
SNP-270	65	Lewis Spring	S	9/22/1999	10:40	3320	9.3	0.2	1
VR-01	66	Town of Stanley # 3	W	7/6/1999	12:30	1175	7.8	6.6	2
VR-02	67	Town of Shenandoah # 5	W	7/6/1999	16:15	1170	9.8	1.5	1
VR-03	68	Wanyesboro Jefferson Rd # 1	W	7/7/1999	10:35	1360	9.5	4.2	2
VR-04	69	Coyner Spring	S	7/7/1999	14:00	1320	8.7	4.4	2
VR-06	71	Town of Shenandoah # 2	W	7/8/1999	16:20	1080	8.4	6.8	2
VR-07	72	Town of Shenandoah # 3	W	7/8/1999	18:20	1070	7.2	4.8	1
VR-08	73	Town of Stanley # 6	W	7/9/1999	10:15	1050	9.4	2.0	2
VR-09	74	Town of Stanley # 5	W	7/9/1999	13:00	970	9.6	2.9	1
VR-10	75	Town of Stanley # 4	W	7/9/1999	15:00	1070	9.5	1.4	1
VR-11	76	Town of Stanley # 2	W	7/9/1999	16:45	1140	9.1	4.2	1

Table 7. Summary of chlorofluorocarbon concentrations in water from wells and springs

[W, well; S, spring; CFC-11, (trichlorofluoromethane, $CFCl_3$); CFC-12, (dichlorodifluoromethane, CF_2Cl_2); CFC-113, (trichlorotrifluoroethane, $C_2F_3Cl_3$); Conc., concentration; pg/kg, picograms per kilogram; °C, degrees Celsius; Calc., calculated; pptv, parts per trillion by volume; ND, not determined]

SNP No.	Site ID	Site Name	W/S	Date	Time	CFC-11 Conc. in Water (pg/kg)	CFC-12 Conc. in Water (pg/kg)	CFC-113 Conc. in Water (pg/kg)	Recharge Temp (°C)	Recharge Elevation (feet)	CFC-11 Calc Atmospheric Partial Pressure (pptv)	CFC-12 Calc Atmospheric Partial Pressure (pptv)	CFC-113 Calc Atmospheric Partial Pressure (pptv)
SNP-001	1	HQ #1 Well (W-855)	W	4/1/1996	10:30	586.5	301.2	50.2	9.0	1120	199.2	450.4	40.2
SNP-090	1	HQ #1 Well (W-855)	W	8/27/1997	8:40	691.5	318.3	48.1	8.9	1120	236.3	479.2	38.8
SNP-227	1	HQ #1 Well (W-855)	W	8/16/1999	9:00	669.9	330.2	610.1	9.7	1100	239.3	517.2	516.4
SNP-002	2	HQ Spring #14-3 - above HQ on Rt 211	S	4/1/1996	13:00	657.5	318.3	88.6	8.6	1760	223.6	477.6	70.9
SNP-003	3	Hemlock Spring	S	4/1/1996	15:00	737.2	346.4	101.4	7.9	3440	256.2	533.6	82.7
SNP-108	3	Hemlock Spring	S	9/4/1997	12:00	691.8	340.5	97.6	8.4	3440	250.5	544.8	83.2
SNP-231	3	Hemlock Spring	S	8/17/1999	9:45	701.3	353.6	146.6	8.2	3440	251.0	559.8	123.3
SNP-004	4	Pinnacles Spring #16	S	4/2/1996	9:30	718.2	339.1	89.9	9.7	3480	276.6	572.6	82.0
SNP-112	4	Pinnacles Spring #16	S	9/4/1997	10:00	636.1	304.6	87.3	10.2	3480	255.3	534.4	83.2
SNP-006	5	Furnace Spring at Skyland	S	4/2/1996	14:30	1061.5	386.4	105.4	7.0	3430	350.2	568.1	81.2
SNP-089	5	Furnace Spring at Skyland	S	8/27/1997	18:35	855.8	366.3	108.1	7.3	3430	290.6	553.2	85.9
SNP-125	5	Furnace Spring at Skyland	S	9/11/1997	12:25	855.1	442.8	103.6	9.0	3430	320.3	730.2	91.6
SNP-169	5	Furnace Spring at Skyland	S	9/18/1997	9:15	860.2	371.8	101.7	10.2	3430	344.6	651.2	96.8
SNP-182	5	Furnace Spring at Skyland	S	3/2/1999	14:35	851.4	363.6	99.7	7.5	3460	292.8	555.5	80.3
SNP-187	5	Furnace Spring at Skyland	S	4/2/1999	11:20	882.3	380.9	100.9	7.1	3460	296.4	569.9	79.2
SNP-192	5	Furnace Spring at Skyland	S	4/27/1999	14:40	887.8	373.3	98.9	7.9	3460	312.5	582.4	81.7
SNP-197	5	Furnace Spring at Skyland	S	5/26/1999	14:50	978.3	370.4	178.6	8.3	3460	352.4	590.0	151.3
SNP-202	5	Furnace Spring at Skyland	S	6/23/1999	13:40	1002.5	374.5	263.0	7.7	3460	348.8	578.3	214.5
SNP-221	5	Furnace Spring at Skyland	S	7/15/1999	11:45	985.1	362.0	291.7	7.6	3460	340.8	556.1	236.4
SNP-224	5	Furnace Spring at Skyland	S	8/11/1999	13:30	937.2	358.4	144.7	8.2	3460	335.7	567.9	121.8
SNP-260	5	Furnace Spring at Skyland	S	9/7/1999	12:45	924.1	352.4	152.1	8.6	3460	338.7	570.0	131.3
SNP-266	5	Furnace Spring at Skyland	S	9/9/1999	12:30	921.9	367.7	148.2	8.2	3460	330.2	582.6	124.8
SNP-271	5	Furnace Spring at Skyland	S	9/22/1999	12:09	961.7	410.2	160.0	8.3	3460	346.5	653.4	135.5
SNP-008	6	Skyland #2 (W-1033)	W	4/2/1996	17:30	780.5	339.9	95.1	7.0	3560	258.7	502.1	73.6
SNP-094	6	Skyland #2 (W-1033)	W	8/28/1997	9:45	718.2	321.9	88.6	9.5	3560	278.1	547.1	81.2
SNP-232	6	Skyland #2 (W-1033)	W	8/17/1999	11:25	729.1	324.8	144.8	9.9	3500	288.0	561.9	135.7
SNP-009	7	Dundo Spring #29	S	4/3/1996	12:15	751.0	352.6	94.1	7.4	2880	248.5	518.6	72.8
SNP-120	7	Dundo Spring #29	S	9/10/1997	10:30	625.7	309.4	90.5	12.0	2880	271.0	579.6	94.0
SNP-014	8	Simmons Gap Spring	S	4/4/1996	12:40	770.9	350.4	95.9	8.9	2360	272.5	545.6	80.0
SNP-131	8	Simmons Gap Spring	S	9/16/1997	13:00	689.8	359.7	96.9	9.7	3300	267.5	611.5	89.0
SNP-238	8	Simmons Gap Spring	S	8/18/1999	10:45	706.9	347.9	139.4	9.7	2360	264.7	571.1	123.6
SNP-017	9	Panorama Spring #13-3	S	4/5/1996	9:00	695.1	335.6	103.7	10.2	2560	266.0	561.4	94.3
SNP-018	10	Browntown Valley Overlook Spring	S	4/5/1996	12:40	870.8	401.2	125.4	4.2	2900	238.3	498.2	78.9
SNP-103	10	Browntown Valley Overlook Spring	S	9/2/1997	9:30	757.8	383.2	108.9	7.3	2900	252.3	567.5	84.8
SNP-123	10	Browntown Valley Overlook Spring	S	9/11/1997	16:30	738.7	359.1	102.1	8.7	2900	266.7	571.8	86.9
SNP-139	10	Browntown Valley Overlook Spring	S	9/18/1997	13:30	733.2	373.8	105.3	7.6	2900	248.4	562.3	83.6
SNP-184	10	Browntown Valley Overlook Spring	S	3/3/1999	10:00	768.5	367.2	105.7	6.8	2900	248.4	529.7	79.7
SNP-189	10	Browntown Valley Overlook Spring	S	4/2/1999	15:00	785.3	433.3	108.0	7.1	2900	258.4	635.1	83.1
SNP-193	10	Browntown Valley Overlook Spring	S	4/28/1999	10:30	770.4	389.2	112.1	7.3	2900	256.5	576.4	87.3
SNP-198	10	Browntown Valley Overlook Spring	S	5/27/1999	9:05	843.9	373.1	206.0	7.3	2900	280.9	552.6	160.4
SNP-204	10	Browntown Valley Overlook Spring	S	6/24/1999	11:55	830.0	371.3	305.9	7.5	2900	279.6	555.7	241.2
SNP-219	10	Browntown Valley Overlook Spring	S	7/14/1999	14:35	938.4	362.4	251.5	7.6	2900	317.9	545.2	199.6
SNP-225	10	Browntown Valley Overlook Spring	S	8/12/1999	9:20	847.7	363.1	156.0	7.7	2900	288.9	549.1	124.6
SNP-262	10	Browntown Valley Overlook Spring	S	9/7/1999	16:30	650.5	334.6	157.9	7.4	2900	217.8	498.2	123.7
SNP-268	10	Browntown Valley Overlook Spring	S	9/10/1999	8:25	656.0	363.0	125.7	7.7	2900	223.6	549.0	100.4
SNP-273	10	Browntown Valley Overlook Spring	S	9/22/1999	15:45	662.0	375.3	126.3	7.2	2900	219.1	552.9	97.7

Table 7. Summary of chlorofluorocarbon concentrations in water from wells and springs--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	CFC-11 Conc. in Water (pg/kg)	CFC-12 Conc. in Water (pg/kg)	CFC-113 Conc. in Water (pg/kg)	Recharge Temp (°C)	Recharge Elevation (feet)	CFC-11 Calc Atmospheric Partial Pressure (pptv)	CFC-12 Calc Atmospheric Partial Pressure (pptv)	CFC-113 Calc Atmospheric Partial Pressure (pptv)
SNP-021	11	Camp Hoover Spring #2	S	4/8/1996	14:30	682.4	328.1	86.9	8.9	2580	243.2	515.1	73.0
SNP-116	11	Camp Hoover Spring #2	S	9/9/1997	14:00	679.5	330.2	94.3	11.3	2580	280.2	591.5	92.9
SNP-234	11	Camp Hoover Spring #2	S	8/17/1999	14:35	681.1	336.5	139.1	10.1	2510	262.2	566.7	127.2
SNP-022	12	Davids Spring	S	4/8/1996	17:15	722.0	335.5	108.4	7.7	3400	247.7	510.9	87.2
SNP-110	12	Davids Spring	S	9/4/1997	18:00	710.0	358.6	136.8	9.0	3400	265.6	590.7	120.8
SNP-243	12	Davids Spring	S	8/20/1999	11:05	778.0	373.3	428.8	8.4	3400	281.3	596.4	364.7
SNP-024	13	Dickeys Ridge Spring	S	4/10/1996	11:30	773.4	370.2	96.4	8.0	2400	260.2	551.8	76.1
SNP-129	13	Dickeys Ridge Spring	S	9/12/1997	10:00	701.3	338.3	95.5	10.6	2400	276.4	581.7	89.6
SNP-130	13	Dickeys Ridge Spring	S	9/12/1997	9:45	642.1	339.2	88.2	10.6	2400	253.1	583.1	82.8
SNP-246	13	Dickeys Ridge Spring (pipe 2)	S	8/20/1999	17:00	671.7	339.0	148.5	10.1	2400	257.5	568.5	135.2
SNP-025	14	Gravel Spring NE	S	4/10/1996	14:30	738.0	330.2	89.9	8.7	2490	259.2	511.6	74.4
SNP-101	14	Gravel Spring NE	S	9/2/1997	11:00	716.8	335.8	115.8	8.2	2490	247.7	513.2	94.0
SNP-026	15	Pass Mountain Overlook Spring	S	4/10/1996	17:50	777.5	343.7	95.7	8.5	2580	270.9	528.9	78.5
SNP-100	15	Pass Mountain Overlook Spring	S	9/2/1997	16:00	688.6	309.9	92.8	11.5	2580	287.0	560.4	92.5
SNP-027	16	Swift Run Gap Spring #27	S	4/11/1996	10:00	727.1	327.2	91.2	9.5	2640	268.5	530.4	79.7
SNP-133	16	Swift Run Gap Spring #27	S	9/16/1997	10:30	659.2	365.8	91.4	10.4	2640	259.3	628.3	85.5
SNP-239	16	Swift Run Gap Spring #27	S	8/19/1999	13:45	637.2	324.2	145.9	10.4	2640	250.7	556.9	136.5
SNP-028	17	Dean Mountain/South River Spring	S	4/11/1996	12:00	768.8	355.0	105.8	6.0	3110	236.4	489.4	75.5
SNP-115	17	Dean Mountain/South River Spring	S	9/5/1997	14:00	674.7	322.4	92.4	9.6	3110	258.3	541.5	83.7
SNP-240	17	Dean Mountain/South River Spring	S	8/19/1999	15:40	646.2	328.2	145.9	9.4	3120	244.7	545.9	130.7
SNP-029	18	Baldface Mountain Spring	S	4/11/1996	14:00	837.8	359.2	100.7	6.0	3560	261.8	503.5	73.1
SNP-030	19	Hazeltop Ridge Overlook Spring	S	4/11/1996	18:30	762.2	346.0	101.8	8.3	3300	269.6	541.1	84.7
SNP-032	20	Byrds Nest #4/Beahms Gap Spring	S	4/12/1996	9:40	747.6	331.5	92.8	9.0	2200	264.2	515.8	77.4
SNP-104	20	Byrds Nest #4/Beahms Gap Spring	S	9/3/1997	12:00	690.8	343.1	96.1	9.3	2200	251.4	548.7	82.7
SNP-242	20	Byrds Nest #4/Beahms Gap Spring	S	8/20/1999	8:45	673.4	335.1	149.3	10.2	2200	257.7	560.7	135.7
SNP-034	21	Byrds Nest #3 Spring	S	4/12/1996	15:20	711.4	332.6	94.1	9.0	3000	254.2	532.9	80.8
SNP-109	21	Byrds Nest #3 Spring	S	9/4/1997	8:30	683.4	325.2	91.0	9.0	3000	251.9	527.8	79.2
SNP-127	21	Byrds Nest #3 Spring	S	9/11/1997	14:30	677.1	327.0	92.7	9.8	3000	261.1	552.5	84.7
SNP-138	21	Byrds Nest #3 Spring	S	9/18/1997	11:00	691.6	328.2	93.7	10.0	3000	269.6	560.1	86.7
SNP-183	21	Byrds Nest #3 Spring	S	3/2/1999	16:50	684.0	326.6	92.1	9.4	3000	257.9	540.9	82.2
SNP-188	21	Byrds Nest #3 Spring	S	4/2/1999	12:50	776.3	339.8	81.7	9.6	3000	296.0	568.4	73.8
SNP-194	21	Byrds Nest #3 Spring	S	4/28/1999	17:25	683.2	332.9	92.2	9.4	3000	257.6	551.3	82.3
SNP-199	21	Byrds Nest #3 Spring	S	5/27/1999	11:22	671.2	332.5	173.5	9.0	3000	247.4	539.6	151.0
SNP-203	21	Byrds Nest #3 Spring	S	6/24/1999	9:05	663.4	330.6	287.4	8.8	3000	241.8	531.1	246.9
SNP-218	21	Byrds Nest #3 Spring	S	7/14/1999	11:34	668.9	334.1	419.8	9.0	3000	246.6	542.2	365.2
SNP-226	21	Byrds Nest #3 Spring	S	8/12/1999	12:00	690.0	334.7	155.6	9.4	3000	260.1	554.3	138.7
SNP-261	21	Byrds Nest #3 Spring	S	9/7/1999	14:20	1088.3	329.5	191.2	9.6	3000	415.0	551.2	172.7
SNP-267	21	Byrds Nest #3 Spring	S	9/9/1999	14:30	655.0	339.2	140.4	9.1	3000	242.8	553.2	122.9
SNP-272	21	Byrds Nest #3 Spring	S	9/22/1999	13:45	678.6	367.6	153.2	9.3	3000	254.4	605.7	135.8
SNP-035	22	Big Meadows #9 Well	W	4/15/1996	11:20	714.9	331.9	94.6	7.7	3460	245.8	506.4	76.3
SNP-096	22	Big Meadows #9 Well	W	8/28/1997	13:30	696.3	338.5	95.8	9.8	3460	273.1	581.9	89.0
SNP-036	23	Big Meadows #14 Well	W	4/15/1996	14:00	736.0	322.5	83.1	8.7	3510	268.4	518.7	71.4
SNP-092	23	Big Meadows #14 Well	W	8/28/1997	11:30	717.9	314.7	89.2	8.4	3510	260.6	504.8	76.2
SNP-233	23	Big Meadows #14 Well	W	8/17/1999	12:50	669.5	332.3	684.6	7.2	3510	226.7	500.8	541.8
SNP-038	24	Hogback Spring #5	S	4/16/1996	11:45	711.6	331.1	95.6	8.6	3240	255.5	524.7	80.8
SNP-039	25	Elkwallow Well (W-1703)	W	4/16/1996	16:00	682.4	336.2	91.0	8.3	2570	235.0	511.9	73.7
SNP-086	25	Elkwallow Well (W-1703)	W	8/26/1997	18:30	677.8	313.1	90.1	9.0	3300	252.6	513.9	79.3
SNP-228	25	Elkwallow Well (W-1703)	W	8/16/1999	11:45	664.5	334.9	137.5	8.0	3300	233.9	522.2	113.6
SNP-041	26	Hightop Hut Spring	S	4/17/1996	15:15	740.1	354.6	103.1	8.2	3120	258.6	548.1	84.7

Table 7. Summary of chlorofluorocarbon concentrations in water from wells and springs--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	CFC-11 Conc. in Water (pg/kg)	CFC-12 Conc. in Water (pg/kg)	CFC-113 Conc. in Water (pg/kg)	Recharge Temp (°C)	Recharge Elevation (feet)	CFC-11 Calc Atmospheric Partial Pressure (pptv)	CFC-12 Calc Atmospheric Partial Pressure (pptv)	CFC-113 Calc Atmospheric Partial Pressure (pptv)
SNP-043	27	Pass Mountain Hut Spring	S	4/18/1996	9:15	679.0	321.0	87.7	8.7	2700	240.3	501.1	73.2
SNP-105	27	Pass Mountain Hut Spring	S	9/3/1997	14:10	656.7	315.1	89.8	9.0	3300	244.8	517.1	79.0
SNP-048	31	Dickeys Ridge Well (W-1346)	W	4/19/1996	14:40	299.3	131.4	24.5	9.1	1840	105.0	202.7	20.3
SNP-084	31	Dickeys Ridge Well (W-1346)	W	8/26/1997	10:50	311.1	130.9	30.4	8.2	1840	104.9	195.4	24.1
SNP-230	31	Dickeys Ridge Well (W-1346)	W	8/16/1999	16:15	364.4	156.4	58.5	8.0	1840	121.5	231.0	45.8
SNP-050	33	Domestic well #1	W	4/24/1996	9:50	483.8	287.3	62.5	7.7	850	151.2	398.3	45.8
SNP-051	34	Domestic well #2	W	4/24/1996	14:55	327.5	284.7	37.2	10.0	825	116.3	442.4	31.3
SNP-052	35	White Oak Cabin Spring	S	4/25/1996	10:35	701.5	337.4	94.4	8.5	3370	251.6	534.4	79.7
SNP-111	35	White Oak Cabin Spring	S	9/4/1997	15:55	563.9	300.6	98.5	13.1	3370	263.6	604.4	111.1
SNP-053	36	Big Meadows #1 Well (W-1701)	W	4/25/1996	16:30	821.6	438.7	60.1	6.7	3504	267.0	636.7	45.6
SNP-083	36	Big Meadows #1 Well (W-1701)	W	9/17/1997	16:30	720.8	456.7	65.2	7.9	3504	254.2	713.7	53.9
SNP-037	37	HQ #2 Well (W-851)	W	4/16/1996	9:45	553.4	587.7	80.2	11.2	1135	212.1	978.9	73.4
SNP-087	37	HQ #2 Well (W-851)	W	8/27/1997	10:30	452.8	300.3	80.3	9.4	1135	159.3	464.0	66.8
SNP-007	38	Skyland #5	W	4/2/1996	16:00	946.3	440.7	131.5	6.3	3670	302.3	630.1	97.7
SNP-088	38	Skyland #5	W	8/27/1997	17:10	776.0	344.2	98.4	8.9	3670	291.6	569.7	87.2
SNP-005	39	Pinnacles Well (W-3288)	W	4/2/1996	12:00	686.7	331.3	97.3	10.3	3280	271.3	571.7	91.4
SNP-091	39	Pinnacles Well (W-3288)	W	8/27/1997	12:45	723.6	426.5	114.5	9.0	3280	269.5	699.4	100.6
SNP-019	40	Mathews Arm Spring Range View Cabin	S	4/5/1996	14:35	729.6	360.8	97.9	6.3	2880	226.4	501.1	70.7
SNP-102	40	Mathews Arm Spring Range View Cabin	S	9/2/1997	13:30	682.2	319.0	91.7	9.4	2880	256.1	525.8	81.4
SNP-031	41	Lewis Mountain Spring #25-2	S	4/11/1996	16:30	771.7	348.7	99.2	8.4	2920	270.7	540.6	81.9
SNP-054	42	Old Rag Shelter Spring	S	4/26/1996	14:30	783.6	342.8	102.6	9.7	2035	286.1	548.8	88.8
SNP-118	42	Old Rag Shelter Spring	S	9/9/1997	18:00	579.7	277.3	77.1	14.8	2035	281.5	573.8	91.2
SNP-015	43	Loft Mountain Overlook Spring	S	4/4/1996	15:30	789.0	370.6	99.2	8.3	2460	270.6	562.1	80.0
SNP-121	43	Loft Mountain Overlook Spring	S	9/10/1997	17:00	600.8	298.4	86.0	13.1	2460	271.5	579.8	93.8
SNP-016	44	Loft Mountain Spring	S	4/4/1996	17:30	683.0	331.7	88.9	8.3	3000	238.9	513.1	73.1
SNP-122	44	Loft Mountain Spring	S	9/10/1997	15:00	630.2	310.7	151.1	12.3	3000	278.6	593.1	160.5
SNP-013	45	Simmons Gap Well (W-1704)	W	4/4/1996	9:30	4814.7	734.7	53.3	10.4	2230	1840.0	1226.0	48.4
SNP-099	45	Simmons Gap Well (W-1704)	W	8/29/1997	10:00	7321.8	715.4	48.6	10.2	2230	2805.2	1198.2	44.2
SNP-137	46	Yeager's Spring (Luray)	S	9/17/1997	13:10	783.6	743.7	105.5	14.1	687	349.1	1417.0	114.0
SNP-248	46	Yeager's Spring (Luray)	S	8/23/1999	11:20	1127.9	434.3	217.1	11.9	800	449.6	749.4	207.4
SNP-042	47	Lewis Mountain Well (W-1072)	W	4/17/1996	18:20	726.1	333.3	97.2	8.4	3390	259.2	525.7	81.7
SNP-095	47	Lewis Mountain Well (W-1072)	W	8/28/1997	15:45	726.9	454.4	119.1	9.0	3390	271.8	748.2	105.1
SNP-140	47	Lewis Mountain Well (W-1072)	W	9/19/1997	9:30	692.4	342.4	93.1	8.3	3390	248.8	543.9	78.7
SNP-255	48	Bear Lithia Spring	S	9/2/1999	10:20	259.7	118.1	126.0	8.9	866	87.9	176.1	100.7
SNP-046	49	Mathews Arm Well (W-856)	W	4/19/1996	10:40	685.5	317.7	84.8	9.7	2590	255.5	519.1	74.9
SNP-085	49	Mathews Arm Well (W-856)	W	8/26/1997	15:05	655.3	320.6	88.6	8.2	2590	227.3	491.9	72.2
SNP-229	49	Mathews Arm Well (W-856)	W	8/16/1999	13:10	634.0	348.3	129.8	7.6	2590	212.4	518.0	101.8
SNP-011	50	Loft Mountain Well #1 (W-715)	W	4/3/1996	15:45	518.6	235.5	51.8	7.1	2740	167.8	339.3	39.1
SNP-098	50	Loft Mountain Well #1 (W-715)	W	8/29/1997	14:00	416.9	195.0	40.8	8.7	2740	149.6	308.7	34.5
SNP-235	50	Loft Mountain Well #1 (W-715)	W	8/17/1999	18:15	452.7	201.2	65.5	8.2	2680	157.5	309.7	53.6
SNP-010	51	Loft Mountain Well #2 (W-754)	W	4/3/1996	14:30	683.8	340.0	1485.6	5.3	2680	198.4	444.5	997.5
SNP-097	51	Loft Mountain Well #2 (W-754)	W	8/29/1997	12:30	611.3	337.7	279.3	5.9	2680	185.8	460.6	197.0
SNP-236	51	Loft Mountain Well #2 (W-754)	W	8/18/1999	8:35	565.1	204.1	151.5	7.7	2680	191.0	306.2	120.1
SNP-012	52	Ivy Creek Shelter Spring	S	4/3/1996	18:00	645.7	297.3	75.9	5.1	2920	186.8	387.9	50.7
SNP-119	52	Ivy Creek Shelter Spring	S	9/10/1997	12:00	641.6	317.3	94.1	9.3	2920	239.8	521.2	83.1
SNP-237	52	Ivy Creek Shelter Spring	S	8/18/1999	10:20	643.8	325.9	123.5	9.1	2800	236.9	527.6	107.3
SNP-113	53	Lewis Mountain Spring #25	S	9/5/1997	9:30	689.0	333.4	96.5	8.8	2920	250.4	534.0	82.7
SNP-241	53	Lewis Mountain Spring #25	S	8/19/1999	18:05	682.5	340.9	154.4	9.5	2920	258.0	565.7	138.1
SNP-033	54	Elkwallow Spring #8	S	4/12/1996	12:30	752.9	334.6	96.8	10.2	2500	287.4	558.5	87.8

Table 7. Summary of chlorofluorocarbon concentrations in water from wells and springs--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	CFC-11 Conc. in Water (pg/kg)	CFC-12 Conc. in Water (pg/kg)	CFC-113 Conc. in Water (pg/kg)	Recharge Temp (°C)	Recharge Elevation (feet)	CFC-11 Calc Atmospheric Partial Pressure (pptv)	CFC-12 Calc Atmospheric Partial Pressure (pptv)	CFC-113 Calc Atmospheric Partial Pressure (pptv)
SNP-106	54	Elkwallow Spring #8	S	9/3/1997	9:00	699.4	335.9	95.8	9.7	2500	263.2	554.3	85.5
SNP-244	54	Elkwallow Spring #8	S	8/20/1999	13:50	674.7	336.6	149.5	9.6	2500	252.5	552.6	132.5
SNP-136	55	Hite Spring (Luray)	S	9/17/1997	11:40	262.4	185.9	56.4	11.6	837	103.0	316.5	53.0
SNP-247	55	Hite Spring (Luray)	S	8/23/1999	8:56	276.0	157.3	93.4	9.7	837	97.6	244.0	78.3
SNP-040	56	HQ Spring #14-1	S	4/17/1996	9:15	710.2	357.1	103.6	5.7	1460	201.9	456.1	68.3
SNP-117	56	HQ Spring #14-1	S	9/9/1997	9:10	587.9	294.9	78.5	9.0	1460	204.6	452.0	64.5
SNP-249	56	HQ Spring #14-1	S	8/23/1999	14:10	542.5	266.6	101.0	9.0	1000	185.6	401.6	81.6
SNP-023	57	Indian Run Shelter Spring	S	4/9/1996	13:00	709.6	342.8	91.4	10.0	2290	265.9	562.2	81.3
SNP-128	57	Indian Run Shelter Spring	S	9/12/1997	13:30	689.0	342.0	95.5	10.5	2290	269.0	582.6	88.7
SNP-251	57	Indian Run Shelter Spring	S	8/23/1999	18:15	675.9	336.6	133.1	9.5	2290	249.6	545.5	116.3
SNP-252	58	Town of Elkton Spring	S	9/1/1999	10:25	94.0	47.9	25.7	10.4	800	34.5	76.8	22.4
SNP-253	59	Town of Elkton well	W	9/1/1999	11:15	7508.4	3734.4	295.9	10.0	800	2697.5	5871.9	252.3
SNP-254	60	Town of Grottoes #2	W	9/1/1999	15:00	98.4	74.5	41.2	8.0	1000	31.8	106.6	31.3
SNP-256	61	Blue Ridge School #5	W	9/2/1999	12:30	37.1	249.1	92.1	9.8	733	13.1	386.8	77.4
SNP-257	62	Town of Washington #3	W	9/2/1999	15:45	17.6	198.2	12.8	12.6	600	7.2	350.9	12.7
SNP-263	63	Mountain side Market	W	9/8/1999	9:00	280.3	195.4	54.7	11.1	800	107.0	324.3	49.9
SNP-134	64	Hudson Spring (Luray)	S	9/17/1997	9:45	197.9	95.8	9.5	10.1	765	71.4	151.2	8.1
SNP-180	64	Hudson Spring (Luray)	S	3/2/1999	10:10	160.7	96.0	10.3	9.7	1000	57.2	149.9	8.7
SNP-185	64	Hudson Spring (Luray)	S	4/2/1999	8:40	155.7	94.4	9.0	9.6	1000	55.1	146.6	7.5
SNP-190	64	Hudson Spring (Luray)	S	4/27/1999	9:40	170.4	113.0	13.6	9.5	1000	60.0	174.6	11.4
SNP-195	64	Hudson Spring (Luray)	S	5/26/1999	10:00	345.7	143.1	80.7	9.5	1000	121.7	221.1	67.2
SNP-200	64	Hudson Spring (Luray)	S	6/23/1999	9:30	147.2	95.9	196.4	9.4	1000	51.5	147.5	162.6
SNP-217	64	Hudson Spring (Luray)	S	7/14/1999	9:30	168.6	96.8	547.4	9.5	1000	59.3	149.6	455.9
SNP-222	64	Hudson Spring (Luray)	S	8/11/1999	9:15	162.8	94.0	39.3	10.3	1000	59.9	151.2	34.4
SNP-258	64	Hudson Spring (Luray)	S	9/7/1999	9:30	164.8	95.3	44.3	10.0	1000	59.6	151.0	38.1
SNP-264	64	Hudson Spring (Luray)	S	9/9/1999	9:05	226.3	145.5	188.6	9.6	1000	80.1	225.9	158.1
SNP-269	64	Hudson Spring (Luray)	S	9/22/1999	9:00	195.4	106.9	44.2	9.5	1000	68.8	165.2	36.8
SNP-020	65	Lewis Spring	S	4/8/1996	10:30	717.4	358.0	94.2	9.5	3320	271.6	595.0	84.4
SNP-093	65	Lewis Spring	S	8/28/1997	17:05	769.8	402.2	93.1	9.5	3320	295.4	677.4	84.6
SNP-126	65	Lewis Spring	S	9/11/1997	10:50	723.2	398.1	90.9	10.1	3320	286.9	691.0	85.6
SNP-124	65	Lewis Spring	S	9/11/1997	9:35	711.8	386.3	92.0	10.1	3320	282.4	670.5	86.7
SNP-135	65	Lewis Spring	S	9/17/1997	16:00	718.8	397.1	92.1	9.8	3320	280.5	679.0	85.2
SNP-181	65	Lewis Spring	S	3/2/1999	12:30	718.1	356.2	88.4	8.7	3320	263.3	576.1	76.4
SNP-186	65	Lewis Spring	S	4/2/1999	10:10	723.5	378.2	94.8	8.5	3320	262.3	605.4	80.9
SNP-191	65	Lewis Spring	S	4/27/1999	13:00	727.2	389.2	94.8	8.9	3320	269.7	635.9	83.0
SNP-196	65	Lewis Spring	S	5/26/1999	12:55	788.0	379.8	166.9	9.2	3320	297.3	630.1	148.8
SNP-201	65	Lewis Spring	S	6/23/1999	11:50	789.1	383.6	267.1	8.7	3320	289.3	620.3	230.8
SNP-220	65	Lewis Spring	S	7/15/1999	9:25	760.4	370.8	354.1	8.7	3320	278.8	599.8	306.0
SNP-223	65	Lewis Spring	S	8/11/1999	11:35	743.4	375.4	155.0	9.3	3320	282.0	625.9	139.1
SNP-259	65	Lewis Spring	S	9/7/1999	11:00	752.0	374.3	153.9	9.3	3320	285.3	624.0	138.0
SNP-265	65	Lewis Spring	S	9/9/1999	10:40	785.3	391.8	156.7	9.3	3320	297.9	653.2	140.6
SNP-270	65	Lewis Spring	S	9/22/1999	10:40	765.2	404.9	174.1	9.3	3320	290.3	675.1	156.1
VR-01	66	Town of Stanley # 3	W	7/6/1999	12:30	4.6	0.0	2.0	7.8	1175	0.9	0.0	0.9
VR-02	67	Town of Shenandoah # 5	W	7/6/1999	16:15	282.5	114.3	22.6	9.8	1170	53.4	101.0	9.6
VR-03	68	Wanyesboro Jefferson Rd # 1	W	7/7/1999	10:35	629.8	322.5	421.1	9.5	1360	119.2	284.9	179.0
VR-04	69	Coyner Spring	S	7/7/1999	14:00	503.3	203.0	672.7	8.7	1320	95.2	179.3	286.0
VR-06	71	Town of Shenandoah # 2	W	7/8/1999	16:20	390.1	316.7	46082.1	8.4	1080	73.8	279.8	19592.4
VR-07	72	Town of Shenandoah # 3	W	7/8/1999	18:20	201.5	191.7	129128.4	7.2	1070	38.1	169.4	54900.5
VR-08	73	Town of Stanley # 6	W	7/9/1999	10:15	86.0	116.3	184.9	9.4	1050	16.3	102.7	78.6

Table 7. Summary of chlorofluorocarbon concentrations in water from wells and springs--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	CFC-11 Conc. in Water (pg/kg)	CFC-12 Conc. in Water (pg/kg)	CFC-113 Conc. in Water (pg/kg)	Recharge Temp (°C)	Recharge Elevation (feet)	CFC-11 Calc Atmospheric Partial Pressure (pptv)	CFC-12 Calc Atmospheric Partial Pressure (pptv)	CFC-113 Calc Atmospheric Partial Pressure (pptv)
VR-09	74	Town of Stanley # 5	W	7/9/1999	13:00	190.2	135.6	31.2	9.6	970	36.0	119.8	13.3
VR-10	75	Town of Stanley # 4	W	7/9/1999	15:00	388.2	241.3	23.1	9.5	1070	73.5	213.2	9.8
VR-11	76	Town of Stanley # 2	W	7/9/1999	16:45	2.1	3.1	11.4	9.1	1140	0.4	2.8	4.9

Table 8. Summary of chlorofluorocarbon-based apparent recharge dates, ages, and uncertainties ([1])

[W, well; S, spring; CFC-11, (trichlorofluoromethane, $CFCl_3$); CFC-12, (dichlorodifluoromethane, CF_2Cl_2); CFC-113, (trichlorotrifluoroethane, $C_2F_3Cl_3$);
°C, degrees Celsius; Age Errors, changes in age resulting from uncertainty in recharge temperature of "+" or "–" one °C;
C, contaminated, concentration greater than that of water in equilibrium with North American air at time of recharge;
M, modern, concentration near that of water in equilibrium with North American air at time of recharge; ND, not determined]

SNP No.	Site ID	Site Name	W/S	Date	Time	Model CFC-11 Rech. Date	Model CFC-12 Rech. Date	Model CFC-113 Rech. Date	CFC-11 Age (years)	CFC-11 +1° C Age Errors (years)	CFC-11 -1° C Age Errors (years)	CFC-12 Age (years)	CFC-12 +1° C Age Errors (years)	CFC-12 -1° C Age Errors (years)	CFC-113 Age (years)	CFC-113 +1° C Age Errors (years)	CFC-113 -1° C Age Errors (years)
SNP-001	1	HQ #1 Well (W-855)	W	4/1/1996	10:30	1983.0	1987.5	1984.0	13.3	1.5	1.0	8.8	1.5	0.5	12.3	0.5	0.0
SNP-090	1	HQ #1 Well (W-855)	W	8/27/1997	8:40	1987.0	1989.5	1984.0	10.7	0.5	1.5	8.2	2.0	1.5	13.7	0.5	0.5
SNP-227	1	HQ #1 Well (W-855)	W	8/16/1999	9:00	1987.0	1993.0	Contam.	12.6	1.0	1.0	6.6	4.0	2.5	C	C	C
SNP-002	2	HQ Spring #14-3 - above HQ on Rt 211	S	4/1/1996	13:00	1985.5	1989.5	1989.0	10.8	1.5	1.0	6.8	2.0	1.5	7.3	0.5	0.5
SNP-003	3	Hemlock Spring	S	4/1/1996	15:00	1988.5	1995.0	1991.5	7.8	2.5	1.5	1.3	1.3	3.5	4.8	2.5	1.5
SNP-108	3	Hemlock Spring	S	9/4/1997	12:00	1988.0	1997.0	1992.0	9.7	1.5	1.0	0.7	0.7	4.0	5.7	2.0	1.5
SNP-231	3	Hemlock Spring	S	8/17/1999	9:45	1988.0	1997.0	Contam.	11.6	1.5	1.0	2.6	2.6	2.5	C	C	C
SNP-004	4	Pinnacles Spring #16	S	4/2/1996	9:30	1993.5	1996.3	1991.5	2.8	2.8	4.5	0.0	C	C	4.8	2.5	1.5
SNP-112	4	Pinnacles Spring #16	S	9/4/1997	10:00	1988.0	1995.0	1992.0	9.7	2.5	1.0	2.7	2.7	3.5	5.7	2.0	1.5
SNP-006	5	Furnace Spring at Skyland	S	4/2/1996	14:30	C	1996.3	1991.0	C	C	C	M	C	0.3	5.3	3.0	1.0
SNP-089	5	Furnace Spring at Skyland	S	8/27/1997	18:35	1997.7	1997.0	1994.0	M	C	5.7	0.7	0.7	3.5	3.7	3.7	3.0
SNP-125	5	Furnace Spring at Skyland	S	9/11/1997	12:25	C	C	1997.7	C	C	C	C	C	C	M	C	3.7
SNP-169	5	Furnace Spring at Skyland	S	9/18/1997	9:15	C	C	C	C	C	C	C	C	C	C	C	C
SNP-182	5	Furnace Spring at Skyland	S	3/2/1999	14:35	1999.2	1997.0	1991.0	M	C	3.7	2.2	2.2	3.0	8.2	3.0	1.5
SNP-187	5	Furnace Spring at Skyland	S	4/2/1999	11:20	1999.3	1999.3	1990.5	M	C	3.8	M	C	3.3	8.8	6.5	1.0
SNP-192	5	Furnace Spring at Skyland	S	4/27/1999	14:40	Contam.	1999.3	1991.0	C	C	C	M	C	2.3	8.3	3.0	1.0
SNP-197	5	Furnace Spring at Skyland	S	5/26/1999	14:50	Contam.	1999.4	Contam.	C	C	C	M	C	0.0	C	C	C
SNP-202	5	Furnace Spring at Skyland	S	6/23/1999	13:40	Contam.	1999.5	Contam.	C	C	C	M	C	2.5	C	C	C
SNP-221	5	Furnace Spring at Skyland	S	7/15/1999	11:45	Contam.	1997.0	Contam.	C	C	C	2.5	2.5	3.0	C	C	C
SNP-224	5	Furnace Spring at Skyland	S	8/11/1999	13:30	Contam.	1999.6	Contam.	C	C	C	M	C	3.6	C	C	C
SNP-260	5	Furnace Spring at Skyland	S	9/7/1999	12:45	Contam.	1999.7	Contam.	C	C	C	M	C	3.2	C	C	C
SNP-266	5	Furnace Spring at Skyland	S	9/9/1999	12:30	Contam.	1999.7	Contam.	C	C	C	M	C	2.7	C	C	C
SNP-271	5	Furnace Spring at Skyland	S	9/22/1999	12:09	Contam.	Contam.	Contam.	C	C	C	C	C	C	C	C	C
SNP-008	6	Skyland #2 (W-1033)	W	4/2/1996	17:30	1988.5	1991.5	1989.5	7.8	3.5	1.0	4.8	2.5	2.0	6.8	1.0	1.0
SNP-094	6	Skyland #2 (W-1033)	W	8/28/1997	9:45	1993.5	1997.0	1991.0	4.2	4.2	4.5	0.7	0.7	4.0	6.7	3.0	1.0
SNP-232	6	Skyland #2 (W-1033)	W	8/17/1999	11:25	1999.6	1999.6	Contam.	M	C	2.1	M	C	4.6	C	C	C
SNP-009	7	Dundo Spring #29	S	4/3/1996	12:15	1987.5	1993.0	1989.5	8.8	1.5	1.0	3.3	4.0	2.5	6.8	0.5	1.0
SNP-120	7	Dundo Spring #29	S	9/10/1997	10:30	1991.0	1997.7	1997.7	6.7	6.7	2.5	M	C	0.7	0.0	C	3.7
SNP-014	8	Simmons Gap Spring	S	4/4/1996	12:40	1991.0	1997.0	1990.5	5.3	5.3	2.0	C	C	3.0	5.8	1.5	0.5
SNP-131	8	Simmons Gap Spring	S	9/16/1997	13:00	1989.5	C	1994.0	8.2	8.2	1.5	C	C	C	3.7	3.7	2.0
SNP-238	8	Simmons Gap Spring	S	8/18/1999	10:45	1989.5	1999.6	Contam.	10.1	6.0	2.0	M	C	3.1	C	C	C
SNP-017	9	Panorama Spring #13-3	S	4/5/1996	9:00	1989.5	1996.3	1996.3	6.8	6.8	1.5	M	0.0	1.3	M	C	2.3
SNP-018	10	Browntown Valley Overlook Spring	S	4/5/1996	12:40	1987.0	1991.0	1990.5	9.3	1.0	1.5	5.3	2.5	2.0	5.8	1.5	1.0
SNP-103	10	Browntown Valley Overlook Spring	S	9/2/1997	9:30	1988.0	1997.7	1992.5	9.7	1.5	1.0	M	C	1.7	5.2	5.2	2.0
SNP-123	10	Browntown Valley Overlook Spring	S	9/11/1997	16:30	1989.5	1997.7	1994.0	8.2	8.2	1.5	M	C	0.7	3.7	3.7	3.0
SNP-139	10	Browntown Valley Overlook Spring	S	9/18/1997	13:30	1987.5	1997.7	1992.0	10.2	1.5	1.0	M	C	3.2	5.7	2.0	1.5

Table 8. Summary of chlorofluorocarbon-based apparent recharge dates, ages, and uncertainties--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	Model CFC-11 Rech. Date	Model CFC-12 Rech. Date	Model CFC-113 Rech. Date	CFC-11 Age (years)	CFC-11 +1° C Age Errors (years)	CFC-11 -1° C Age Errors (years)	CFC-12 Age (years)	CFC-12 +1° C Age Errors (years)	CFC-12 -1° C Age Errors (years)	CFC-113 Age (years)	CFC-113 +1° C Age Errors (years)	CFC-113 -1° C Age Errors (years)
SNP-184	10	Browntown Valley Overlook Spring	S	3/3/1999	10:00	1987.5	1994.0	1990.5	11.7	1.5	1.0	5.2	3.0	2.5	8.7	5.5	1.0
SNP-189	10	Browntown Valley Overlook Spring	S	4/2/1999	15:00	1988.5	Contam.	1998.0	10.8	8.0	1.0	C	C	C	1.3	C	8.0
SNP-193	10	Browntown Valley Overlook Spring	S	4/28/1999	10:30	1988.5	1999.3	1994.0	10.8	9.0	1.5	M	C	2.3	5.3	5.3	-4.0
SNP-198	10	Browntown Valley Overlook Spring	S	5/27/1999	9:05	1999.4	1997.0	Contam.	M	0.0	9.9	2.4	2.4	3.5	C	C	C
SNP-204	10	Browntown Valley Overlook Spring	S	6/24/1999	11:55	1995.5	1997.0	Contam.	4.0	4.0	6.5	2.5	2.5	3.0	C	C	C
SNP-219	10	Browntown Valley Overlook Spring	S	7/14/1999	14:35	Contam.	1997.0	Contam.	C	C	C	2.5	2.5	4.0	C	C	C
SNP-225	10	Browntown Valley Overlook Spring	S	8/12/1999	9:20	1999.6	1997.0	Contam.	M	C	2.1	2.6	2.6	4.0	C	C	C
SNP-262	10	Browntown Valley Overlook Spring	S	9/7/1999	16:30	1985.0	1991.0	Contam.	14.7	1.5	1.0	8.7	2.5	2.0	C	C	C
SNP-268	10	Browntown Valley Overlook Spring	S	9/10/1999	8:25	1985.5	1997.0	Contam.	14.2	1.5	1.0	2.7	2.7	4.0	C	C	C
SNP-273	10	Browntown Valley Overlook Spring	S	9/22/1999	15:45	1985.5	1997.0	Contam.	14.2	1.0	1.5	2.7	2.7	3.5	C	C	C
SNP-021	11	Camp Hoover Spring #2	S	4/8/1996	14:30	1987.5	1992.5	1989.5	8.8	1.0	1.0	3.8	4.0	2.5	6.8	0.5	1.0
SNP-116	11	Camp Hoover Spring #2	S	9/9/1997	14:00	1997.7	C	1997.7	M	0.0	8.2	C	C	C	M	C	3.7
SNP-234	11	Camp Hoover Spring #2	S	8/17/1999	14:35	1989.0	1999.6	Contam.	10.6	6.5	1.5	M	C	3.6	C	C	C
SNP-022	12	Davids Spring	S	4/8/1996	17:15	1987.5	1992.0	1994.0	8.8	1.5	1.0	4.3	4.0	2.0	2.3	0.0	2.5
SNP-110	12	Davids Spring	S	9/4/1997	18:00	1989.5	C	C	8.2	8.2	1.5	C	C	C	C	C	C
SNP-243	12	Davids Spring	S	8/20/1999	11:05	1999.6	Contam.	Contam.	M	0.0	10.1	C	C	C	C	C	C
SNP-024	13	Dickeys Ridge Spring	S	4/10/1996	11:30	1989.0	1997.0	1990.0	7.3	4.5	1.5	C	C	3.5	6.3	1.0	1.0
SNP-129	13	Dickeys Ridge Spring	S	9/12/1997	10:00	1993.5	1997.7	1994.0	4.2	4.2	4.5	M	C	0.7	3.7	C	2.0
SNP-130	13	Dickeys Ridge Spring	S	9/12/1997	9:45	1988.0	1997.7	1991.5	9.7	1.5	1.0	M	C	0.7	6.2	2.5	1.5
SNP-246	13	Dickeys Ridge Spring (pipe 2)	S	8/20/1999	17:00	1988.5	1999.6	Contam.	11.1	9.0	1.0	M	C	3.6	C	C	C
SNP-025	14	Gravel Spring NE	S	4/10/1996	14:30	1989.0	1992.0	1989.5	7.3	3.0	1.5	4.3	4.0	2.0	6.8	1.0	0.5
SNP-101	14	Gravel Spring NE	S	9/2/1997	11:00	1987.5	1992.5	1997.7	10.2	1.5	1.0	5.2	3.5	2.5	0.0	C	3.7
SNP-026	15	Pass Mountain Overlook Spring	S	4/10/1996	17:50	1991.0	1994.0	1990.5	5.3	5.3	2.5	2.3	3.0	2.5	5.8	1.5	1.0
SNP-100	15	Pass Mountain Overlook Spring	S	9/2/1997	16:00	1997.7	1997.7	1997.7	M	C	6.7	M	0.0	2.7	M	C	3.7
SNP-027	16	Swift Run Gap Spring #27	S	4/11/1996	10:00	1990.0	1994.0	1990.5	6.3	6.3	2.0	2.3	3.0	2.5	5.8	5.5	1.0
SNP-133	16	Swift Run Gap Spring #27	S	9/16/1997	10:30	1989.0	C	1994.0	8.7	3.0	1.5	C	C	C	3.7	3.7	3.0
SNP-239	16	Swift Run Gap Spring #27	S	8/19/1999	13:45	1988.0	1997.0	Contam.	11.6	1.5	1.0	2.6	2.6	3.0	C	C	C
SNP-028	17	Dean Mountain/South River Spring	S	4/11/1996	12:00	1987.0	1990.0	1989.5	9.3	1.0	1.5	6.3	2.5	1.5	6.8	1.5	0.5
SNP-115	17	Dean Mountain/South River Spring	S	9/5/1997	14:00	1988.5	1996.5	1992.0	9.2	3.0	1.0	1.2	1.2	4.0	5.7	2.0	1.5
SNP-240	17	Dean Mountain/South River Spring	S	8/19/1999	15:40	1987.5	1997.0	Contam.	12.1	1.0	1.0	2.6	2.6	4.0	C	C	C
SNP-029	18	Baldface Mountain Spring	S	4/11/1996	14:00	1989.0	1991.5	1989.5	7.3	4.5	1.5	4.8	2.5	2.0	6.8	0.5	1.0
SNP-030	19	Hazeltop Ridge Overlook Spring	S	4/11/1996	18:30	1990.5	1996.5	1992.5	5.8	5.8	2.5	0.0	0.0	4.0	3.8	3.8	2.0
SNP-032	20	Byrds Nest #4/Beahms Gap Spring	S	4/12/1996	9:40	1989.5	1992.5	1990.0	6.8	4.0	2.0	3.8	4.0	2.5	6.3	1.5	1.0
SNP-104	20	Byrds Nest #4/Beahms Gap Spring	S	9/3/1997	12:00	1988.0	1997.0	1991.5	9.7	1.5	1.0	0.7	0.7	3.5	6.2	2.5	1.5
SNP-242	20	Byrds Nest #4/Beahms Gap Spring	S	8/20/1999	8:45	1988.5	1999.6	Contam.	11.1	9.0	1.0	M	0.0	5.1	C	C	C
SNP-034	21	Byrds Nest #3 Spring	S	4/12/1996	15:20	1988.0	1994.5	1991.0	8.3	1.5	0.5	1.8	2.5	3.0	5.3	3.0	1.0
SNP-109	21	Byrds Nest #3 Spring	S	9/4/1997	8:30	1988.0	1994.0	1990.5	9.7	1.5	1.0	3.7	3.0	2.5	7.2	1.5	1.0
SNP-127	21	Byrds Nest #3 Spring	S	9/11/1997	14:30	1989.0	1997.0	1992.5	8.7	4.5	1.5	0.7	0.7	3.5	5.2	5.2	2.0
SNP-138	21	Byrds Nest #3 Spring	S	9/18/1997	11:00	1990.5	1997.7	1994.0	7.2	7.2	2.5	M	0.0	3.2	3.7	3.7	3.0
SNP-183	21	Byrds Nest #3 Spring	S	3/2/1999	16:50	1988.5	1996.0	1998.0	10.7	9.0	1.0	3.2	3.2	3.5	1.2	C	8.0
SNP-188	21	Byrds Nest #3 Spring	S	4/2/1999	12:50	1999.3	1999.3	1989.5	M	C	3.8	M	C	3.3	9.8	1.0	1.0
SNP-194	21	Byrds Nest #3 Spring	S	4/28/1999	17:25	1988.5	1997.0	1998.0	10.8	9.0	1.0	2.3	2.3	3.5	1.3	C	8.0

Table 8. Summary of chlorofluorocarbon-based apparent recharge dates, ages, and uncertainties--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	Model CFC-11 Rech. Date	Model CFC-12 Rech. Date	Model CFC-113 Rech. Date	CFC-11 Age (years)	CFC-11 +1° C Age Errors (years)	CFC-11 -1° C Age Errors (years)	CFC-12 Age (years)	CFC-12 +1° C Age Errors (years)	CFC-12 -1° C Age Errors (years)	CFC-113 Age (years)	CFC-113 +1° C Age Errors (years)	CFC-113 -1° C Age Errors (years)
SNP-199	21	Byrds Nest #3 Spring	S	5/27/1999	11:22	1987.5	1996.0	Contam.	11.9	1.5	1.0	3.4	3.4	3.5	C	C	C
SNP-203	21	Byrds Nest #3 Spring	S	6/24/1999	9:05	1987.0	1994.0	Contam.	12.5	1.5	1.0	5.5	3.0	2.5	C	C	C
SNP-218	21	Byrds Nest #3 Spring	S	7/14/1999	11:34	1987.5	1996.5	Contam.	12.0	1.5	1.0	3.0	3.0	4.0	C	C	C
SNP-226	21	Byrds Nest #3 Spring	S	8/12/1999	12:00	1989.0	1997.0	Contam.	10.6	7.0	1.5	2.6	2.6	3.0	C	C	C
SNP-261	21	Byrds Nest #3 Spring	S	9/7/1999	14:20	Contam.	1997.0	Contam.	C	C	C	2.7	2.7	3.5	C	C	C
SNP-267	21	Byrds Nest #3 Spring	S	9/9/1999	14:30	1987.5	1997.0	Contam.	12.2	1.0	1.5	2.7	2.7	3.5	C	C	C
SNP-272	21	Byrds Nest #3 Spring	S	9/22/1999	13:45	1988.0	Contam.	Contam.	11.7	10.5	1.0	C	C	C	C	C	C
SNP-035	22	Big Meadows #9 Well	W	4/15/1996	11:20	1987.5	1991.5	1990.0	8.8	1.5	1.0	4.8	3.0	2.0	6.3	1.0	1.0
SNP-096	22	Big Meadows #9 Well	W	8/28/1997	13:30	1991.5	1997.7	1994.0	6.2	6.2	3.0	M	C	0.7	3.7	3.7	2.0
SNP-036	23	Big Meadows #14 Well	W	4/15/1996	14:00	1990.0	1993.0	1989.0	6.3	6.3	2.0	3.3	4.0	2.5	7.3	1.0	0.5
SNP-092	23	Big Meadows #14 Well	W	8/28/1997	11:30	1989.0	1991.5	1990.0	8.7	4.5	1.5	6.2	3.0	2.0	7.7	1.0	1.0
SNP-233	23	Big Meadows #14 Well	W	8/17/1999	12:50	1986.0	1991.0	Contam.	13.6	1.0	1.0	8.6	3.0	2.0	C	C	C
SNP-038	24	Hogback Spring #5	S	4/16/1996	11:45	1988.0	1993.5	1991.0	8.3	2.5	1.0	2.8	3.5	2.5	5.3	3.0	1.0
SNP-039	25	Elkwallow Well (W-1703)	W	4/16/1996	16:00	1987.0	1992.0	1989.5	9.3	0.5	1.5	4.3	4.0	2.0	6.8	1.0	1.0
SNP-086	25	Elkwallow Well (W-1703)	W	8/26/1997	18:30	1988.0	1992.5	1990.5	9.7	1.5	1.0	5.2	3.5	2.5	7.2	1.5	1.0
SNP-228	25	Elkwallow Well (W-1703)	W	8/16/1999	11:45	1986.5	1993.5	Contam.	13.1	1.0	1.0	6.1	3.5	3.0	C	C	C
SNP-041	26	Hightop Hut Spring	S	4/17/1996	15:15	1988.5	1997.0	1992.5	7.8	3.5	1.0	C	C	4.0	3.8	3.8	2.0
SNP-043	27	Pass Mountain Hut Spring	S	4/18/1996	9:15	1987.0	1991.0	1989.5	9.3	1.0	1.0	5.3	3.0	1.5	6.8	0.5	1.0
SNP-105	27	Pass Mountain Hut Spring	S	9/3/1997	14:10	1987.5	1993.0	1990.5	10.2	1.0	1.0	4.7	4.0	3.0	7.2	1.5	1.0
SNP-048	31	Dickeys Ridge Well (W-1346)	W	4/19/1996	14:40	1974.0	1974.0	1979.0	22.3	0.5	0.5	22.3	0.5	0.5	17.3	0.5	0.5
SNP-084	31	Dickeys Ridge Well (W-1346)	W	8/26/1997	10:50	1974.0	1973.5	1980.0	23.7	0.5	0.5	24.2	0.5	0.5	17.7	0.5	0.5
SNP-230	31	Dickeys Ridge Well (W-1346)	W	8/16/1999	16:15	1975.0	1975.5	1985.0	24.6	0.5	0.5	24.1	0.5	1.0	14.6	0.5	0.5
SNP-050	33	Domestic well #1	W	4/24/1996	9:50	1978.0	1985.5	1985.0	18.3	0.5	1.5	10.8	1.0	1.5	11.3	0.5	0.5
SNP-051	34	Domestic well #2	W	4/24/1996	14:55	1975.0	1987.5	1982.5	21.3	0.0	0.5	8.8	1.0	1.0	13.8	0.5	1.0
SNP-052	35	White Oak Cabin Spring	S	4/25/1996	10:35	1988.0	1995.0	1990.5	8.3	1.5	1.0	1.3	1.3	3.5	5.8	2.0	1.0
SNP-111	35	White Oak Cabin Spring	S	9/4/1997	15:55	1989.0	C	C	8.7	4.5	1.5	C	C	C	C	C	C
SNP-053	36	Big Meadows #1 Well (W-1701)	W	4/25/1996	16:30	1989.5	C	1985.0	6.8	6.8	1.5	C	C	C	11.3	0.5	0.5
SNP-083	36	Big Meadows #1 Well (W-1701)	W	9/17/1997	16:30	1988.0	C	1986.5	9.7	2.5	1.0	C	C	C	11.2	0.5	0.5
SNP-037	37	HQ #2 Well (W-851)	W	4/16/1996	9:45	1984.5	C	1989.5	11.8	1.0	1.0	C	C	C	6.8	0.5	1.0
SNP-087	37	HQ #2 Well (W-851)	W	8/27/1997	10:30	1978.5	1988.5	1988.5	19.2	1.0	1.0	9.2	1.5	1.5	9.2	0.5	0.5
SNP-007	38	Skyland #5	W	4/2/1996	16:00	C	C	C	C	C	C	C	C	C	C	C	C
SNP-088	38	Skyland #5	W	8/27/1997	17:10	1997.7	1997.7	1994.0	0.0	C	2.2	M	C	1.2	3.7	0.0	2.5
SNP-005	39	Pinnacles Well (W-3288)	W	4/2/1996	12:00	1991.0	1996.3	1996.3	5.3	5.3	2.5	M	C	C	0.0	C	2.3
SNP-091	39	Pinnacles Well (W-3288)	W	8/27/1997	12:45	1990.5	C	C	7.2	7.2	2.5	C	C	C	C	C	C
SNP-019	40	Mathews Arm Spring	S	4/5/1996	14:35	1986.0	1991.0	1989.0	10.3	1.0	1.0	5.3	3.0	2.0	7.3	0.5	0.5
SNP-102	40	Mathews Arm Spring	S	9/2/1997	13:30	1988.5	1993.5	1991.0	9.2	2.5	1.5	4.2	3.5	2.5	6.7	3.0	1.0
SNP-031	41	Lewis Mountain Spring #25-2	S	4/11/1996	16:30	1991.0	1996.0	1991.5	5.3	5.3	2.5	0.3	0.3	3.5	4.8	2.5	1.5
SNP-054	42	Old Rag Shelter Spring	S	4/26/1996	14:30	1996.3	1997.0	1994.0	M	C	5.3	C	C	3.5	2.3	2.3	2.0
SNP-118	42	Old Rag Shelter Spring	S	9/9/1997	18:00	1997.7	1997.7	1997.7	M	0.0	8.2	M	C	0.7	M	C	3.7
SNP-015	43	Loft Mountain Overlook Spring	S	4/4/1996	15:30	1991.0	M	1990.5	5.3	5.3	3.0	C	C	C	5.8	2.5	1.0
SNP-121	43	Loft Mountain Overlook Spring	S	9/10/1997	17:00	1991.0	1997.7	1997.7	6.7	6.7	2.5	M	C	0.7	M	C	3.7
SNP-016	44	Loft Mountain Spring	S	4/4/1996	17:30	1987.0	1992.5	1989.5	9.3	1.0	1.0	3.8	3.5	2.5	6.8	0.5	1.0

Table 8. Summary of chlorofluorocarbon-based apparent recharge dates, ages, and uncertainties--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	Model CFC-11 Rech. Date	Model CFC-12 Rech. Date	Model CFC-113 Rech. Date	CFC-11 Age (years)	CFC-11 +1° C Age Errors (years)	CFC-11 -1° C Age Errors (years)	CFC-12 Age (years)	CFC-12 +1° C Age Errors (years)	CFC-12 -1° C Age Errors (years)	CFC-113 Age (years)	CFC-113 +1° C Age Errors (years)	CFC-113 -1° C Age Errors (years)
SNP-122	44	Loft Mountain Spring	S	9/10/1997	15:00	1993.0	C	C	4.7	4.7	3.5	C	C	C	C	C	C
SNP-013	45	Simmons Gap Well (W-1704)	W	4/4/1996	9:30	C	C	1985.5	C	C	C	C	C	C	10.8	0.5	0.5
SNP-099	45	Simmons Gap Well (W-1704)	W	8/29/1997	10:00	C	C	1985.0	C	C	C	C	C	C	12.7	0.5	0.5
SNP-137	46	Yeager's Spring (Luray)	S	9/17/1997	13:10	C	C	C	C	C	C	C	C	C	C	C	C
SNP-248	46	Yeager's Spring (Luray)	S	8/23/1999	11:20	Contam.	Contam.	Contam.	C	C	C	C	C	C	C	C	C
SNP-042	47	Lewis Mountain Well (W-1072)	W	4/17/1996	18:20	1989.0	1993.5	1991.0	7.3	3.0	1.5	2.8	3.5	2.5	5.3	3.0	1.0
SNP-095	47	Lewis Mountain Well (W-1072)	W	8/28/1997	15:45	1991.0	C	C	6.7	6.7	2.5	C	C	C	C	C	C
SNP-140	47	Lewis Mountain Well (W-1072)	W	9/19/1997	9:30	1987.5	1997.0	1990.5	10.2	1.5	1.0	0.7	0.7	4.5	7.2	1.5	1.0
SNP-170	48	Bear Lithia Spring	S	9/8/1997	17:15	1974.0	1974.5	C	24.0	ND	ND	24.0	ND	ND	ND	ND	ND
SNP-255	48	Bear Lithia Spring	S	9/2/1999	10:20	1972.5	1972.5	Contam.	27.2	0.5	0.5	27.2	0.5	0.5	C	C	C
SNP-046	49	Mathews Arm Well (W-856)	W	4/19/1996	10:40	1988.0	1993.0	1989.5	8.3	2.5	1.0	3.3	4.0	2.5	6.8	1.0	0.5
SNP-085	49	Mathews Arm Well (W-856)	W	8/26/1997	15:05	1986.0	1990.5	1989.0	11.7	1.0	1.0	7.2	2.5	2.0	8.7	1.0	0.5
SNP-229	49	Mathews Arm Well (W-856)	W	8/16/1999	13:10	1984.5	1993.0	Contam.	15.1	1.5	1.0	6.6	4.0	3.0	C	C	C
SNP-011	50	Loft Mountain Well #1 (W-715)	W	4/3/1996	15:45	1979.5	1982.0	1984.0	16.8	1.5	1.0	14.3	1.0	1.0	12.3	0.5	0.5
SNP-098	50	Loft Mountain Well #1 (W-715)	W	8/29/1997	14:00	1977.5	1980.0	1983.0	20.2	1.0	1.0	17.7	1.0	1.5	14.7	0.5	0.5
SNP-235	50	Loft Mountain Well #1 (W-715)	W	8/17/1999	18:15	1978.0	1980.0	1986.5	21.6	1.5	0.5	19.6	1.0	1.0	13.1	0.5	0.5
SNP-010	51	Loft Mountain Well #2 (W-754)	W	4/3/1996	14:30	1983.0	1987.5	C	13.3	1.5	1.0	8.8	1.0	1.0	C	C	C
SNP-097	51	Loft Mountain Well #2 (W-754)	W	8/29/1997	12:30	1982.0	1988.0	C	15.7	1.0	1.5	9.7	2.0	1.0	C	C	C
SNP-236	51	Loft Mountain Well #2 (W-754)	W	8/18/1999	8:35	1982.5	1979.5	Contam.	17.1	1.0	1.5	20.1	1.5	1.0	C	C	C
SNP-012	52	Ivy Creek Shelter Spring	S	4/3/1996	18:00	1982.0	1984.5	1986.0	14.3	1.0	1.5	11.8	1.5	1.0	10.3	0.5	0.5
SNP-119	52	Ivy Creek Shelter Spring	S	9/10/1997	12:00	1987.0	1993.0	1992.0	10.7	1.0	1.0	4.7	4.0	2.5	5.7	2.0	1.5
SNP-237	52	Ivy Creek Shelter Spring	S	8/18/1999	10:20	1987.0	1994.0	Contam.	12.6	1.0	1.5	5.6	3.0	2.5	C	C	C
SNP-113	53	Lewis Mountain Spring #25	S	9/5/1997	9:30	1988.0	1995.0	1991.5	9.7	1.5	1.0	2.7	2.7	3.5	6.2	2.5	1.5
SNP-241	53	Lewis Mountain Spring #25	S	8/19/1999	18:05	1988.5	1999.6	Contam.	11.1	8.5	1.0	M	C	3.6	C	C	C
SNP-033	54	Elkwallow Spring #8	S	4/12/1996	12:30	1996.3	1997.0	1994.0	M	C	5.3	C	C	2.5	2.3	2.3	2.5
SNP-106	54	Elkwallow Spring #8	S	9/3/1997	9:00	1989.0	1997.0	1994.0	8.7	4.5	1.5	0.7	0.7	3.0	3.7	3.7	3.0
SNP-244	54	Elkwallow Spring #8	S	8/20/1999	13:50	1988.0	1997.0	Contam.	11.6	1.5	1.0	2.6	2.6	3.5	C	C	C
SNP-136	55	Hite Spring (Luray)	S	9/17/1997	11:40	1974.0	1980.5	1986.5	23.7	0.0	0.5	17.2	1.0	1.0	11.2	0.5	0.5
SNP-247	55	Hite Spring (Luray)	S	8/23/1999	8:56	1973.5	1976.0	1990.5	26.1	0.5	0.5	23.6	0.5	0.5	9.1	6.5	1.0
SNP-040	56	HQ Spring #14-1	S	4/17/1996	9:15	1983.5	1988.0	1988.5	12.8	1.5	1.0	8.3	1.5	1.0	7.8	0.5	0.5
SNP-117	56	HQ Spring #14-1	S	9/9/1997	9:10	1984.0	1987.5	1988.0	13.7	1.0	1.5	10.2	1.5	0.5	9.7	0.5	0.5
SNP-249	56	HQ Spring #14-1	S	8/23/1999	14:10	1982.0	1985.5	1991.0	17.6	1.0	1.5	14.1	1.0	1.0	8.6	3.0	1.0
SNP-023	57	Indian Run Shelter Spring	S	4/9/1996	13:00	1989.5	1996.3	1991.0	6.8	6.8	1.5	M	C	1.3	5.3	3.0	1.0
SNP-128	57	Indian Run Shelter Spring	S	9/12/1997	13:30	1990.0	1997.7	1994.0	7.7	7.7	2.0	M	C	0.7	3.7	3.7	2.0
SNP-251	57	Indian Run Shelter Spring	S	8/23/1999	18:15	1987.5	1997.0	Contam.	12.1	2.0	0.5	2.6	2.6	4.0	C	C	C
SNP-252	58	Town of Elkton Spring	S	9/1/1999	10:25	1966.5	1966.0	1979.5	33.2	0.0	0.5	33.7	0.0	0.5	20.2	0.5	0.5
SNP-253	59	Town of Elkton well	W	9/1/1999	11:15	Contam.	Contam.	Contam.	C	C	C	C	C	C	C	C	C
SNP-254	60	Town of Grottoes #2	W	9/1/1999	15:00	1966.0	1968.5	1982.0	33.7	0.0	0.5	31.2	0.0	0.5	17.7	1.0	0.5
SNP-256	61	Blue Ridge School #5	W	9/2/1999	12:30	1961.0	1984.5	1990.0	38.7	0.5	0.0	15.2	1.0	1.0	9.7	8.0	1.0
SNP-257	62	Town of Washington #3	W	9/2/1999	15:45	1957.5	1982.5	1975.5	42.2	0.5	0.5	17.2	1.0	1.0	24.2	0.5	0.5
SNP-263	63	Mountain side Market	W	9/8/1999	9:00	1974.0	1981.0	1986.0	25.7	0.5	0.5	18.7	1.0	1.0	13.7	0.5	0.5
SNP-134	64	Hudson Spring (Luray)	S	9/17/1997	9:45	1971.0	1971.0	1972.0	26.7	0.5	0.5	26.7	0.5	0.0	25.7	0.5	0.5

Table 8. Summary of chlorofluorocarbon-based apparent recharge dates, ages, and uncertainties--Continued

SNP No	Site ID	Site Name	W/S	Date	Time	Model CFC-11 Rech. Date	Model CFC-12 Rech. Date	Model CFC-113 Rech. Date	CFC-11 Age (years)	CFC-11 +1° C Age Errors (years)	CFC-11 -1° C Age Errors (years)	CFC-12 Age (years)	CFC-12 +1° C Age Errors (years)	CFC-12 -1° C Age Errors (years)	CFC-113 Age (years)	CFC-113 +1° C Age Errors (years)	CFC-113 -1° C Age Errors (years)
SNP-180	64	Hudson Spring (Luray)	S	3/2/1999	10:10	1969.5	1971.0	1972.5	29.7	0.5	0.5	28.2	0.5	0.5	26.7	0.5	0.5
SNP-185	64	Hudson Spring (Luray)	S	4/2/1999	8:40	1969.5	1971.0	1971.5	29.8	0.0	0.5	28.3	0.5	0.5	27.8	0.5	0.5
SNP-190	64	Hudson Spring (Luray)	S	4/27/1999	9:40	1970.0	1972.5	1974.5	29.3	0.5	0.5	26.8	0.5	0.5	24.8	0.5	0.5
SNP-195	64	Hudson Spring (Luray)	S	5/26/1999	10:00	1975.0	1975.0	1988.5	24.4	0.5	0.5	24.4	0.5	1.0	10.9	0.5	0.5
SNP-200	64	Hudson Spring (Luray)	S	6/23/1999	9:30	1969.0	1971.0	Contam.	30.5	0.0	0.5	28.5	0.5	0.5	C	C	C
SNP-217	64	Hudson Spring (Luray)	S	7/14/1999	9:30	1970.0	1971.0	Contam.	29.5	0.0	0.5	28.5	0.5	0.5	C	C	C
SNP-222	64	Hudson Spring (Luray)	S	8/11/1999	9:15	1970.0	1971.0	1983.0	29.6	0.0	0.5	28.6	0.5	0.0	16.6	0.5	0.5
SNP-258	64	Hudson Spring (Luray)	S	9/7/1999	9:30	1970.0	1971.0	1984.0	29.7	0.0	0.5	28.7	0.5	0.0	15.7	0.5	0.5
SNP-264	64	Hudson Spring (Luray)	S	9/9/1999	9:05	1972.0	1975.0	Contam.	27.7	0.5	0.5	24.7	0.5	0.5	C	C	C
SNP-269	64	Hudson Spring (Luray)	S	9/22/1999	9:00	1971.0	1972.0	1983.5	28.7	0.0	0.5	27.7	0.5	0.5	16.2	0.5	0.5
SNP-020	65	Lewis Spring	S	4/8/1996	10:30	1991.0	C	1993.0	5.3	5.3	2.5	C	C	C	3.3	1.0	2.5
SNP-093	65	Lewis Spring	S	8/28/1997	17:05	1997.7	C	1992.5	M	C	4.2	C	C	C	5.2	1.5	2.0
SNP-124	65	Lewis Spring	S	9/11/1997	9:35	1997.7	C	1994.0	M	0.0	8.2	C	C	C	3.7	3.7	3.0
SNP-126	65	Lewis Spring	S	9/11/1997	10:50	1997.7	C	1994.0	M	C	6.7	C	C	C	3.7	3.7	3.0
SNP-135	65	Lewis Spring	S	9/17/1997	16:00	1997.7	C	1993.0	M	0.0	8.2	C	C	C	4.7	4.7	2.5
SNP-181	65	Lewis Spring	S	3/2/1999	12:30	1989.0	1999.2	1990.0	10.2	6.5	1.5	M	C	2.2	9.2	1.0	1.0
SNP-186	65	Lewis Spring	S	4/2/1999	10:10	1989.0	Contam.	1991.0	10.3	6.5	1.5	C	C	C	8.3	3.0	1.0
SNP-191	65	Lewis Spring	S	4/27/1999	13:00	1998.0	Contam.	1998.0	1.3	1.3	10.0	C	C	C	1.3	C	8.0
SNP-196	65	Lewis Spring	S	5/26/1999	12:55	1999.4	Contam.	Contam.	M	C	0.0	C	C	C	C	C	C
SNP-201	65	Lewis Spring	S	6/23/1999	11:50	1999.5	Contam.	Contam.	M	C	2.5	C	C	C	C	C	C
SNP-220	65	Lewis Spring	S	7/15/1999	9:25	1995.5	Contam.	Contam.	4.0	4.0	6.5	C	C	C	C	C	C
SNP-223	65	Lewis Spring	S	8/11/1999	11:35	1999.6	Contam.	Contam.	M	0.0	10.1	C	C	C	C	C	C
SNP-259	65	Lewis Spring	S	9/7/1999	11:00	1999.7	Contam.	Contam.	M	C	1.7	C	C	C	C	C	C
SNP-265	65	Lewis Spring	S	9/9/1999	10:40	1999.7	Contam.	Contam.	M	C	0.0	C	C	C	C	C	C
SNP-270	65	Lewis Spring	S	9/22/1999	10:40	1999.7	Contam.	Contam.	M	C	3.2	C	C	C	C	C	C
VR-01	66	Town of Stanley # 3	W	7/6/1999	12:30	1950.7	1940.0	1961.1	48.8	ND	ND	59.5	ND	ND	38.4	ND	ND
VR-02	67	Town of Shenandoah # 5	W	7/6/1999	16:15	1969.0	1967.7	1973.2	30.5	ND	ND	31.8	ND	ND	26.3	ND	ND
VR-03	68	Wanyesboro Jefferson Rd # 1	W	7/7/1999	10:35	1975.0	1978.2	C	24.5	ND	ND	21.3	ND	ND	C	ND	ND
VR-04	69	Coyner Spring	S	7/7/1999	14:00	1973.0	1972.8	C	26.5	ND	ND	26.7	ND	ND	C	ND	ND
VR-06	71	Town of Shenandoah # 2	W	7/8/1999	16:20	1971.3	1977.8	C	28.2	ND	ND	21.7	ND	ND	C	ND	ND
VR-07	72	Town of Shenandoah # 3	W	7/8/1999	18:20	1967.0	1972.3	C	32.5	ND	ND	27.2	ND	ND	C	ND	ND
VR-08	73	Town of Stanley # 6	W	7/9/1999	10:15	1962.1	1968.1	1988.5	37.4	ND	ND	31.4	ND	ND	11.0	ND	ND
VR-09	74	Town of Stanley # 5	W	7/9/1999	13:00	1966.5	1969.3	1975.3	33.0	ND	ND	30.3	ND	ND	24.3	ND	ND
VR-10	75	Town of Stanley # 4	W	7/9/1999	15:00	1971.3	1974.3	1973.5	28.2	ND	ND	25.2	ND	ND	26.0	ND	ND
VR-11	76	Town of Stanley # 2	W	7/9/1999	16:45	1949.0	1947.0	1967.3	50.5	ND	ND	52.5	ND	ND	32.2	ND	ND

[1] Dates and ages are based on the N.A. data of Table 9.

Table 9. Concentrations of chlorofluorocarbons and sulfur hexafluoride in North American (N.A.) air

[W, well; S, spring; CFC-11, (trichlorofluoromethane, $CFCl_3$); CFC-12, (dichlorodifluoromethane, CF_2Cl_2); CFC-113, (trichlorotrifluoroethane, $C_2F_3Cl_3$); SF_6, sulfur hexafluoride; pptv, parts per trillion by volume]

Year	CFC-12 pptv	CFC-11 pptv	CFC-113 pptv	SF_6 pptv
1930.0	0.000	0.000	0.000	0.054
1930.5	0.000	0.000	0.000	0.054
1931.0	0.003	0.000	0.000	0.054
1931.5	0.005	0.000	0.000	0.054
1932.0	0.008	0.000	0.000	0.054
1932.5	0.011	0.000	0.000	0.054
1933.0	0.014	0.000	0.000	0.054
1933.5	0.016	0.000	0.000	0.054
1934.0	0.022	0.000	0.000	0.054
1934.5	0.027	0.000	0.000	0.054
1935.0	0.035	0.000	0.000	0.054
1935.5	0.043	0.000	0.000	0.054
1936.0	0.057	0.000	0.000	0.054
1936.5	0.070	0.000	0.000	0.054
1937.0	0.092	0.000	0.000	0.054
1937.5	0.114	0.000	0.000	0.054
1938.0	0.146	0.002	0.000	0.054
1938.5	0.178	0.005	0.000	0.054
1939.0	0.224	0.007	0.000	0.054
1939.5	0.270	0.010	0.000	0.054
1940.0	0.332	0.012	0.000	0.054
1940.5	0.394	0.014	0.000	0.054
1941.0	0.474	0.016	0.000	0.054
1941.5	0.554	0.019	0.000	0.054
1942.0	0.653	0.021	0.000	0.054
1942.5	0.752	0.023	0.000	0.054
1943.0	0.872	0.028	0.000	0.054
1943.5	0.992	0.032	0.007	0.054
1944.0	1.155	0.037	0.013	0.054
1944.5	1.318	0.041	0.028	0.054
1945.0	1.531	0.048	0.043	0.054
1945.5	1.745	0.055	0.059	0.054
1946.0	2.118	0.069	0.075	0.054
1946.5	2.491	0.082	0.093	0.054
1947.0	3.063	0.113	0.110	0.054
1947.5	3.636	0.143	0.131	0.054
1948.0	4.299	0.197	0.152	0.054
1948.5	4.963	0.251	0.174	0.054
1949.0	5.670	0.339	0.196	0.054
1949.5	6.377	0.428	0.222	0.054
1950.0	7.157	0.556	0.249	0.054
1950.5	7.937	0.684	0.279	0.054
1951.0	8.790	0.859	0.308	0.054
1951.5	9.643	1.035	0.343	0.054
1952.0	10.524	1.288	0.377	0.054
1952.5	11.406	1.542	0.415	0.054
1953.0	12.394	1.887	0.454	0.054
1953.5	13.383	2.231	0.497	0.054
1954.0	14.499	2.655	0.540	0.055
1954.5	15.616	3.079	0.591	0.055
1955.0	16.869	3.601	0.641	0.055
1955.5	18.121	4.122	0.699	0.056
1956.0	19.579	4.767	0.758	0.056
1956.5	21.036	5.412	0.823	0.057
1957.0	22.692	6.131	0.889	0.058
1957.5	24.348	6.850	0.964	0.059
1958.0	26.075	7.506	1.038	0.060
1958.5	27.801	8.162	1.125	0.061
1959.0	29.729	8.822	1.212	0.062

Table 9. Concentrations of chlorofluorocarbons and sulfur hexafluoride in N.A. air--Continued

Year	CFC-12 pptv	CFC-11 pptv	CFC-113 pptv	SF_6 pptv
1959.5	31.657	9.482	1.311	0.064
1960.0	33.960	10.360	1.409	0.066
1960.5	36.263	11.237	1.522	0.069
1961.0	38.836	12.375	1.634	0.072
1961.5	41.409	13.513	1.761	0.076
1962.0	44.365	14.948	1.888	0.079
1962.5	47.321	16.382	2.035	0.084
1963.0	50.783	18.138	2.182	0.088
1963.5	54.245	19.895	2.350	0.095
1964.0	58.268	21.976	2.518	0.101
1964.5	62.291	24.057	2.709	0.110
1965.0	66.825	26.416	2.901	0.118
1965.5	71.358	28.775	3.120	0.129
1966.0	76.389	31.398	3.339	0.139
1966.5	81.420	34.022	3.590	0.151
1967.0	87.089	36.984	3.840	0.162
1967.5	92.758	39.946	4.127	0.175
1968.0	99.106	43.310	4.414	0.187
1968.5	105.454	46.674	4.742	0.200
1969.0	112.509	50.573	5.071	0.212
1969.5	119.564	54.472	5.448	0.222
1970.0	127.258	58.886	5.825	0.233
1970.5	134.952	63.300	6.256	0.245
1971.0	143.160	68.113	6.687	0.255
1971.5	151.368	72.926	7.183	0.267
1972.0	160.293	78.336	7.680	0.281
1972.5	169.219	83.746	8.246	0.298
1973.0	179.091	89.927	8.813	0.317
1973.5	188.964	96.107	9.462	0.338
1974.0	199.607	102.860	10.112	0.362
1974.5	210.251	109.613	10.856	0.388
1975.0	220.405	115.310	11.600	0.416
1975.5	230.560	122.891	12.453	0.446
1976.0	240.250	129.753	13.306	0.479
1976.5	249.941	136.000	14.283	0.515
1977.0	259.020	143.000	15.261	0.552
1977.5	268.100	147.650	16.380	0.592
1978.0	277.850	150.927	17.499	0.634
1978.5	288.133	157.509	18.781	0.678
1979.0	293.282	160.825	20.063	0.725
1979.5	296.325	163.692	21.531	0.774
1980.0	306.192	169.667	22.999	0.825
1980.5	312.300	173.918	24.594	0.879
1981.0	317.525	177.127	26.189	0.935
1981.5	328.408	180.892	27.838	0.993
1982.0	338.058	185.033	29.488	1.054
1982.5	347.025	189.558	31.316	1.117
1983.0	355.758	194.542	33.144	1.182
1983.5	366.225	199.292	35.429	1.250
1984.0	372.478	203.242	37.713	1.320
1984.5	380.000	207.350	40.415	1.392
1985.0	389.000	212.592	43.118	1.466
1985.5	396.750	218.658	46.002	1.543
1986.0	407.933	224.417	48.887	1.622
1986.5	416.633	229.383	52.061	1.704
1987.0	426.591	234.967	55.235	1.788
1987.5	442.064	242.600	58.787	1.874
1988.0	452.058	250.250	62.339	1.962
1988.5	461.517	255.600	66.052	2.053
1989.0	468.975	259.100	69.765	2.146
1989.5	476.217	263.667	72.819	2.241
1990.0	484.967	267.642	75.874	2.339
1990.5	491.517	269.042	78.034	2.439
1991.0	495.592	270.592	80.194	2.541

Table 9. Concentrations of chlorofluorocarbons and sulfur hexafluoride in N.A. air--Continued

Year	CFC-12 pptv	CFC-11 pptv	CFC-113 pptv	SF6 pptv
1991.5	501.133	272.775	81.749	2.646
1992.0	510.517	273.500	83.100	2.752
1992.5	512.500	274.800	84.500	2.862
1993.0	517.000	275.100	85.000	2.973
1993.5	521.300	275.150	85.300	3.087
1994.0	526.300	275.100	85.400	3.203
1994.5	531.100	274.100	85.300	3.322
1995.0	533.500	274.080	85.200	3.442
1995.5	535.300	273.900	84.800	3.566
1996.0	537.300	273.000	84.500	3.691
1996.5	541.000	272.000	84.200	3.819
1997.0	543.000	271.000	83.700	3.949
1997.5	543.500	270.000	83.000	4.081
1998.0	544.000	269.000	82.700	4.216
1998.5	544.500	268.000	82.000	4.353
1999.0	544.800	267.000	81.700	4.492
1999.5	545.000	266.000	81.300	4.634
2000.0	545.000	265.000	81.000	4.778

Table 10. Summary of sulfur hexafluoride data in water samples from wells and springs

[W, well; S, spring; SF_6, sulfur hexafluoride; fg/L, femtograms per liter; pptv, parts per trillion by volume; ND, not determined; C, contaminated, SF_6 concentration higher than that of water in equilibrium with modern air; M, modern]

SNP No.	Site ID	Site Name	W/S	Date	Time	SF_6 Concentration in Water (fg/L)	Recharge Temp (°C)	SF_6 Partial Pressure (pptv)[1]	Excess Air (cc/L)	Model SF_6 Partial Pressure Remove Ex Air (pptv)[2]	Model SF_6 Recharge Date (years)[2]	Model SF_6 Age (years)[2]	Model SF_6 Age Error (years)[3]
SNP-001	1	HQ #1 Well (W-855)	W	4/1/1996	10:30	115.3	9.0	1.94	4.9	1.25	1983.0	13.3	0.5
SNP-090	1	HQ #1 Well (W-855)	W	8/27/1997	8:40	116.4	8.9	1.95	6.6	1.05	1981.3	16.4	0.4
SNP-227	1	HQ #1 Well (W-855)	W	8/16/1999	9:00	220.2	8.7	3.65	4.7	2.41	1989.5	10.1	0.5
SNP-002	2	HQ Spring #14-3 - above HQ on Rt 211	S	4/1/1996	13:00	156.4	8.6	2.64	0.1	2.61	1990.5	5.8	0.5
SNP-003	3	Hemlock Spring	S	4/1/1996	15:00	175.7	7.9	3.06	0.0	3.06	1992.5	3.8	0.5
SNP-108	3	Hemlock Spring	S	9/4/1997	12:00	219.2	8.4	3.91	0.0	3.91	1996.0	1.7	0.6
SNP-231	3	Hemlock Spring	S	8/17/1999	9:45	254.1	8.2	4.49	0.0	4.49	1998.0	1.6	0.8
SNP-004	4	Pinnacles Spring #16	S	4/2/1996	9:30	176.6	9.7	3.33	0.2	3.25	1993.5	2.8	0.8
SNP-112	4	Pinnacles Spring #16	S	9/4/1997	10:00	232.5	10.2	4.48	0.0	4.48	1997.8	-0.1	0.8
SNP-006	5	Furnace Spring at Skyland	S	4/2/1996	14:30	168.5	7.0	2.82	0.1	2.80	1991.5	4.8	0.5
SNP-089	5	Furnace Spring at Skyland	S	8/27/1997	18:35	230.7	7.3	3.92	0.0	3.92	1995.8	1.9	0.8
SNP-125	5	Furnace Spring at Skyland	S	9/11/1997	12:25	252.5	9.0	4.62	0.1	4.56	1998.0	-0.3	0.8
SNP-169	5	Furnace Spring at Skyland	S	9/18/1997	9:15	200.5	8.7	3.62	0.0	3.62	1995.0	4.2	0.5
SNP-182	5	Furnace Spring at Skyland	S	3/2/1999	14:35	262.4	7.5	4.50	0.0	4.50	1998.0	1.2	0.8
SNP-187	5	Furnace Spring at Skyland	S	4/2/1999	11:20	272.3	7.2	4.60	0.0	4.60	1998.5	0.8	0.8
SNP-192	5	Furnace Spring at Skyland	S	4/27/1999	14:40	264.3	7.9	4.61	0.1	4.56	1998.3	1.0	0.8
SNP-197	5	Furnace Spring at Skyland	S	5/26/1999	14:50	247.9	8.3	4.40	0.1	4.35	1997.5	1.9	0.8
SNP-202	5	Furnace Spring at Skyland	S	6/23/1999	13:40	271.1	7.7	4.68	0.0	4.68	1998.7	0.8	0.8
SNP-221	5	Furnace Spring at Skyland	S	7/15/1999	11:45	279.7	7.7	4.83	0.2	4.73	1998.8	0.8	0.9
SNP-224	5	Furnace Spring at Skyland	S	8/11/1999	13:30	246.8	8.3	4.38	0.1	4.33	1997.3	2.4	0.8
SNP-260	5	Furnace Spring at Skyland	S	9/7/1999	12:45	269.3	8.7	4.86	0.1	4.81	1999.0	0.7	0.8
SNP-266	5	Furnace Spring at Skyland	S	9/9/1999	12:30	261.3	8.3	4.64	0.0	4.64	1998.5	1.2	0.8
SNP-271	5	Furnace Spring at Skyland	S	9/22/1999	12:09	258.0	8.3	4.58	0.1	4.53	1998.0	1.7	0.8
SNP-008	6	Skyland #2 (W-1033)	W	4/2/1996	17:30	166.5	7.0	2.80	0.1	2.77	1991.0	5.3	0.8
SNP-094	6	Skyland #2 (W-1033)	W	8/28/1997	9:45	238.9	9.5	4.49	0.9	4.04	1996.3	1.4	0.8
SNP-232	6	Skyland #2 (W-1033)	W	8/17/1999	11:25	251.6	9.8	4.78	1.4	4.08	1996.5	3.1	0.8
SNP-009	7	Dundo Spring #29	S	4/3/1996	12:15	176.4	7.4	2.95	0.1	2.92	1992.0	4.3	0.5
SNP-120	7	Dundo Spring #29	S	9/10/1997	10:30	188.8	12.1	3.85	0.2	3.75	1995.5	2.2	0.8
SNP-014	8	Simmons Gap Spring	S	4/4/1996	12:40	154.9	9.0	2.71	0.0	2.72	1991.0	5.3	0.6
SNP-131	8	Simmons Gap Spring	S	9/16/1997	13:00	250.7	9.7	4.54	0.0	4.54	1998.0	-0.3	0.8
SNP-238	8	Simmons Gap Spring	S	8/18/1999	10:45	247.0	9.7	4.47	0.0	4.47	1998.0	1.6	0.8
SNP-017	9	Panorama Spring #13-3	S	4/5/1996	9:00	167.1	10.2	3.11	0.4	2.97	1992.0	4.3	0.5
SNP-018	10	Browntown Valley Overlook Spring	S	4/5/1996	12:40	232.8	4.2	3.36	1.5	2.94	1992.0	4.3	0.5
SNP-103	10	Browntown Valley Overlook Spring	S	9/2/1997	9:30	259.7	7.3	4.33	0.2	4.23	1997.0	0.7	0.8
SNP-123	10	Browntown Valley Overlook Spring	S	9/11/1997	16:30	256.4	8.8	4.54	0.7	4.22	1997.0	0.7	0.8
SNP-139	10	Browntown Valley Overlook Spring	S	9/18/1997	13:30	278.6	7.6	4.70	0.3	4.55	1998.0	-0.3	0.8
SNP-184	10	Browntown Valley Overlook Spring	S	3/3/1999	10:00	278.3	6.8	4.53	0.1	4.48	1998.0	1.2	0.8
SNP-189	10	Browntown Valley Overlook Spring	S	4/2/1999	15:00	299.8	7.0	4.93	0.9	4.50	1998.0	1.3	0.8
SNP-193	10	Browntown Valley Overlook Spring	S	4/28/1999	10:30	290.4	7.2	4.81	0.7	4.48	1998.0	1.3	0.8
SNP-198	10	Browntown Valley Overlook Spring	S	5/27/1999	9:05	280.6	7.3	4.67	0.5	4.43	1997.8	1.6	0.8
SNP-204	10	Browntown Valley Overlook Spring	S	6/24/1999	11:55	283.9	7.5	4.77	0.7	4.43	1997.8	1.6	0.8
SNP-219	10	Browntown Valley Overlook Spring	S	7/14/1999	14:35	270.5	7.6	4.57	0.6	4.28	1997.3	2.3	0.8
SNP-225	10	Browntown Valley Overlook Spring	S	8/12/1999	9:20	263.1	7.7	4.46	0.6	4.18	1996.8	2.9	0.8
SNP-262	10	Browntown Valley Overlook Spring	S	9/7/1999	16:30	310.1	7.4	5.19	2.1	4.22	1997.0	2.7	0.6
SNP-268	10	Browntown Valley Overlook Spring	S	9/10/1999	8:25	300.4	7.7	5.09	2.1	4.13	1996.5	3.2	0.8

Table 10. Summary of sulfur hexafluoride data in water samples from wells and springs--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	SF_6 Concentration in Water (fg/L)	Recharge Temp (°C)	SF_6 Partial Pressure (pptv)[1]	Excess Air (cc/L)	Model SF_6 Partial Pressure Remove Ex Air (pptv)[2]	Model SF_6 Recharge Date (years)[2]	Model SF_6 Age (years)[2]	Model SF_6 Age Error (years)[3]
SNP-273	10	Browntown Valley Overlook Spring	S	9/22/1999	15:45	326.8	7.2	5.42	2.5	4.27	1997.0	2.7	0.8
SNP-021	11	Camp Hoover Spring #2	S	4/8/1996	14:30	183.9	8.9	3.25	1.0	2.91	1992.0	4.3	0.5
SNP-116	11	Camp Hoover Spring #2	S	9/9/1997	14:00	250.9	11.3	4.90	1.1	4.29	1997.3	0.4	0.8
SNP-234	11	Camp Hoover Spring #2	S	8/17/1999	14:35	239.4	10.1	4.45	0.9	4.01	1996.3	3.4	0.8
SNP-022	12	Davids Spring	S	4/8/1996	17:15	149.2	7.6	2.58	1.4	2.22	1988.5	7.8	0.5
SNP-110	12	Davids Spring	S	9/4/1997	18:00	228.2	8.6	4.10	1.8	3.38	1994.0	3.7	0.8
SNP-243	12	Davids Spring	S	8/20/1999	11:05	235.8	8.5	4.22	1.3	3.66	1995.0	4.6	0.6
SNP-024	13	Dickeys Ridge Spring	S	4/10/1996	11:30	187.2	9.0	3.30	0.0	3.30	1993.5	2.8	0.5
SNP-129	13	Dickeys Ridge Spring	S	9/12/1997	10:00	263.4	10.6	5.07	0.3	4.79	1999.0	-1.3	0.8
SNP-246	13	Dickeys Ridge Spring (pipe 2)	S	8/20/1999	17:00	251.1	10.1	4.63	0.1	4.58	1998.3	1.4	0.8
SNP-025	14	Gravel Spring NE	S	4/10/1996	14:30	167.0	8.7	2.91	0.2	2.85	1991.5	4.8	0.5
SNP-101	14	Gravel Spring NE	S	9/2/1997	11:00	241.6	8.2	4.12	0.0	4.12	1996.7	1.0	0.8
SNP-026	15	Pass Mountain Overlook Spring	S	4/10/1996	17:50	173.2	8.5	3.00	0.3	2.91	1992.0	4.3	0.8
SNP-100	15	Pass Mountain Overlook Spring	S	9/2/1997	16:00	227.2	11.5	4.47	0.0	4.47	1997.8	-0.2	0.7
SNP-027	16	Swift Run Gap Spring #27	S	4/11/1996	10:00	168.3	9.5	3.05	1.0	2.73	1991.0	5.3	0.5
SNP-133	16	Swift Run Gap Spring #27	S	9/16/1997	10:30	250.9	10.4	4.73	0.5	4.46	1998.0	-0.3	0.8
SNP-239	16	Swift Run Gap Spring #27	S	8/19/1999	13:45	218.4	10.4	4.12	0.4	3.92	1996.0	3.7	0.6
SNP-028	17	Dean Mountain/South River Spring	S	4/11/1996	12:00	183.2	6.0	2.90	0.1	2.87	1991.5	4.8	0.8
SNP-115	17	Dean Mountain/South River Spring	S	9/5/1997	14:00	218.8	9.6	4.06	0.7	3.74	1995.3	2.4	0.5
SNP-240	17	Dean Mountain/South River Spring	S	8/19/1999	15:40	209.6	9.4	3.85	0.5	3.64	1995.0	4.6	0.8
SNP-029	18	Baldface Mountain Spring	S	4/11/1996	14:00	172.4	6.0	2.77	0.0	2.77	1991.3	5.0	0.5
SNP-030	19	Hazeltop Ridge Overlook Spring	S	4/11/1996	18:30	178.9	8.3	3.16	0.0	3.16	1993.0	3.3	0.5
SNP-104	20	Byrds Nest #4/Beahms Gap Spring	S	9/3/1997	12:00	246.3	9.3	4.36	0.0	4.36	1997.5	0.2	0.8
SNP-242	20	Byrds Nest #4/Beahms Gap Spring	S	8/20/1999	8:45	238.2	10.2	4.38	0.0	4.38	1997.8	1.9	0.8
SNP-034	21	Byrds Nest #3 Spring	S	4/12/1996	15:20	174.4	9.0	3.14	0.0	3.14	1993.0	3.3	0.8
SNP-109	21	Byrds Nest #3 Spring	S	9/4/1997	8:30	243.6	9.0	4.39	1.4	3.76	1995.5	2.2	0.8
SNP-127	21	Byrds Nest #3 Spring	S	9/11/1997	14:30	190.0	9.8	3.54	0.6	3.30	1993.5	4.2	0.5
SNP-138	21	Byrds Nest #3 Spring	S	9/18/1997	11:00	224.4	10.0	4.21	1.3	3.64	1995.0	2.7	0.8
SNP-183	21	Byrds Nest #3 Spring	S	3/2/1999	16:50	253.5	9.4	4.64	0.7	4.29	1997.3	1.8	0.8
SNP-188	21	Byrds Nest #3 Spring	S	4/2/1999	12:50	252.6	9.6	4.66	0.6	4.35	1997.5	1.8	0.8
SNP-194	21	Byrds Nest #3 Spring	S	4/28/1999	17:25	250.9	9.4	4.60	0.7	4.24	1997.0	2.3	0.8
SNP-199	21	Byrds Nest #3 Spring	S	5/27/1999	11:22	251.8	9.2	4.49	0.7	4.22	1997.0	2.4	0.8
SNP-203	21	Byrds Nest #3 Spring	S	6/24/1999	9:05	254.3	8.8	4.54	0.7	4.20	1997.0	2.5	0.8
SNP-218	21	Byrds Nest #3 Spring	S	7/14/1999	11:34	238.9	9.0	4.30	0.9	3.91	1995.8	3.8	0.8
SNP-226	21	Byrds Nest #3 Spring	S	8/12/1999	12:00	250.2	9.4	4.58	0.9	4.14	1996.8	2.9	0.8
SNP-261	21	Byrds Nest #3 Spring	S	9/7/1999	14:20	263.6	9.6	4.86	0.9	4.40	1997.7	2.0	0.8
SNP-267	21	Byrds Nest #3 Spring	S	9/9/1999	14:30	257.8	9.2	4.67	0.8	4.27	1997.3	2.4	0.8
SNP-272	21	Byrds Nest #3 Spring	S	9/22/1999	13:45	249.6	9.4	4.56	1.0	4.10	1996.8	3.0	0.8
SNP-035	22	Big Meadows #9 Well	W	4/15/1996	11:20	105.5	7.8	1.83	0.1	1.82	1986.5	9.8	0.5
SNP-096	22	Big Meadows #9 Well	W	8/28/1997	13:30	206.8	9.8	3.92	0.1	3.87	1995.8	1.9	0.8
SNP-036	23	Big Meadows #14 Well	W	4/15/1996	14:00	111.1	8.7	2.01	2.9	1.50	1984.5	11.8	0.5
SNP-092	23	Big Meadows #14 Well	W	8/28/1997	11:30	197.4	8.4	3.53	0.1	3.49	1994.3	3.4	0.5
SNP-233	23	Big Meadows #14 Well	W	8/17/1999	12:50	319.3	7.2	5.41	6.5	2.95	1992.0	7.6	0.8
SNP-038	24	Hogback Spring #5	S	4/16/1996	11:45	172.5	8.6	3.08	0.0	3.08	1992.5	3.8	0.5
SNP-039	25	Elkwallow Well (W-1703)	W	4/16/1996	16:00	228.6	8.3	3.83	6.7	2.02	1987.7	8.6	0.5
SNP-086	25	Elkwallow Well (W-1703)	W	8/26/1997	18:30	279.4	9.1	4.95	4.6	3.22	1993.0	4.7	0.8
SNP-228	25	Elkwallow Well (W-1703)	W	8/16/1999	11:45	233.1	9.0	4.14	0.0	4.13	1996.8	2.9	0.6
SNP-041	26	Hightop Hut Spring	S	4/17/1996	15:15	158.3	8.2	2.76	0.8	2.53	1990.0	6.3	0.5

Table 10. Summary of sulfur hexafluoride data in water samples from wells and springs--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	SF_6 Concentration in Water (fg/L)	Recharge Temp (°C)	SF_6 Partial Pressure (pptv)[1]	Excess Air (cc/L)	Model SF_6 Partial Pressure Remove Ex Air (pptv)[2]	Model SF_6 Recharge Date (years)[2]	Model SF_6 Age (years)[2]	Model SF_6 Age Error (years)[3]
SNP-132	26	Hightop Hut Spring	S	9/16/1997	15:45	244.3	9.0	4.42	0.0	4.42	1997.8	-0.1	0.3
SNP-043	27	Pass Mountain Hut Spring	S	4/18/1996	9:15	186.7	8.7	3.28	1.0	2.94	1992.0	4.3	0.5
SNP-105	27	Pass Mountain Hut Spring	S	9/3/1997	14:10	240.1	9.0	4.28	1.1	3.78	1995.2	2.5	0.8
SNP-048	31	Dickeys Ridge Well (W-1346)	W	4/19/1996	14:40	55.7	9.1	0.96	3.7	0.68	1978.0	18.3	0.5
SNP-084	31	Dickeys Ridge Well (W-1346)	W	8/26/1997	10:50	75.7	8.2	1.26	4.0	0.88	1980.0	17.7	0.3
SNP-230	31	Dickeys Ridge Well (W-1346)	W	8/16/1999	16:15	125.4	8.0	2.07	4.5	1.39	1983.8	15.9	0.4
SNP-051	34	Richards Steve (Domestic well)	W	4/24/1996	14:55	152.0	9.9	2.63	11.7	2.63	1990.5	5.8	0.5
SNP-052	35	White Oak Cabin Spring	S	4/25/1996	10:35	177.4	8.5	3.17	0.0	3.17	1993.0	3.3	0.5
SNP-111	35	White Oak Cabin Spring	S	9/4/1997	15:55	203.8	13.1	4.39	0.0	4.39	1997.5	0.2	0.8
SNP-053	36	Big Meadows #1 Well (W-1701)	W	4/25/1996	16:30	114.3	6.7	1.89	3.8	1.34	1983.5	12.8	0.5
SNP-083	36	Big Meadows #1 Well (W-1701)	W	9/17/1997	16:30	87.7	8.0	1.53	3.9	1.06	1981.5	16.2	0.5
SNP-037	37	HQ #2 Well (W-851)	W	4/16/1996	9:45	216.2	11.2	3.98	7.7	0.97	1980.5	15.8	0.5
SNP-087	37	HQ #2 Well (W-851)	W	8/27/1997	10:30	189.2	10.7	3.24	2.7	2.59	1990.5	7.2	0.5
SNP-007	38	Skyland #5	W	4/2/1996	16:00	275.7	6.4	4.51	7.9	1.81	1986.5	9.8	0.5
SNP-088	38	Skyland #5	W	8/27/1997	17:10	201.3	8.9	3.70	0.1	3.65	1994.8	2.9	0.6
SNP-005	39	Pinnacles Well (W-3288)	W	4/2/1996	12:00	180.8	10.3	3.53	0.6	3.23	1993.0	3.3	0.8
SNP-091	39	Pinnacles Well (W-3288)	W	8/27/1997	12:45	463.9	9.0	8.44	0.8	7.87	C	C	C
SNP-102	40	Mathews Arm Spring Range View Cabin	S	9/2/1997	13:30	238.7	9.6	4.24	0.6	4.09	1996.5	1.2	0.8
SNP-031	41	Lewis Mountain Spring #25-2	S	4/11/1996	16:30	174.4	8.4	3.05	0.0	3.05	1992.5	3.8	0.5
SNP-054	42	Old Rag Shelter Spring	S	4/26/1996	14:30	175.3	9.8	3.14	0.0	3.15	1993.0	3.3	0.5
SNP-118	42	Old Rag Shelter Spring	S	9/9/1997	18:00	180.2	14.8	3.94	0.2	3.83	1995.5	2.2	0.8
SNP-015	43	Loft Mountain Overlook Spring	S	4/4/1996	15:30	175.2	8.3	3.00	0.4	2.87	1991.8	4.5	0.5
SNP-121	43	Loft Mountain Overlook Spring	S	9/10/1997	17:00	236.0	13.1	4.87	0.0	4.92	1999.5	-1.8	0.8
SNP-016	44	Loft Mountain Spring	S	4/4/1996	17:30	157.4	8.3	2.75	0.0	2.75	1991.0	5.3	0.5
SNP-122	44	Loft Mountain Spring	S	9/10/1997	15:00	236.0	12.3	4.87	0.1	4.80	1999.0	-1.3	0.8
SNP-013	45	Simmons Gap Well (W-1704)	W	4/4/1996	9:30	121.1	10.5	2.25	3.3	1.61	1985.0	11.3	0.5
SNP-099	45	Simmons Gap Well (W-1704)	W	8/29/1997	10:00	167.6	10.2	3.08	2.0	2.49	1990.0	7.7	0.6
SNP-137	46	Yeager's Spring (Luray)	S	9/17/1997	13:10	352.0	12.8	7.78	2.6	5.19	C	C	C
SNP-248	46	Yeager's Spring (Luray)	S	8/23/1999	11:20	423.7	11.9	7.92	2.4	6.25	C	C	C
SNP-042	47	Lewis Mountain Well (W-1072)	W	4/17/1996	18:20	177.5	8.4	3.16	0.6	2.95	1992.0	4.3	0.5
SNP-095	47	Lewis Mountain Well (W-1072)	W	8/28/1997	15:45	606.4	9.0	11.08	1.1	10.35	C	C	C
SNP-140	47	Lewis Mountain Well (W-1072)	W	9/19/1997	9:30	215.7	8.4	4.72	1.0	3.44	1994.0	3.7	0.5
SNP-276	48	Bear Lithia Spring	S	9/18/1996	14:15	87.7	10.8	1.58	2.5	1.22	1982.5	14.2	0.5
SNP-255	48	Bear Lithia Spring	S	9/2/1999	10:20	317.8	9.0	5.29	3.1	3.96	1996.0	3.7	0.8
SNP-046	49	Mathews Arm Well (W-856)	W	4/19/1996	10:40	164.4	9.4	3.00	1.6	2.50	1990.0	6.3	0.5
SNP-085	49	Mathews Arm Well (W-856)	W	8/26/1997	15:05	282.3	8.3	4.82	3.9	3.38	1994.0	3.7	0.8
SNP-229	49	Mathews Arm Well (W-856)	W	8/16/1999	13:10	333.6	7.6	5.57	5.2	3.53	1994.3	5.4	0.8
SNP-011	50	Loft Mountain Well #1 (W-715)	W	4/3/1996	15:45	66.3	7.1	1.09	2.6	0.85	1979.5	16.8	0.4
SNP-098	50	Loft Mountain Well #1 (W-715)	W	8/29/1997	14:00	94.8	8.7	1.67	3.2	1.22	1982.8	14.9	0.4
SNP-235	50	Loft Mountain Well #1 (W-715)	W	8/17/1999	18:15	105.0	8.1	1.80	3.2	1.33	1983.5	16.1	0.4
SNP-010	51	Loft Mountain Well #2 (W-754)	W	4/3/1996	14:30	205.3	5.3	3.09	3.0	2.39	1989.5	6.8	0.5
SNP-097	51	Loft Mountain Well #2 (W-754)	W	8/29/1997	12:30	328.7	5.9	5.09	2.8	3.96	1996.3	1.4	0.8
SNP-236	51	Loft Mountain Well #2 (W-754)	W	8/18/1999	8:35	287.7	7.7	4.84	4.0	3.36	1993.5	6.1	0.8
SNP-012	52	Ivy Creek Shelter Spring	S	4/3/1996	18:00	177.7	5.1	2.68	0.1	2.65	1990.5	5.8	0.8
SNP-119	52	Ivy Creek Shelter Spring	S	9/10/1997	12:00	240.2	9.0	4.37	3.4	3.08	1992.5	5.2	0.5
SNP-237	52	Ivy Creek Shelter Spring	S	8/18/1999	10:20	239.0	8.9	4.27	0.5	4.04	1996.5	3.1	0.8
SNP-113	53	Lewis Mountain Spring #25	S	9/5/1997	9:30	257.6	9.3	4.19	0.0	4.68	1998.5	-0.8	0.8
SNP-241	53	Lewis Mountain Spring #25	S	8/19/1999	18:05	241.1	9.5	4.42	0.4	4.22	1997.0	2.6	0.8

Table 10. Summary of sulfur hexafluoride data in water samples from wells and springs--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	SF_6 Concentration in Water (fg/L)	Recharge Temp (°C)	SF_6 Partial Pressure (pptv)[1]	Excess Air (cc/L)	Model SF_6 Partial Pressure Remove Ex Air (pptv)[2]	Model SF_6 Recharge Date (years)[2]	Model SF_6 Age (years)[2]	Model SF_6 Age Error (years)[3]
SNP-033	54	Elkwallow Spring #8	S	4/12/1996	12:30	175.6	10.2	3.27	0.0	3.27	1993.5	2.8	0.8
SNP-106	54	Elkwallow Spring #8	S	9/3/1997	9:00	231.9	9.7	4.22	0.7	3.90	1995.8	1.8	0.8
SNP-244	54	Elkwallow Spring #8	S	8/20/1999	13:50	246.0	9.6	4.46	0.8	4.08	1996.5	3.1	0.8
SNP-136	55	Hite Spring (Luray)	S	9/17/1997	11:40	559.1	11.6	10.07	2.5	8.63	C	C	C
SNP-247	55	Hite Spring (Luray)	S	8/23/1999	8:56	496.8	9.7	8.51	2.9	6.66	C	C	C
SNP-040	56	HQ Spring #14-1	S	4/17/1996	9:15	164.0	5.7	2.41	0.0	2.41	1989.5	6.8	0.5
SNP-117	56	HQ Spring #14-1	S	9/9/1997	9:10	272.7	9.0	4.64	0.0	4.64	1998.5	-0.8	0.8
SNP-023	57	Indian Run Shelter Spring	S	4/9/1996	13:00	224.3	10.0	4.10	0.5	3.89	1996.0	0.3	0.8
SNP-128	57	Indian Run Shelter Spring	S	9/12/1997	13:30	262.4	10.6	4.90	0.5	4.65	1998.5	-0.8	0.8
SNP-251	57	Indian Run Shelter Spring	S	8/23/1999	18:15	263.3	9.6	4.74	0.3	4.58	1998.3	1.4	0.8
SNP-252	58	Town of Elkton Spring	S	9/1/1999	10:25	703.5	9.6	12.23	2.9	10.25	C	C	C
SNP-253	59	Town of Elkton well	W	9/1/1999	11:15	414.8	9.0	6.92	0.0	6.92	C	C	C
SNP-254	60	Town of Grottoes #2	W	9/1/1999	15:00	417.3	7.8	6.67	4.8	4.48	1998.0	1.7	0.8
SNP-256	61	Blue Ridge School #5	W	9/2/1999	12:30	3725.5	10.8	66.55	0.9	65.95	C	C	C
SNP-257	62	Town of Washington #3	W	9/2/1999	15:45	498.1	12.5	9.49	4.2	6.51	C	C	C
SNP-263	63	Mountain side Market	W	9/8/1999	9:00	332.4	11.0	6.00	2.9	4.51	1998.0	1.7	0.8
SNP-134	64	Hudson Spring (Luray)	S	9/17/1997	9:45	385.4	10.2	7.27	1.3	5.88	C	C	C
SNP-180	64	Hudson Spring (Luray)	S	3/2/1999	10:10	398.7	10.1	6.93	1.5	5.96	C	C	C
SNP-185	64	Hudson Spring (Luray)	S	4/2/1999	8:40	412.1	10.0	7.13	1.6	6.10	C	C	C
SNP-190	64	Hudson Spring (Luray)	S	4/27/1999	9:40	390.7	9.8	6.70	1.7	5.67	C	C	C
SNP-195	64	Hudson Spring (Luray)	S	5/26/1999	10:00	372.9	9.8	6.40	1.5	5.53	C	C	C
SNP-200	64	Hudson Spring (Luray)	S	6/23/1999	9:30	388.6	9.8	6.67	1.7	5.65	C	C	C
SNP-217	64	Hudson Spring (Luray)	S	7/14/1999	9:30	343.6	9.9	5.92	1.6	5.03	1999.8	-0.2	0.4
SNP-222	64	Hudson Spring (Luray)	S	8/11/1999	9:15	382.2	10.7	6.81	1.7	5.73	C	C	C
SNP-258	64	Hudson Spring (Luray)	S	9/7/1999	9:30	387.9	10.4	6.82	1.7	5.71	C	C	C
SNP-264	64	Hudson Spring (Luray)	S	9/9/1999	9:05	375.2	10.0	6.49	1.6	5.55	C	C	C
SNP-269	64	Hudson Spring (Luray)	S	9/22/1999	9:00	381.7	9.9	6.58	1.6	5.64	C	C	C
SNP-020	65	Lewis Spring	S	4/8/1996	10:30	175.7	8.5	3.13	0.4	2.99	1992.0	4.3	0.8
SNP-093	65	Lewis Spring	S	8/28/1997	17:05	143.9	9.5	2.68	0.0	2.68	1990.8	6.9	0.5
SNP-124	65	Lewis Spring	S	9/11/1997	9:35	224.6	10.2	4.29	0.0	4.30	1997.5	0.2	0.8
SNP-126	65	Lewis Spring	S	9/11/1997	10:50	223.5	10.1	4.26	0.0	4.26	1997.0	0.7	0.8
SNP-135	65	Lewis Spring	S	9/17/1997	16:00	241.1	9.8	4.54	0.0	4.54	1998.0	0.7	0.8
SNP-181	65	Lewis Spring	S	3/2/1999	12:30	256.1	8.7	4.61	0.0	4.61	1998.3	0.8	0.8
SNP-186	65	Lewis Spring	S	4/2/1999	10:10	272.0	8.5	4.85	0.1	4.79	1999.0	0.3	0.8
SNP-191	65	Lewis Spring	S	4/27/1999	13:00	257.4	8.9	4.67	0.2	4.56	1998.3	1.1	0.8
SNP-196	65	Lewis Spring	S	5/26/1999	12:55	243.8	9.2	4.48	0.0	4.48	1997.8	1.7	0.8
SNP-201	65	Lewis Spring	S	6/23/1999	11:50	253.9	8.8	4.59	0.2	4.48	1998.0	1.5	0.8
SNP-220	65	Lewis Spring	S	7/15/1999	9:25	269.7	8.7	4.85	0.0	4.85	1999.3	0.3	0.8
SNP-223	65	Lewis Spring	S	8/11/1999	11:35	230.1	9.3	4.25	0.0	4.25	1997.3	2.4	0.8
SNP-259	65	Lewis Spring	S	9/7/1999	11:00	254.7	9.2	4.68	0.2	4.57	1998.5	1.2	0.8
SNP-265	65	Lewis Spring	S	9/9/1999	10:40	258.3	9.4	4.79	0.3	4.62	1998.5	1.2	0.8
SNP-270	65	Lewis Spring	S	9/22/1999	10:40	251.2	9.3	4.63	0.2	4.53	1998.0	1.7	0.8
VR-01	66	Town of Stanley # 3	W	7/6/1999	12:30	195.3	7.8	3.12	6.6	1.76	1986.5	13.0	ND
VR-02	67	Town of Shenandoah # 5	W	7/6/1999	16:15	352.3	9.8	6.13	1.5	5.25	M	0.0	ND
VR-03	68	Wanyesboro Jefferson Rd # 1	W	7/7/1999	10:35	968.0	9.5	16.76	4.2	14.05	C	C	ND
VR-04	69	Coyner Spring	S	7/7/1999	14:00	536.6	8.7	8.97	4.4	6.23	C	C	ND
VR-06	71	Town of Shenandoah # 2	W	7/8/1999	16:20	545.8	8.4	8.92	6.8	5.16	M	0.0	ND

Table 10. Summary of sulfur hexafluoride data in water samples from wells and springs--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	SF_6 Concentration in Water (fg/L)	Recharge Temp (°C)	SF_6 Partial Pressure (pptv)[1]	Excess Air (cc/L)	Model SF_6 Partial Pressure Remove Ex Air (pptv)[2]	Model SF_6 Recharge Date (years)[2]	Model SF_6 Age (years)[2]	Model SF_6 Age Error (years)[3]
VR-07	72	Town of Shenandoah # 3	W	7/8/1999	18:20	435.8	7.2	6.75	4.8	4.56	1999.0	0.5	ND
VR-08	73	Town of Stanley # 6	W	7/9/1999	10:15	314.5	9.4	5.36	2.0	4.39	1998.5	1.0	ND
VR-09	74	Town of Stanley # 5	W	7/9/1999	13:00	363.7	9.6	6.24	2.9	4.72	1999.5	0.0	ND
VR-10	75	Town of Stanley # 4	W	7/9/1999	15:00	335.3	9.5	5.74	1.4	4.97	2000.0	-0.5	ND
VR-11	76	Town of Stanley # 2	W	7/9/1999	16:45	134.6	9.1	2.27	4.2	1.55	1985.5	14.0	ND

[1] Partial pressure of SF_6 in the sample calculated from the measured concentration at the given recharge temperature and site elevation (Tables 1 and 2).

[2] Modeled partial pressure of SF_6, modeled recharge date, and modeled age for the sample, after subtraction of SF_6 in excess air.

The composition of the excess air corresponds to the modeled recharge year and assumes a 5% local enrichment over North American (N.A.) air (Table 9) for air in Shenandoah National Park.

[3] Uncertainty in modeled SF_6-based age due to uncertainty of ± 5% in local Shenandoah National Park air.

Local Shenandoah National Park air is defined as N.A. air (Table 9) plus 5%. Therefore, SF_6 age minus age error corresponds to age based on N.A. air (Table 9), and SF_6 age plus age error corresponds to age based on N.A. air enriched by 10%.

Table 11. Summary of tritium, dissolved helium, and dissolved neon data

[W, well; S, spring; ^{3}H, tritium; TU, Tritium Unit, 1 TU=1atom of ^{3}H in 10^{18} atoms of H; 1 σ, 1 standard deviation; cc STP/g, cubic centimeters at standard temperature and pressure per gram; He, helium, Ne, neon, Δ^4He (%), percent of ^{4}He over solubility equilibrium concentration; $\delta^3He=((R_{sample}/R_{air})-1)x100$; R is the ratio ^{3}He/^{4}He; $R_{air}=1.384x10^{-6}$; ΔNe (%), percent of Ne over solubility equilibrium concentration; Terr., terrigenic]

SNP No.	Site ID	Site Name	W/S	Date	Time	^{3}H (TU)	^{3}H error 1 σ (TU)	^{4}He x10^8 (ccSTP/g)	Δ ^{4}He (%)	δ ^{3}He (%)	Ne x10^8 (ccSTP/g)	ΔNe (%)	Terr. He (%)
SNP-001	1	HQ #1 Well (W-855)	W	4/1/1996	10:30	18.0	0.7	6.837	52.6	58.92	28.459	45.5	-3.1
SNP-090	1	HQ #1 Well (W-855)	W	8/27/1997	8:40	15.41	0.31	7.675	71.3	64.62	31.378	60.3	-2.7
SNP-002	2	HQ Spring #14-3 - above HQ on Rt 211	S	4/1/1996	13:00	11.4	0.5	4.587	4.6	2.72	19.404	1.2	3.0
SNP-003	3	Hemlock Spring	S	4/1/1996	15:00	7.6	0.4	30.463	636.4	-90.68	72.863	301.1	34.7
SNP-004	4	Pinnacles Spring #16	S	4/2/1996	9:30	8.4	0.4	4.261	4.0	-1.80	18.842	5.7	-3.1
SNP-112	4	Pinnacles Spring #16	S	9/4/1997	10:00	6.62	0.16	4.204	2.9	-2.15	18.181	2.5	-0.3
SNP-006	5	Furnace Spring at Skyland	S	4/2/1996	14:30	9.5	0.50	4.236	1.9	-2.04	18.484	0.8	0.9
SNP-089	5	Furnace Spring at Skyland	S	8/27/1997	18:35	8.36	0.17	4.240	2.2	-1.05	18.746	2.5	-1.0
SNP-125	5	Furnace Spring at Skyland	S	9/11/1997	12:25	9.19	0.22	4.250	3.2	-1.85	18.520	3.0	-0.6
SNP-169	5	Furnace Spring at Skyland	S	9/18/1997	9:15	8.50	0.17	4.258	4.0	-1.20	18.601	4.7	-1.8
SNP-008	6	Skyland #2 (W-1033)	W	4/2/1996	17:30	10.0	0.5	4.716	14.0	1.05	19.961	9.4	1.8
SNP-094	6	Skyland #2 (W-1033)	W	8/28/1997	9:45	9.59	0.3	4.660	14.0	3.39	19.868	11.6	-0.5
SNP-009	7	Dundo Spring #29	S	4/3/1996	12:15	8.3	0.5	4.439	4.9	-1.11	19.604	5.2	-1.6
SNP-120	7	Dundo Spring #29	S	9/10/1997	10:30	12.46	0.25	4.264	2.9	-1.50	18.387	3.2	-1.0
SNP-014	8	Simmons Gap Spring	S	4/4/1996	12:40	8.3	0.4	4.302	0.4	-1.69	18.708	0.0	0.4
SNP-131	8	Simmons Gap Spring	S	9/16/1997	13:00	7.82	0.19	4.434	3.9	-0.69	19.156	3.2	-0.1
SNP-017	9	Panorama Spring #13-3	S	4/5/1996	9:00	12.3	0.5	4.302	1.8	-0.85	18.719	2.1	-0.8
SNP-018	10	Browntown Valley Overlook Spring	S	4/5/1996	12:40	9.2	0.4	5.223	21.4	-1.72	22.945	19.1	-2.6
SNP-103	10	Browntown Valley Overlook Spring	S	9/2/1997	9:30	8.41	0.19	4.583	8.3	-0.04	20.019	7.4	-1.0
SNP-123	10	Browntown Valley Overlook Spring	S	9/11/1997	16:30	9.76	0.23	4.579	8.9	-0.15	19.857	8.0	-1.1
SNP-139	10	Browntown Valley Overlook Spring	S	9/18/1997	13:30	8.84	0.21	4.569	8.1	-1.81	20.147	8.4	-2.3
SNP-021	11	Camp Hoover Spring #2	S	4/8/1996	14:30	10.2	0.2	5.117	20.4	-0.13	21.798	17.5	-1.3
SNP-116	11	Camp Hoover Spring #2	S	9/9/1997	14:00	9.95	0.44	4.765	13.3	0.33	20.467	12.9	-2.3
SNP-022	12	Davids Spring	S	4/8/1996	17:15	10.74	0.21	4.322	4.2	5.20	19.230	5.5	-2.6
SNP-110	12	Davids Spring	S	9/4/1997	18:00	9.91	0.21	4.653	12.9	9.58	20.081	11.6	-1.5
SNP-024	13	Dickeys Ridge Spring	S	4/10/1996	11:30	11.2	0.2	4.428	3.1	-1.87	19.377	2.8	-0.4
SNP-129	13	Dickeys Ridge Spring	S	9/12/1997	10:00	10.03	0.20	4.384	3.3	-1.82	19.143	4.2	-1.8
SNP-025	14	Gravel Spring NE	S	4/10/1996	14:30	11.54	0.23	4.432	3.9	-0.23	19.393	4.0	-1.1
SNP-101	14	Gravel Spring NE	S	9/2/1997	11:00	10.65	0.21	4.942	15.6	-1.49	20.284	8.2	4.5
SNP-026	15	Pass Mountain Overlook Spring	S	4/10/1996	17:50	8.89	0.18	4.304	1.1	-1.21	18.790	0.9	0.0
SNP-100	15	Pass Mountain Overlook Spring	S	9/2/1997	16:00	7.45	0.19	4.275	1.8	-1.16	18.439	1.9	-0.5
SNP-027	16	Swift Run Gap Spring #27	S	4/11/1996	10:00	10.93	0.22	4.635	9.6	4.28	20.083	9.1	-1.6
SNP-133	16	Swift Run Gap Spring #27	S	9/16/1997	10:30	9.50	0.19	4.596	9.2	5.55	20.027	9.7	-2.8
SNP-028	17	Dean Mountain/South River Spring	S	4/11/1996	12:00	9.43	0.19	4.311	2.0	-0.90	19.107	1.9	-0.4
SNP-115	17	Dean Mountain/South River Spring	S	9/5/1997	14:00	6.36	0.13	4.269	2.8	-0.67	18.653	3.2	-1.2
SNP-029	18	Baldface Mountain Spring	S	4/11/1996	14:00	8.2	0.4	4.219	1.5	-2.07	18.545	0.5	0.8
SNP-030	19	Hazeltop Ridge Overlook Spring	S	4/11/1996	18:30	9.2	0.5	4.250	2.4	-1.52	18.697	2.8	-1.1
SNP-032	20	Byrds Nest #4/Beahms Gap Spring	S	4/12/1996	9:40	10.83	0.22	2.870	-33.7	-2.26	12.934	-31.9	10.0
SNP-104	20	Byrds Nest #4/Beahms Gap Spring	S	9/3/1997	12:00	10.70	0.21	4.394	2.2	-1.05	19.130	2.1	-0.4
SNP-034	21	Byrds Nest #3 Spring	S	4/12/1996	15:20	8.7	0.4	4.671	11.2	1.47	20.143	9.2	-0.4
SNP-109	21	Byrds Nest #3 Spring	S	9/4/1997	8:30	8.44	0.22	4.576	9.4	3.21	19.473	6.7	1.0
SNP-127	21	Byrds Nest #3 Spring	S	9/11/1997	14:30	8.37	0.17	4.544	9.0	2.99	19.279	6.4	0.9
SNP-138	21	Byrds Nest #3 Spring	S	9/18/1997	11:00	7.77	0.29	4.570	9.8	2.11	19.834	9.7	-2.2
SNP-035	22	Big Meadows #9 Well	W	4/15/1996	11:20	10.5	0.3	4.078	-1.5	0.15	18.324	0.7	-2.4
SNP-096	22	Big Meadows #9 Well	W	8/28/1997	13:30	10.48	0.21	4.265	4.1	-0.89	18.572	4.3	-1.2
SNP-036	23	Big Meadows #14 Well	W	4/15/1996	14:00	13.4	0.06	5.623	36.8	8.62	23.749	32.1	-2.7
SNP-092	23	Big Meadows #14 Well	W	8/28/1997	11:30	12.58	0.25	4.437	7.8	1.79	19.145	6.2	0.0
SNP-038	24	Hogback Spring #5	S	4/16/1996	11:45	8.2	0.4	4.327	4.2	-1.32	18.836	3.7	-0.4
SNP-039	25	Elkwallow Well (W-1703)	W	4/16/1996	16:00	12.1	0.5	7.672	80.0	4.18	30.796	64.9	-1.1
SNP-086	25	Elkwallow Well (W-1703)	W	8/26/1997	18:30	4.31	0.11	7.018	65.2	6.27	28.221	52.2	-0.3
SNP-041	26	Hightop Hut Spring	S	4/17/1996	15:15	9.7	0.05	4.511	7.9	0.78	19.582	6.9	-0.7
SNP-043	27	Pass Mountain Hut Spring	S	4/18/1996	9:15	10.0	0.5	4.615	9.0	0.68	20.079	8.5	-1.5
SNP-105	27	Pass Mountain Hut Spring	S	9/3/1997	14:10	9.45	0.21	4.383	7.4	-1.38	19.094	12.1	-6.7
SNP-048	31	Dickeys Ridge Well (W-1346)	W	4/19/1996	14:40	11.6	0.5	7.579	73.8	9.40	28.824	51.5	5.2
SNP-084	31	Dickeys Ridge Well (W-1346)	W	8/26/1997	10:50	9.47	0.19	7.380	68.5	9.62	28.086	46.3	6.0
SNP-050	33	Domestic well #1	W	4/24/1996	9:50	9.9	0.5	7.290	60.2	5.18	30.142	50.7	-2.5
SNP-052	35	White Oak Cabin Spring	S	4/25/1996	10:35	8.3	0.4	4.439	7.3	-6.75	18.164	0.3	6.4
SNP-111	35	White Oak Cabin Spring	S	9/4/1997	15:55	7.50	0.21	4.251	4.9	-0.71	17.859	3.0	1.1
SNP-053	36	Big Meadows #1 Well (W-1701)	W	4/25/1996	16:30	13.4	0.5	6.051	45.7	65.54	25.278	37.8	-1.6
SNP-083	36	Big Meadows #1 Well (W-1701)	W	9/17/1997	16:30	10.51	0.21	6.059	46.8	67.16	25.518	40.8	-3.3
SNP-037	37	HQ #2 Well (W-851)	W	4/16/1996	9:45	13.3	0.5	8.091	82.5	7.34	32.930	72.1	-3.9
SNP-087	37	HQ #2 Well (W-851)	W	8/27/1997	10:30	11.47	0.23	5.880	31.6	3.62	24.284	24.7	0.4
SNP-007	38	Skyland #5	W	4/2/1996	16:00	10.1	0.5	8.193	98.1	1.80	33.665	83.8	-4.5
SNP-088	38	Skyland #5	W	8/27/1997	17:10	8.42	0.28	4.306	5.5	-1.30	18.667	4.7	-0.4
SNP-005	39	Pinnacles Well (W-3288)	W	4/2/1996	12:00	8.0	0.5	4.482	8.9	-0.98	19.363	8.5	-1.6
SNP-091	39	Pinnacles Well (W-3288)	W	8/27/1997	12:45	6.86	0.14	16.642	302.0	-0.31	61.588	240.8	-0.2

Table 11. Summary of tritium, dissolved helium, and dissolved neon data--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	^{3}H (TU)	^{3}H error 1 σ (TU)	^{4}He x10^8 (ccSTP/g)	Δ ^{4}He (%)	δ ^{3}He (%)	Ne x10^8 (ccSTP/g)	ΔNe (%)	Terr. He (%)
SNP-019	40	Mathews Arm Spring Range View Cabin	S	4/5/1996	14:35	9.5	0.5	4.506	5.9	-3.80	19.849	5.3	-0.8
SNP-102	40	Mathews Arm Spring Range View Cabin	S	9/2/1997	13:30	8.3	0.17	4.317	3.0	-1.75	19.256	5.4	-3.7
SNP-031	41	Lewis Mountain Spring #25-2	S	4/11/1996	16:30	8.15	0.16	4.244	0.9	-1.72	18.607	1.0	-0.4
SNP-054	42	Old Rag Shelter Spring	S	4/26/1996	14:30	9.0	0.4	4.426	2.5	-2.00	19.859	5.7	-4.6
SNP-118	42	Old Rag Shelter Spring	S	9/9/1997	18:00	8.64	0.17	5.311	25.6	-1.57	21.909	22.2	-1.2
SNP-015	43	Loft Mountain Overlook Spring	S	4/4/1996	15:30	8.1	0.4	4.266	-0.3	-1.84	18.668	-0.5	0.2
SNP-121	43	Loft Mountain Overlook Spring	S	9/10/1997	17:00	8.83	0.20	4.255	1.5	-1.68	18.441	2.9	-2.0
SNP-016	44	Loft Mountain Spring	S	4/4/1996	17:30	9.2	0.5	4.159	-0.9	-1.20	18.122	-1.4	0.9
SNP-122	44	Loft Mountain Spring	S	9/10/1997	15:00	10.63	0.22	4.321	4.8	-1.89	19.298	9.1	-6.1
SNP-013	45	Simmons Gap Well (W-1704)	W	4/4/1996	9:30	9.1	0.4	5.946	39.1	15.62	24.387	31.6	-0.3
SNP-099	45	Simmons Gap Well (W-1704)	W	8/29/1997	10:00	6.92	0.14	5.509	28.8	8.94	22.520	21.3	1.6
SNP-137	46	Yeager's Spring (Luray)	S	9/17/1997	13:10	8.11	0.16	17.382	291.5	-0.20	59.208	213.5	7.6
SNP-042	47	Lewis Mountain Well (W-1072)	W	4/17/1996	18:20	8.3	0.4	4.753	15.0	-0.95	20.030	10.6	1.3
SNP-095	47	Lewis Mountain Well (W-1072)	W	8/28/1997	15:45	9.13	0.18	33.412	710.3	-85.15	107.396	496.6	10.5
SNP-046	49	Mathews Arm Well (W-856)	W	4/19/1996	10:40	12.6	0.5	5.360	26.7	21.96	22.390	21.6	-0.4
SNP-085	49	Mathews Arm Well (W-856)	W	8/26/1997	15:05	10.96	0.22	6.235	46.3	20.15	25.706	37.6	-0.8
SNP-011	50	Loft Mountain Well #1 (W-715)	W	4/3/1996	15:45	15.3	0.6	5.796	36.0	129.53	24.512	30.5	-2.0
SNP-098	50	Loft Mountain Well #1 (W-715)	W	8/29/1997	14:00	12.24	0.24	5.878	39.0	114.51	24.577	32.9	-1.8
SNP-010	51	Loft Mountain Well #2 (W-754)	W	4/3/1996	14:30	10.0	0.5	5.878	36.4	2.41	24.632	28.4	0.0
SNP-097	51	Loft Mountain Well #2 (W-754)	W	8/29/1997	12:30	9.13	0.18	13.940	224.5	3.61	54.812	187.5	-4.7
SNP-012	52	Ivy Creek Shelter Spring	S	4/3/1996	18:00	8.1	0.4	4.637	8.4	-0.06	20.241	6.2	0.5
SNP-119	52	Ivy Creek Shelter Spring	S	9/10/1997	12:00	9.48	0.21	4.435	5.9	2.02	19.410	6.3	-1.9
SNP-113	53	Lewis Mountain Spring #25	S	9/5/1997	9:30	6.75	0.16	4.384	4.4	0.16	19.058	3.9	-0.4
SNP-033	54	Elkwallow Spring #8	S	4/12/1996	12:30	9.2	0.4	4.626	9.2	-0.77	19.957	8.6	-1.4
SNP-106	54	Elkwallow Spring #8	S	9/3/1997	9:00	10.57	0.21	4.635	9.2	2.34	20.050	8.6	-1.5
SNP-040	56	HQ Spring #14-1	S	4/17/1996	9:15	10.4	0.5	4.831	7.5	-1.19	20.819	4.2	1.9
SNP-117	56	HQ Spring #14-1	S	9/9/1997	9:10	13.48	0.75	8.190	85.1	1.53	29.257	51.5	11.0
SNP-023	57	Indian Run Shelter Spring	S	4/9/1996	13:00	10.17	0.20	4.484	5.0	-0.98	19.363	4.3	-0.5
SNP-128	57	Indian Run Shelter Spring	S	9/12/1997	13:30	8.35	0.18	4.513	5.9	-0.64	19.459	5.4	-0.8
SNP-134	64	Hudson Spring (Luray)	S	9/17/1997	9:45	2.76	0.14	11.319	150.7	-39.18	22.803	16.3	52.0
SNP-020	65	Lewis Spring	S	4/8/1996	10:30	11.4	0.5	4.295	3.7	-1.96	18.748	3.4	-0.6
SNP-093	65	Lewis Spring	S	8/28/1997	17:05	9.85	0.20	4.221	2.3	-1.98	18.454	2.8	-1.1
SNP-124	65	Lewis Spring	S	9/11/1997	9:35	9.64	0.19	4.399	6.9	-0.85	18.743	5.0	0.7
SNP-135	65	Lewis Spring	S	9/17/1997	16:00	10.35	0.22	4.249	3.2	-1.85	18.351	2.5	0.0
VR-01	66	Town of Stanley #3	W	7/6/1999	12:30	0.02	0.04	8.550	96.1	-3.34	34.270	85.9	-4.4
VR-02	67	Town of Shenandoah #5	W	7/6/1999	16:15	4.54	0.09	5.250	19.6	8.49	22.320	19.1	-3.2
VR-03	68	Waynesboro Jefferson Ave #1	W	7/7/1999	10:35	4.71	0.10	7.480	71.5	6.13	26.140	40.2	12.8
VR-04	69	Coyner Spring	S	7/7/1999	14:00	3.78	0.08	34.110	678.7	-5.32	130.150	593.7	-7.0
VR-06	71	Town of Shenandoah #2	W	7/8/1999	16:20	4.66	0.09	7.980	80.2	8.45	32.830	72.4	-5.3
VR-07	72	Town of Shenandoah #3	W	7/8/1999	18:20	3.72	0.07	7.450	68.4	14.02	29.890	57.3	-1.5
VR-08	73	Town of Stanley #6	W	7/9/1999	10:15	0.80	0.04	16.990	288.1	-58.80	22.690	22.6	67.1
VR-09	74	Town of Stanley #5	W	7/9/1999	13:00	5.20	0.10	15.970	261.9	-43.89	24.760	32.0	61.5
VR-10	75	Town of Stanley #4	W	7/9/1999	15:00	3.73	0.08	10.660	142.1	-39.92	22.640	20.7	48.2
VR-11	76	Town of Stanley #2	W	7/9/1999	16:45	0.58	0.07	7.050	60.1	-1.97	28.290	50.1	-1.1

Table 12. Summary of tritium/helium-3 ages

[W, well; S, spring; Age uncorr., not corrected for terrigenic helium; Uncorr. Err., one standard deviation age error of uncorrected age; Age Corr., age corrected for terrigenic helium; Corr. Err., one standard deviation age error of age corrected for terrigenic helium; Terr. He, terrigenic helium; Y, yes, terrigenic helium correction needed; N, no, terrigenic helium correction not needed; ND, not determined]

SNP No.	Site ID	Site Name	W/S	Date	Time	Age uncorr (years)	Uncorr Err (years)	Age corr (years)	Corr Err (years)	Terr He (Y/N)	Final Age (years)[1]	Final Error (years)
SNP-001	1	HQ #1 Well (W-855)	W	4/1/1996	10:30	14.7	0.4	14.2	0.4	N	14.7	0.4
SNP-090	1	HQ #1 Well (W-855)	W	8/27/1997	8:40	18.6	0.2	18.1	0.3	N	18.6	0.2
SNP-002	2	HQ Spring #14-3 - above HQ on Rt 211	S	4/1/1996	13:00	1.7	0.1	2.7	0.3	N	1.7	0.1
SNP-004	4	Pinnacles Spring #16	S	4/2/1996	9:30	-0.1	0.1	-1.7	0.5	N	-0.1	0.1
SNP-112	4	Pinnacles Spring #16	S	9/4/1997	10:00	-0.3	0.3	-0.5	0.5	N	-0.3	0.3
SNP-006	5	Furnace Spring at Skyland	S	4/2/1996	14:30	-0.1	0.1	0.3	0.4	N	-0.1	0.1
SNP-089	5	Furnace Spring at Skyland	S	8/27/1997	18:35	0.3	0.3	-0.2	0.4	N	0.3	0.3
SNP-125	5	Furnace Spring at Skyland	S	9/11/1997	12:25	-0.1	0.2	-0.3	0.3	N	-0.1	0.2
SNP-169	5	Furnace Spring at Skyland	S	9/18/1997	9:15	0.2	0.2	-0.7	0.3	N	0.2	0.2
SNP-008	6	Skyland #2 (W-1033)	W	4/2/1996	17:30	1.2	0.1	2.0	0.4	N	1.2	0.1
SNP-094	6	Skyland #2 (W-1033)	W	8/28/1997	9:45	2.2	0.2	2.0	0.3	N	2.2	0.2
SNP-009	7	Dundo Spring #29	S	4/3/1996	12:15	0.3	0.2	-0.6	0.5	N	0.3	0.2
SNP-120	7	Dundo Spring #29	S	9/10/1997	10:30	0.1	0.2	-0.3	0.3	N	0.1	0.2
SNP-014	8	Simmons Gap Spring	S	4/4/1996	12:40	0.0	0.1	0.3	0.4	N	0.0	0.1
SNP-131	8	Simmons Gap Spring	S	9/16/1997	13:00	0.6	0.3	0.5	0.4	N	0.6	0.3
SNP-017	9	Panorama Spring #13-3	S	4/5/1996	9:00	0.3	0.1	0.0	0.3	N	0.3	0.1
SNP-018	10	Browntown Valley Overlook Spring	S	4/5/1996	12:40	-0.2	0.1	-1.7	0.5	N	-0.2	0.1
SNP-103	10	Browntown Valley Overlook Spring	S	9/2/1997	9:30	0.8	0.2	0.3	0.4	N	0.8	0.2
SNP-123	10	Browntown Valley Overlook Spring	S	9/11/1997	16:30	0.7	0.2	0.2	0.4	N	0.7	0.2
SNP-139	10	Browntown Valley Overlook Spring	S	9/18/1997	13:30	-0.1	0.2	-1.3	0.5	N	-0.1	0.2
SNP-021	11	Camp Hoover Spring #2	S	4/8/1996	14:30	0.7	0.1	0.0	0.1	N	0.7	0.1
SNP-116	11	Camp Hoover Spring #2	S	9/9/1997	14:00	0.9	0.2	-0.2	0.4	N	0.9	0.2
SNP-022	12	Davids Spring	S	4/8/1996	17:15	2.6	0.1	1.6	0.2	N	2.6	0.1
SNP-110	12	Davids Spring	S	9/4/1997	18:00	4.6	0.2	4.0	0.3	N	4.6	0.2
SNP-024	13	Dickeys Ridge Spring	S	4/10/1996	11:30	-0.1	0.1	-0.2	0.1	N	-0.1	0.1
SNP-129	13	Dickeys Ridge Spring	S	9/12/1997	10:00	-0.1	0.2	-0.9	0.3	N	-0.1	0.2
SNP-025	14	Gravel Spring NE	S	4/10/1996	14:30	0.6	0.1	0.2	0.1	N	0.6	0.1
SNP-101	14	Gravel Spring NE	S	9/2/1997	11:00	0.0	0.2	2.0	0.3	Y	2.0	0.3
SNP-026	15	Pass Mountain Overlook Spring	S	4/10/1996	17:50	0.3	0.1	0.3	0.1	N	0.3	0.1
SNP-100	15	Pass Mountain Overlook Spring	S	9/2/1997	16:00	0.3	0.3	0.0	0.4	N	0.3	0.3
SNP-027	16	Swift Run Gap Spring #27	S	4/11/1996	10:00	2.3	0.1	1.7	0.1	N	2.3	0.1
SNP-133	16	Swift Run Gap Spring #27	S	9/16/1997	10:30	3.2	0.2	2.0	0.4	N	3.2	0.2
SNP-028	17	Dean Mountain/South River Spring	S	4/11/1996	12:00	0.4	0.1	0.2	0.1	N	0.4	0.1
SNP-115	17	Dean Mountain/South River Spring	S	9/5/1997	14:00	0.7	0.3	-0.1	0.5	N	0.7	0.3
SNP-029	18	Baldface Mountain Spring	S	4/11/1996	14:00	-0.2	0.2	0.2	0.3	N	-0.2	0.2
SNP-030	19	Hazeltop Ridge Overlook Spring	S	4/11/1996	18:30	0.1	0.1	-0.4	0.2	N	0.1	0.1
SNP-032	20	Byrds Nest #4/Beahms Gap Spring	S	4/12/1996	9:40	0.1	0.1	2.5	0.2	Y	2.5	0.2
SNP-104	20	Byrds Nest #4/Beahms Gap Spring	S	9/3/1997	12:00	0.3	0.2	0.1	0.3	N	0.3	0.2
SNP-034	21	Byrds Nest #3 Spring	S	4/12/1996	15:20	1.6	0.1	1.3	0.3	N	1.6	0.1
SNP-109	21	Byrds Nest #3 Spring	S	9/4/1997	8:30	2.4	0.2	2.9	0.4	N	2.4	0.2
SNP-127	21	Byrds Nest #3 Spring	S	9/11/1997	14:30	2.3	0.2	2.8	0.4	N	2.3	0.2
SNP-138	21	Byrds Nest #3 Spring	S	9/18/1997	11:00	2.1	0.2	0.9	0.5	N	2.1	0.2
SNP-035	22	Big Meadows #9 Well	W	4/15/1996	11:20	0.7	0.2	-0.2	0.2	N	0.7	0.2
SNP-096	22	Big Meadows #9 Well	W	8/28/1997	13:30	0.3	0.2	-0.2	0.3	N	0.3	0.2
SNP-036	23	Big Meadows #14 Well	W	4/15/1996	14:00	3.7	0.1	2.8	0.2	N	3.7	0.1

Table 12. Summary of tritium/helium-3 ages--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	Age uncorr (years)	Uncorr Err (years)	Age corr (years)	Corr Err (years)	Terr He (Y/N)	Final Age (years)[1]	Final Error (years)
SNP-092	23	Big Meadows #14 Well	W	8/28/1997	11:30	1.2	0.2	1.2	0.2	N	1.2	0.2
SNP-038	24	Hogback Spring #5	S	4/16/1996	11:45	0.2	0.1	0.0	0.4	N	0.2	0.1
SNP-039	25	Elkwallow Well (W-1703)	W	4/16/1996	16:00	3.0	0.1	2.4	0.2	N	3.0	0.1
SNP-086	25	Elkwallow Well (W-1703)	W	8/26/1997	18:30	9.1	0.5	8.9	0.8	N	9.1	0.5
SNP-041	26	Hightop Hut Spring	S	4/17/1996	15:15	1.1	0.1	0.8	0.4	N	1.1	0.1
SNP-043	27	Pass Mountain Hut Spring	S	4/18/1996	9:15	1.0	0.1	0.4	0.4	N	1.0	0.1
SNP-105	27	Pass Mountain Hut Spring	S	9/3/1997	14:10	0.1	0.2	-3.2	0.4	N	0.1	0.2
SNP-048	31	Dickeys Ridge Well (W-1346)	W	4/19/1996	14:40	5.8	0.2	8.0	0.3	Y	8.0	0.3
SNP-084	31	Dickeys Ridge Well (W-1346)	W	8/26/1997	10:50	6.8	0.3	9.7	0.4	Y	9.7	0.4
SNP-050	33	Domestic well #1	W	4/24/1996	9:50	4.1	0.2	2.6	0.5	N	4.1	0.2
SNP-052	35	White Oak Cabin Spring	S	4/25/1996	10:35	-3.0	0.2	0.6	0.4	Y	0.6	0.4
SNP-111	35	White Oak Cabin Spring	S	9/4/1997	15:55	0.5	0.3	1.1	0.4	N	0.5	0.3
SNP-053	36	Big Meadows #1 Well (W-1701)	W	4/25/1996	16:30	17.7	0.4	17.4	0.5	N	17.7	0.4
SNP-083	36	Big Meadows #1 Well (W-1701)	W	9/17/1997	16:30	20.8	0.3	20.2	0.4	N	20.8	0.3
SNP-037	37	HQ #2 Well (W-851)	W	4/16/1996	9:45	4.4	0.2	2.5	0.3	N	4.4	0.2
SNP-087	37	HQ #2 Well (W-851)	W	8/27/1997	10:30	2.4	0.2	2.5	0.3	N	2.4	0.2
SNP-007	38	Skyland #5	W	4/2/1996	16:00	2.1	0.7	-1.5	1.4	N	2.1	0.7
SNP-088	38	Skyland #5	W	8/27/1997	17:10	0.2	0.2	0.0	0.3	N	0.2	0.2
SNP-005	39	Pinnacles Well (W-3288)	W	4/2/1996	12:00	0.4	0.2	-0.5	0.4	N	0.4	0.2
SNP-091	39	Pinnacles Well (W-3288)	W	8/27/1997	12:45	0.3	1.0	-0.3	1.6	N	0.3	1.0
SNP-019	40	Mathews Arm Spring Range View Cabin	S	4/5/1996	14:35	-1.1	0.5	-1.5	0.8	Y	-1.5	0.8
SNP-102	40	Mathews Arm Spring Range View Cabin	S	9/2/1997	13:30	0.0	0.3	-2.0	0.4	N	0.0	0.3
SNP-031	41	Lewis Mountain Spring #25-2	S	4/11/1996	16:30	0.0	0.1	-0.2	0.1	N	0.0	0.1
SNP-054	42	Old Rag Shelter Spring	S	4/26/1996	14:30	-0.1	0.1	-2.5	0.5	N	-0.1	0.1
SNP-118	42	Old Rag Shelter Spring	S	9/9/1997	18:00	-0.1	0.3	-0.9	0.4	N	-0.1	0.3
SNP-015	43	Loft Mountain Overlook Spring	S	4/4/1996	15:30	0.0	0.1	0.1	0.4	N	0.0	0.1
SNP-121	43	Loft Mountain Overlook Spring	S	9/10/1997	17:00	0.0	0.2	-1.0	0.4	N	0.0	0.2
SNP-016	44	Loft Mountain Spring	S	4/4/1996	17:30	0.3	0.1	0.7	0.4	N	0.3	0.1
SNP-122	44	Loft Mountain Spring	S	9/10/1997	15:00	-0.1	0.2	-2.7	0.3	N	-0.1	0.2
SNP-013	45	Simmons Gap Well (W-1704)	W	4/4/1996	9:30	8.6	0.3	8.5	0.5	N	8.6	0.3
SNP-099	45	Simmons Gap Well (W-1704)	W	8/29/1997	10:00	6.7	0.3	7.6	0.5	N	6.7	0.3
SNP-137	46	Yeager's Spring (Luray)	S	9/17/1997	13:10	0.5	0.7	11.7	0.8	Y	11.7	0.8
SNP-042	47	Lewis Mountain Well (W-1072)	W	4/17/1996	18:20	0.3	0.1	1.1	0.4	N	0.3	0.1
SNP-095	47	Lewis Mountain Well (W-1072)	W	8/28/1997	15:45	?	0.4	?	0.4	Y	?	0.4
SNP-046	49	Mathews Arm Well (W-856)	W	4/19/1996	10:40	7.9	0.3	7.8	0.4	N	7.9	0.3
SNP-085	49	Mathews Arm Well (W-856)	W	8/26/1997	15:05	9.3	0.2	9.0	0.4	N	9.3	0.2
SNP-011	50	Loft Mountain Well #1 (W-715)	W	4/3/1996	15:45	23.7	0.5	23.5	0.6	N	23.7	0.5
SNP-098	50	Loft Mountain Well #1 (W-715)	W	8/29/1997	14:00	25.3	0.3	25.1	0.3	N	25.3	0.3
SNP-010	51	Loft Mountain Well #2 (W-754)	W	4/3/1996	14:30	2.0	0.2	2.0	0.4	N	2.0	0.2
SNP-097	51	Loft Mountain Well #2 (W-754)	W	8/29/1997	12:30	5.4	1.2	-0.8	3.7	N	5.4	1.2
SNP-012	52	Ivy Creek Shelter Spring	S	4/3/1996	18:00	0.9	0.1	1.1	0.4	N	0.9	0.1
SNP-119	52	Ivy Creek Shelter Spring	S	9/10/1997	12:00	1.6	0.2	0.8	0.3	N	1.6	0.2
SNP-113	53	Lewis Mountain Spring #25	S	9/5/1997	9:30	1.2	0.3	0.9	0.5	N	1.2	0.3
SNP-033	54	Elkwallow Spring #8	S	4/12/1996	12:30	0.4	0.1	-0.3	0.1	N	0.4	0.1
SNP-106	54	Elkwallow Spring #8	S	9/3/1997	9:00	1.7	0.2	1.1	0.3	N	1.7	0.2
SNP-040	56	HQ Spring #14-1	S	4/17/1996	9:15	0.2	0.1	1.0	0.4	N	0.2	0.1
SNP-117	56	HQ Spring #14-1	S	9/9/1997	9:10	1.4	0.3	6.7	0.4	Y	6.7	0.4
SNP-023	57	Indian Run Shelter Spring	S	4/9/1996	13:00	0.3	0.1	0.1	0.2	N	0.3	0.1
SNP-128	57	Indian Run Shelter Spring	S	9/12/1997	13:30	0.5	0.3	0.1	0.4	N	0.5	0.3
SNP-134	64	Hudson Spring (Luray)	S	9/17/1997	9:45	?	1.1	24.4	0.8	Y	24.4	0.8

Table 12. Summary of tritium/helium-3 ages--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	Age uncorr (years)	Uncorr Err (years)	Age corr (years)	Corr Err (years)	Terr He (Y/N)	Final Age (years)[1]	Final Error (years)
SNP-020	65	Lewis Spring	S	4/8/1996	10:30	-0.1	0.1	-0.3	0.1	N	-0.1	0.1
SNP-093	65	Lewis Spring	S	8/28/1997	17:05	-0.1	0.2	-0.6	0.3	N	-0.1	0.2
SNP-124	65	Lewis Spring	S	9/11/1997	9:35	0.4	0.2	0.7	0.3	N	0.4	0.2
SNP-135	65	Lewis Spring	S	9/17/1997	16:00	-0.1	0.2	-0.1	0.3	N	-0.1	0.2
VR-02	67	Town of Shenandoah #5	W	7/6/1999	16:15	9.2	0.3	6.8	1.5	N	9.2	0.3
VR-03	68	Waynesboro Jefferson Ave #1	W	7/7/1999	10:35	8.8	0.3	18.2	1.1	Y	18.2	1.1
VR-06	71	Town of Shenandoah #2	W	7/8/1999	16:20	11.7	0.3	6.2	2.1	N	11.7	0.3
VR-07	72	Town of Shenandoah #3	W	7/8/1999	18:20	18.2	1.1	17.0	1.2	N	17.0	1.2
VR-08	73	Town of Stanley #6	W	7/9/1999	10:15	ND	ND	40.8	2.0	Y	40.8	2.0
VR-09	74	Town of Stanley #5	W	7/9/1999	13:00	ND	ND	29.0	0.8	Y	29.0	0.8
VR-10	75	Town of Stanley #4	W	7/9/1999	15:00	ND	ND	14.6	1.2	Y	14.6	1.2

[1] Final age is the corrected age if terrigenic helium is present, and otherwise, is the uncorrected age.

Table 13. Summary of hydrogen (δ^2H, ^3H), oxygen ($\delta^{18}O$), sulfur (^{35}S, $\delta^{34}S$), and nitrogen ($\delta^{15}N$) isotopic data

[W, well; S, spring; per mil, parts per thousand; TU, Tritium Unit, 1 TU=1atom of ^3H in 10^{18} atoms of H; mg/L, milligrams per liter; $\delta=((R_{sample}/R_{standard})-1)x1000$, where R is an isotope ratio; mBq/L, millibecquerel per liter; ND, not determined.
δ^2H and $\delta^{18}O$ were determined on water samples at the U.S. Geological Survey Stable Isotope Laboratory, Reston, Virginia.
The stable isotope results are reported in per mil relative to VSMOW (Vienna Standard Mean Ocean Water; Coplen, 1996)
and normalized (Coplen, 1988) on scales such that the oxygen and hydrogen isotopic values of SLAP (Standard Light Antarctic Precipitation)
are -55.5 and -428 per mil, respectively. The 2 σ precision of oxygen- and hydrogen-isotope results is 0.2 and 1.5 per mil, respectively.
Water samples for the determination of ^3H were enriched electrolytically and analyzed by liquid scintillation counting in the low-level ^3H laboratory
of the U.S. Geological Survey, now located in Menlo Park, CA, following procedures modified from those described by Thatcher et al. (1977).
$\delta^{34}S$ was determined on sulfur in dissolved sulfate in per mil relative to VCDT (Vienna Canyon Diablo Troilite), defined by assigning a value
of –0.3 per mil exactly to IAEA-S-1 silver sulfide (previously known as NZ1). The 1σ uncertainty is ± 0.2 per mil. $\delta^{15}N$ was determined on
nitrogen in dissolved nitrate in per mil relative to air. Replicate samples differ by less than 0.2 per mil. ^{35}S was determined by scintillation
counting on $BaSO_4$ samples prepared by resin extraction of dissolved SO_4 from approximately 20 liter samples].

SNP No.	Site ID	Site Name	W/S	Date	Time	δ^2H (per mil)	$\delta^{18}O$ (per mil)	^3H (TU)	^3H Err (+/-TU)	^{35}S (mBq/L)	^{35}S Err (+/- mBq/L)	$\delta^{34}S$ (per mil)	$\delta^{15}N$ (per mil)
SNP-001	1	HQ #1 Well (W-855)	W	4/1/1996	10:30	-52.0	-8.1	18.0	0.7	ND	ND	5.70	4.39
SNP-090	1	HQ #1 Well (W-855)	W	8/27/1997	8:40	-49.7	-8.1	15.4	0.3	ND	ND	5.20	ND
SNP-002	2	HQ Spring #14-3 - above HQ on Rt 211	S	4/1/1996	13:00	-48.7	-8.1	11.4	0.5	ND	ND	4.40	2.45
SNP-003	3	Hemlock Spring	S	4/1/1996	15:00	-50.6	-8.7	7.6	0.4	ND	ND	6.00	0.07
SNP-108	3	Hemlock Spring	S	9/4/1997	12:00	-50.4	-8.5	8.0	0.2	ND	ND	5.96	ND
SNP-004	4	Pinnacles Spring #16	S	4/2/1996	9:30	-52.3	-8.6	8.4	0.4	ND	ND	6.90	ND
SNP-112	4	Pinnacles Spring #16	S	9/4/1997	10:00	-49.1	-8.4	6.8	0.2	ND	ND	5.23	ND
SNP-006	5	Furnace Spring at Skyland	S	4/2/1996	14:30	-52.6	-8.7	9.5	0.5	ND	ND	5.30	1.68
SNP-089	5	Furnace Spring at Skyland	S	8/27/1997	18:35	-51.3	-8.6	8.8	0.2	ND	ND	5.14	ND
SNP-125	5	Furnace Spring at Skyland	S	9/11/1997	12:25	-50.0	-8.3	8.9	0.2	ND	ND	5.48	ND
SNP-169	5	Furnace Spring at Skyland	S	9/18/1997	9:15	-52.3	-8.5	8.5	0.2	ND	ND	5.40	ND
SNP-182	5	Furnace Spring at Skyland	S	3/2/1999	14:35	-55.5	-8.9	ND	ND	ND	ND	ND	ND
SNP-187	5	Furnace Spring at Skyland	S	4/2/1999	11:20	-55.3	-9.0	ND	ND	ND	ND	ND	ND
SNP-192	5	Furnace Spring at Skyland	S	4/27/1999	14:40	-53.8	-9.0	ND	ND	0.50	0.50	ND	ND
SNP-197	5	Furnace Spring at Skyland	S	5/26/1999	14:50	-53.7	-8.9	ND	ND	1.10	0.40	ND	ND
SNP-202	5	Furnace Spring at Skyland	S	6/23/1999	13:40	-53.6	-8.9	ND	ND	-0.18	0.22	ND	ND
SNP-221	5	Furnace Spring at Skyland	S	7/15/1999	11:45	-52.8	-8.9	ND	ND	0.30	0.20	ND	ND
SNP-224	5	Furnace Spring at Skyland	S	8/11/1999	13:30	-54.7	-8.9	ND	ND	0.30	0.30	ND	ND
SNP-260	5	Furnace Spring at Skyland	S	9/7/1999	12:45	-53.2	-8.7	ND	ND	0.60	0.25	ND	ND
SNP-266	5	Furnace Spring at Skyland	S	9/9/1999	12:30	-52.0	-8.8	ND	ND	-0.10	0.30	ND	ND
SNP-271	5	Furnace Spring at Skyland	S	9/22/1999	12:09	-53.2	-8.8	ND	ND	0.40	0.50	ND	ND
SNP-008	6	Skyland #2 (W-1033)	W	4/2/1996	17:30	-52.2	-8.7	10.0	0.5	ND	ND	6.30	ND
SNP-094	6	Skyland #2 (W-1033)	W	8/28/1997	9:45	-52.4	-8.7	10.0	0.3	ND	ND	4.72	ND
SNP-232	6	Skyland #2 (W-1033)	W	8/17/1999	11:25	-54.0	-8.7	ND	ND	0.00	0.40	ND	ND
SNP-009	7	Dundo Spring #29	S	4/3/1996	12:15	-46.5	-8.0	8.3	0.5	ND	ND	6.00	ND
SNP-120	7	Dundo Spring #29	S	9/10/1997	10:30	-34.8	-6.4	12.5	0.3	ND	ND	3.82	ND
SNP-014	8	Simmons Gap Spring	S	4/4/1996	12:40	-46.0	-8.1	8.3	0.4	ND	ND	5.50	0.92
SNP-131	8	Simmons Gap Spring	S	9/16/1997	13:00	-47.4	-8.0	8.4	0.2	ND	ND	5.27	ND
SNP-238	8	Simmons Gap Spring	S	8/18/1999	10:45	-48.3	-8.2	ND	ND	0.40	0.30	ND	ND
SNP-017	9	Panorama Spring #13-3	S	4/5/1996	9:00	-48.7	-8.2	12.3	0.5	ND	ND	3.80	2.43
SNP-107	9	Panorama Spring #13-3	S	9/3/1997	17:00	-50.1	-8.1	ND	ND	ND	ND	ND	ND

Table 13. Summary of hydrogen, oxygen, sulfur, and nitrogen isotopic data--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	δ^2H (per mil)	$\delta^{18}O$ (per mil)	^3H (TU)	^3H Err (+/-TU)	^{35}S (mBq/L)	^{35}S Err (+/- mBq/L)	$\delta^{34}S$ (per mil)	$\delta^{15}N$ (per mil)
SNP-018	10	Browntown Valley Overlook Spring	S	4/5/1996	12:40	-53.9	-8.9	9.2	0.4	ND	ND	5.30	1.64
SNP-103	10	Browntown Valley Overlook Spring	S	9/2/1997	9:30	-52.7	-8.6	8.7	0.2	ND	ND	5.48	ND
SNP-123	10	Browntown Valley Overlook Spring	S	9/11/1997	16:30	-49.3	-8.3	9.1	0.2	ND	ND	5.15	ND
SNP-139	10	Browntown Valley Overlook Spring	S	9/18/1997	13:30	-51.0	-8.4	8.2	0.2	ND	ND	5.45	ND
SNP-184	10	Browntown Valley Overlook Spring	S	3/3/1999	10:00	-55.3	-9.1	ND	ND	ND	ND	ND	ND
SNP-189	10	Browntown Valley Overlook Spring	S	4/2/1999	15:00	-54.9	-9.3	ND	ND	ND	ND	ND	ND
SNP-193	10	Browntown Valley Overlook Spring	S	4/28/1999	10:30	-55.8	-9.2	ND	ND	-0.20	0.40	ND	ND
SNP-198	10	Browntown Valley Overlook Spring	S	5/27/1999	9:05	-55.4	-9.0	ND	ND	-0.30	0.30	ND	ND
SNP-204	10	Browntown Valley Overlook Spring	S	6/24/1999	11:55	-53.3	-9.0	ND	ND	0.09	0.27	ND	ND
SNP-219	10	Browntown Valley Overlook Spring	S	7/14/1999	14:35	-53.6	-8.9	ND	ND	0.20	0.20	ND	ND
SNP-225	10	Browntown Valley Overlook Spring	S	8/12/1999	9:20	-53.2	-9.0	ND	ND	0.40	0.30	ND	ND
SNP-262	10	Browntown Valley Overlook Spring	S	9/7/1999	16:30	-46.4	-8.0	ND	ND	1.20	0.30	ND	ND
SNP-268	10	Browntown Valley Overlook Spring	S	9/10/1999	8:25	-50.0	-8.5	ND	ND	0.20	0.30	ND	ND
SNP-273	10	Browntown Valley Overlook Spring	S	9/22/1999	15:45	-52.2	-8.7	ND	ND	0.40	0.30	ND	ND
SNP-021	11	Camp Hoover Spring #2	S	4/8/1996	14:30	-43.5	-7.8	10.4	0.5	ND	ND	8.60	ND
SNP-116	11	Camp Hoover Spring #2	S	9/9/1997	14:00	-46.2	-7.8	9.8	0.3	ND	ND	6.46	ND
SNP-234	11	Camp Hoover Spring #2	S	8/17/1999	14:35	-47.0	-7.9	ND	ND	-0.04	0.40	ND	ND
SNP-022	12	Davids Spring	S	4/8/1996	17:15	-49.5	-8.4	11.7	0.5	ND	ND	5.20	3.79
SNP-110	12	Davids Spring	S	9/4/1997	18:00	-50.1	-8.6	10.2	0.2	ND	ND	ND	4.01
SNP-243	12	Davids Spring	S	8/20/1999	11:05	-51.0	-8.6	ND	ND	0.40	0.40	ND	ND
SNP-024	13	Dickeys Ridge Spring	S	4/10/1996	11:30	-51.7	-8.7	11.2	0.5	ND	ND	4.40	1.42
SNP-129	13	Dickeys Ridge Spring	S	9/12/1997	10:00	-51.2	-8.3	10.0	0.2	ND	ND	3.35	1.00
SNP-130	13	Dickeys Ridge Spring	S	9/12/1997	9:45	-49.1	-8.2	ND	ND	ND	ND	ND	ND
SNP-246	13	Dickeys Ridge Spring (pipe 2)	S	8/20/1999	17:00	-50.4	-8.5	ND	ND	ND	ND	ND	ND
SNP-025	14	Gravel Spring NE	S	4/10/1996	14:30	-48.7	-8.3	11.8	0.5	ND	ND	5.50	1.49
SNP-101	14	Gravel Spring NE	S	9/2/1997	11:00	-49.9	-8.3	10.6	0.2	ND	ND	5.66	ND
SNP-026	15	Pass Mountain Overlook Spring	S	4/10/1996	17:50	-51.2	-8.2	9.7	0.5	ND	ND	3.20	ND
SNP-100	15	Pass Mountain Overlook Spring	S	9/2/1997	16:00	-51.2	-8.2	7.9	0.2	ND	ND	2.34	ND
SNP-027	16	Swift Run Gap Spring #27	S	4/11/1996	10:00	-44.9	-7.8	11.0	0.5	ND	ND	1.80	3.13
SNP-133	16	Swift Run Gap Spring #27	S	9/16/1997	10:30	-44.6	-7.7	9.3	0.2	ND	ND	ND	ND
SNP-028	17	Dean Mountain/South River Spring	S	4/11/1996	12:00	-47.6	-8.1	9.9	0.5	ND	ND	5.80	1.37
SNP-115	17	Dean Mountain/South River Spring	S	9/5/1997	14:00	-47.4	-8.0	6.4	0.1	ND	ND	6.23	ND
SNP-029	18	Baldface Mountain Spring	S	4/11/1996	14:00	-46.6	-8.4	8.2	0.4	ND	ND	6.50	ND
SNP-030	19	Hazeltop Ridge Overlook Spring	S	4/11/1996	18:30	-48.9	-8.2	8.4	0.5	ND	ND	5.10	1.48
SNP-032	20	Byrds Nest #4/Beahms Gap Spring	S	4/12/1996	9:40	-50.1	-8.4	10.8	0.5	ND	ND	6.20	2.11
SNP-104	20	Byrds Nest #4/Beahms Gap Spring	S	9/3/1997	12:00	-51.2	-8.3	11.1	0.2	ND	ND	-0.47	ND
SNP-034	21	Byrds Nest #3 Spring	S	4/12/1996	15:20	-51.2	-8.3	8.7	0.4	ND	ND	5.30	1.66
SNP-109	21	Byrds Nest #3 Spring	S	9/4/1997	8:30	-50.5	-8.2	8.4	0.2	ND	ND	6.17	ND
SNP-127	21	Byrds Nest #3 Spring	S	9/11/1997	14:30	-50.6	-8.3	8.4	0.2	ND	ND	4.79	ND
SNP-138	21	Byrds Nest #3 Spring	S	9/18/1997	11:00	-49.0	-8.3	8.1	0.2	ND	ND	3.82	ND
SNP-183	21	Byrds Nest #3 Spring	S	3/2/1999	16:50	-49.2	-8.3	ND	ND	ND	ND	ND	ND
SNP-188	21	Byrds Nest #3 Spring	S	4/2/1999	12:50	-50.3	-8.3	ND	ND	ND	ND	ND	ND
SNP-194	21	Byrds Nest #3 Spring	S	4/28/1999	17:25	-49.2	-8.3	ND	ND	-0.40	0.40	ND	ND
SNP-199	21	Byrds Nest #3 Spring	S	5/27/1999	11:22	-48.9	-8.4	ND	ND	0.00	0.40	ND	ND
SNP-203	21	Byrds Nest #3 Spring	S	6/24/1999	9:05	-48.9	-8.3	ND	ND	0.08	0.22	ND	ND
SNP-218	21	Byrds Nest #3 Spring	S	7/14/1999	11:34	-48.5	-8.3	ND	ND	-0.50	0.20	ND	ND
SNP-226	21	Byrds Nest #3 Spring	S	8/12/1999	12:00	-50.6	-8.3	ND	ND	-0.10	0.30	ND	ND
SNP-261	21	Byrds Nest #3 Spring	S	9/7/1999	14:20	-48.5	-8.3	ND	ND	0.10	0.30	ND	ND
SNP-267	21	Byrds Nest #3 Spring	S	9/9/1999	14:30	-45.6	-8.3	ND	ND	0.10	0.30	ND	ND
SNP-272	21	Byrds Nest #3 Spring	S	9/22/1999	13:45	-49.9	-8.4	ND	ND	0.00	0.30	ND	ND

Table 13. Summary of hydrogen, oxygen, sulfur, and nitrogen isotopic data--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	δ^2H (per mil)	$\delta^{18}O$ (per mil)	^3H (TU)	^3H Err (+/-TU)	^{35}S (mBq/L)	^{35}S Err (+/- mBq/L)	$\delta^{34}S$ (per mil)	$\delta^{15}N$ (per mil)
SNP-035	22	Big Meadows #9 Well	W	4/15/1996	11:20	-50.1	-8.4	10.2	0.4	ND	ND	5.00	ND
SNP-096	22	Big Meadows #9 Well	W	8/28/1997	13:30	-49.8	-8.4	10.5	0.2	ND	ND	4.27	ND
SNP-036	23	Big Meadows #14 Well	W	4/15/1996	14:00	-51.5	-8.6	13.4	0.4	ND	ND	6.00	ND
SNP-092	23	Big Meadows #14 Well	W	8/28/1997	11:30	-50.4	-8.4	12.0	0.2	ND	ND	ND	ND
SNP-038	24	Hogback Spring #5	S	4/16/1996	11:45	-51.0	-8.5	8.2	0.4	ND	ND	6.50	ND
SNP-039	25	Elkwallow Well (W-1703)	W	4/16/1996	16:00	-49.6	-8.5	12.1	0.5	ND	ND	5.60	1.41
SNP-086	25	Elkwallow Well (W-1703)	W	8/26/1997	18:30	-53.1	-8.5	4.3	0.1	ND	ND	5.27	ND
SNP-228	25	Elkwallow Well (W-1703)	W	8/16/1999	11:45	-51.7	-8.6	ND	ND	0.30	0.30	ND	ND
SNP-041	26	Hightop Hut Spring	S	4/17/1996	15:15	-47.6	-8.1	9.7	0.5	ND	ND	5.60	1.16
SNP-132	26	Hightop Hut Spring	S	9/16/1997	15:45	-47.6	-8.1	ND	ND	ND	ND	5.56	1.18
SNP-043	27	Pass Mountain Hut Spring	S	4/18/1996	9:15	-50.3	-8.2	10.0	0.5	ND	ND	5.20	2.20
SNP-105	27	Pass Mountain Hut Spring	S	9/3/1997	14:10	-49.0	-8.2	9.1	0.2	ND	ND	1.27	ND
SNP-044	28	Spring at mile 97.3 (D/O-18 3H only)	S	4/18/1996	15:20	-43.4	-7.4	ND	ND	ND	ND	ND	ND
SNP-045	29	Spring at mile 98.7 (D/O-18 3H only)	S	4/18/1996	15:30	-45.2	-8.0	ND	ND	ND	ND	ND	ND
SNP-047	30	Mathews Arm Stream (D/O-18 3H only)	S	4/19/1996	10:00	-51.9	-8.7	ND	ND	ND	ND	ND	ND
SNP-048	31	Dickeys Ridge Well (W-1346)	W	4/19/1996	14:40	-51.7	-8.4	12.6	0.5	ND	ND	5.10	2.27
SNP-084	31	Dickeys Ridge Well (W-1346)	W	8/26/1997	10:50	-53.4	-8.9	9.6	0.2	ND	ND	-0.41	ND
SNP-049	32	Sneads Farm Spring (D/O-18 3H only)	S	4/19/1996	8:30	-55.7	-8.9	11.6	0.5	ND	ND	0.00	ND
SNP-171	32	Sneads Farm Spring (D/O-18 3H only)	S	ND	ND	-49.2	-8.5	ND	ND	ND	ND	ND	ND
SNP-050	33	Domestic well #1	W	4/24/1996	9:50	-53.6	-8.3	9.9	0.5	ND	ND	4.70	5.06
SNP-051	34	Domestic well #2	W	4/24/1996	14:55	-50.3	-7.9	ND	ND	ND	ND	2.50	9.28
SNP-052	35	White Oak Cabin Spring	S	4/25/1996	10:35	-50.5	-8.7	8.3	0.4	ND	ND	5.20	ND
SNP-111	35	White Oak Cabin Spring	S	9/4/1997	15:55	-50.1	-8.5	7.5	0.2	ND	ND	5.31	ND
SNP-053	36	Big Meadows #1 Well (W-1701)	W	4/25/1996	16:30	-53.4	-8.7	13.4	0.5	ND	ND	5.70	ND
SNP-083	36	Big Meadows #1 Well (W-1701)	W	9/17/1997	16:30	-53.0	-8.6	10.1	0.2	ND	ND	3.56	ND
SNP-037	37	HQ #2 Well (W-851)	W	4/16/1996	9:45	-50.5	-7.9	13.3	0.5	ND	ND	6.00	2.71
SNP-087	37	HQ #2 Well (W-851)	W	8/27/1997	10:30	-47.1	-7.6	11.2	0.2	ND	ND	5.52	ND
SNP-007	38	Skyland #5	W	4/2/1996	16:00	-52.3	-8.6	10.1	0.5	ND	ND	5.80	ND
SNP-088	38	Skyland #5	W	8/27/1997	17:10	-51.6	-8.7	8.3	0.2	ND	ND	5.25	ND
SNP-005	39	Pinnacles Well (W-3288)	W	4/2/1996	12:00	-51.5	-8.6	8.0	0.4	ND	ND	4.90	1.49
SNP-091	39	Pinnacles Well (W-3288)	W	8/27/1997	12:45	-49.4	-8.5	6.4	0.1	ND	ND	2.78	1.24
SNP-019	40	Mathews Arm Spring Range View Cabin	S	4/5/1996	14:35	-49.7	-8.5	9.5	0.5	ND	ND	4.90	1.77
SNP-102	40	Mathews Arm Spring Range View Cabin	S	9/2/1997	13:30	-51.7	-8.3	8.2	0.2	ND	ND	5.26	1.71
SNP-031	41	Lewis Mountain Spring #25-2	S	4/11/1996	16:30	-49.4	-8.4	9.2	0.5	ND	ND	5.20	ND
SNP-114	41	Lewis Mountain Spring #25-2	S	9/5/1997	11:00	-49.0	-8.2	ND	ND	ND	ND	ND	ND
SNP-054	42	Old Rag Shelter Spring	S	4/26/1996	14:30	-43.9	-7.6	9.0	0.4	ND	ND	3.70	1.69
SNP-118	42	Old Rag Shelter Spring	S	9/9/1997	18:00	-44.9	-7.6	8.6	0.2	ND	ND	ND	ND
SNP-015	43	Loft Mountain Overlook Spring	S	4/4/1996	15:30	-45.7	-8.0	8.1	0.4	ND	ND	4.80	1.20
SNP-121	43	Loft Mountain Overlook Spring	S	9/10/1997	17:00	-45.3	-7.6	9.2	0.2	ND	ND	4.70	ND
SNP-016	44	Loft Mountain Spring	S	4/4/1996	17:30	-44.9	-7.8	9.2	0.5	ND	ND	5.60	2.49
SNP-122	44	Loft Mountain Spring	S	9/10/1997	15:00	-37.5	-6.7	10.5	0.2	ND	ND	4.17	ND
SNP-013	45	Simmons Gap Well (W-1704)	W	4/4/1996	9:30	-48.8	-8.1	9.1	0.4	ND	ND	4.90	2.06
SNP-099	45	Simmons Gap Well (W-1704)	W	8/29/1997	10:00	-48.4	-8.0	6.9	0.1	ND	ND	4.69	ND
SNP-137	46	Yeager's Spring (Luray)	S	9/17/1997	13:10	-47.0	-7.4	8.1	0.2	ND	ND	16.38	7.02
SNP-248	46	Yeager's Spring (Luray)	S	8/23/1999	11:20	-50.8	-8.1	ND	ND	0.70	0.40	ND	ND
SNP-042	47	Lewis Mountain Well (W-1072)	W	4/17/1996	18:20	-48.1	-8.3	8.3	0.4	ND	ND	6.00	ND
SNP-095	47	Lewis Mountain Well (W-1072)	W	8/28/1997	15:45	-50.0	-8.2	8.8	0.2	ND	ND	5.79	ND
SNP-140	47	Lewis Mountain Well (W-1072)	W	9/19/1997	9:30	-49.0	-8.1	7.4	0.2	ND	ND	5.41	ND
SNP-170	48	Bear Lithia Spring	S	9/8/1997	17:15	-49.7	-7.9	5.1	0.3	ND	ND	ND	ND
SNP-046	49	Mathews Arm Well (W-856)	W	4/19/1996	10:40	-53.5	-8.5	ND	ND	ND	ND	ND	1.36

Table 13. Summary of hydrogen, oxygen, sulfur, and nitrogen isotopic data--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	$\delta^{2}H$ (per mil)	$\delta^{18}O$ (per mil)	^{3}H (TU)	^{3}H Err (+/-TU)	^{35}S (mBq/L)	^{35}S Err (+/- mBq/L)	$\delta^{34}S$ (per mil)	$\delta^{15}N$ (per mil)
SNP-085	49	Mathews Arm Well (W-856)	W	8/26/1997	15:05	-51.6	-8.5	11.0	0.2	ND	ND	4.83	ND
SNP-011	50	Loft Mountain Well #1 (W-715)	W	4/3/1996	15:45	-49.4	-8.3	15.3	0.6	ND	ND	14.90	2.44
SNP-098	50	Loft Mountain Well #1 (W-715)	W	8/29/1997	14:00	-48.4	-8.3	12.2	0.2	ND	ND	15.32	ND
SNP-010	51	Loft Mountain Well #2 (W-754)	W	4/3/1996	14:30	-47.8	-8.1	10.0	0.5	ND	ND	11.60	ND
SNP-097	51	Loft Mountain Well #2 (W-754)	W	8/29/1997	12:30	-49.9	-8.1	8.7	0.2	ND	ND	15.67	ND
SNP-012	52	Ivy Creek Shelter Spring	S	4/3/1996	18:00	-47.1	-8.1	8.1	0.4	ND	ND	4.60	1.68
SNP-119	52	Ivy Creek Shelter Spring	S	9/10/1997	12:00	-46.5	-7.8	9.5	0.2	ND	ND	4.64	1.51
SNP-113	53	Lewis Mountain Spring #25	S	9/5/1997	9:30	-49.5	-8.2	6.9	0.2	ND	ND	4.83	ND
SNP-033	54	Elkwallow Spring #8	S	4/12/1996	12:30	-50.3	-8.4	9.2	0.4	ND	ND	4.60	1.58
SNP-106	54	Elkwallow Spring #8	S	9/3/1997	9:00	-51.1	-8.3	10.2	0.2	ND	ND	4.78	1.76
SNP-244	54	Elkwallow Spring #8	S	8/20/1999	13:50	-51.5	-8.5	ND	ND	0.50	0.30	ND	ND
SNP-136	55	Hite Spring (Luray)	S	9/17/1997	11:40	-49.6	-7.9	4.4	0.1	ND	ND	27.28	7.33
SNP-040	56	HQ Spring #14-1	S	4/17/1996	9:15	-50.1	-8.1	10.4	0.5	ND	ND	4.10	2.39
SNP-117	56	HQ Spring #14-1	S	9/9/1997	9:10	-50.9	-8.2	13.5	0.8	ND	ND	2.99	ND
SNP-023	57	Indian Run Shelter Spring	S	4/9/1996	13:00	-49.5	-8.3	10.3	0.5	ND	ND	5.40	1.43
SNP-128	57	Indian Run Shelter Spring	S	9/12/1997	13:30	-48.9	-8.2	8.7	0.2	ND	ND	5.09	ND
SNP-251	57	Indian Run Shelter Spring	S	8/23/1999	18:15	-50.8	-8.5	ND	ND	0.10	0.40	ND	ND
SNP-134	64	Hudson Spring (Luray)	S	9/17/1997	9:45	-50.5	-8.1	2.9	0.1	ND	ND	24.39	6.36
SNP-180	64	Hudson Spring (Luray)	S	3/2/1999	10:10	-51.6	-8.0	ND	ND	ND	ND	ND	ND
SNP-185	64	Hudson Spring (Luray)	S	4/2/1999	8:40	-51.5	-8.0	ND	ND	ND	ND	ND	ND
SNP-190	64	Hudson Spring (Luray)	S	4/27/1999	9:40	-50.3	-8.0	ND	ND	ND	ND	ND	ND
SNP-195	64	Hudson Spring (Luray)	S	5/26/1999	10:00	-51.6	-8.0	ND	ND	-0.20	0.40	ND	ND
SNP-200	64	Hudson Spring (Luray)	S	6/23/1999	9:30	-50.9	-8.0	ND	ND	0.35	0.24	ND	ND
SNP-217	64	Hudson Spring (Luray)	S	7/14/1999	9:30	-51.0	-8.1	ND	ND	-0.10	0.20	ND	ND
SNP-222	64	Hudson Spring (Luray)	S	8/11/1999	9:15	-52.0	-8.1	ND	ND	0.10	0.40	ND	ND
SNP-258	64	Hudson Spring (Luray)	S	9/7/1999	9:30	-52.6	-8.0	ND	ND	-0.20	0.30	ND	ND
SNP-264	64	Hudson Spring (Luray)	S	9/9/1999	9:05	-51.2	-8.0	ND	ND	-0.30	0.30	ND	ND
SNP-269	64	Hudson Spring (Luray)	S	9/22/1999	9:00	-51.4	-8.1	ND	ND	-0.30	0.30	ND	ND
SNP-020	65	Lewis Spring	S	4/8/1996	10:30	-50.5	-8.5	11.4	0.5	ND	ND	4.70	1.90
SNP-093	65	Lewis Spring	S	8/28/1997	17:05	-50.5	-8.5	9.6	0.2	ND	ND	4.62	2.33
SNP-124	65	Lewis Spring	S	9/11/1997	9:35	-51.3	-8.4	9.6	0.2	ND	ND	4.72	ND
SNP-126	65	Lewis Spring	S	9/11/1997	10:50	-51.6	-8.4	ND	ND	ND	ND	ND	ND
SNP-135	65	Lewis Spring	S	9/17/1997	16:00	-51.0	-8.5	10.0	0.2	ND	ND	4.47	2.42
SNP-181	65	Lewis Spring	S	3/2/1999	12:30	-53.0	-8.7	ND	ND	ND	ND	ND	ND
SNP-186	65	Lewis Spring	S	4/2/1999	10:10	-54.3	-8.8	ND	ND	ND	ND	ND	ND
SNP-191	65	Lewis Spring	S	4/27/1999	13:00	-53.0	-8.7	ND	ND	0.10	0.40	ND	ND
SNP-196	65	Lewis Spring	S	5/26/1999	12:55	-51.0	-8.7	ND	ND	0.60	0.30	ND	ND
SNP-201	65	Lewis Spring	S	6/23/1999	11:50	-53.0	-8.7	ND	ND	0.11	0.21	ND	ND
SNP-220	65	Lewis Spring	S	7/15/1999	9:25	-53.3	-8.6	ND	ND	0.00	0.20	ND	ND
SNP-223	65	Lewis Spring	S	8/11/1999	11:35	-52.4	-8.7	ND	ND	-0.70	0.50	ND	ND
SNP-265	65	Lewis Spring	S	9/9/1999	10:40	-51.9	-8.7	ND	ND	0.00	0.30	ND	ND
SNP-270	65	Lewis Spring	S	9/22/1999	10:40	-53.2	-8.7	ND	ND	0.00	0.30	ND	ND
VR-01	66	Town of Stanley # 3	W	7/6/1999	12:30	-53.9	-8.3	0.0	0.0	ND	ND	ND	ND
VR-02	67	Town of Shenandoah # 5	W	7/6/1999	16:15	-52.1	-8.2	4.5	0.1	ND	ND	ND	ND
VR-03	68	Wanyesboro Jefferson Rd # 1	W	7/7/1999	10:35	-47.2	-7.8	4.7	0.1	ND	ND	ND	ND
VR-04	69	Coyner Spring	S	7/7/1999	14:00	-50.2	-7.9	3.8	0.1	ND	ND	ND	ND
VR-06	71	Town of Shenandoah # 2	W	7/8/1999	16:20	-51.7	-8.1	4.7	0.1	ND	ND	ND	ND
VR-07	72	Town of Shenandoah # 3	W	7/8/1999	18:20	-51.8	-8.1	3.7	0.1	ND	ND	ND	ND
VR-08	73	Town of Stanley # 6	W	7/9/1999	10:15	-51.1	-8.1	0.8	0.0	ND	ND	ND	ND
VR-09	74	Town of Stanley # 5	W	7/9/1999	13:00	-52.2	-7.9	5.2	0.1	0.80	0.60	ND	ND
VR-10	75	Town of Stanley # 4	W	7/9/1999	15:00	-51.8	-8.1	3.7	0.1	0.60	0.30	ND	ND
VR-11	76	Town of Stanley # 2	W	7/9/1999	16:45	-52.9	-8.1	0.6	0.1	-0.10	0.70	ND	ND

Table 14. Summary of field parameters and major-element chemistry

[W, well; S, spring; Temp., field water temperature; °C, degrees Celsius; O_2, dissolved oxygen; mg/L, milligrams per liter; Sp. Cond., specific conductance in µS/cm, microsiemens per centimeter at 25 °C; Q, discharge in gpm, gallons per minute; Ca^{2+}, calcium; Mg^{2+}, magnesium, Na^{+}, sodium; K^{+}, potassium; Cl^{-}, chloride; SO_4^{2-}, sulfate; HCO_3^{-}, total titration alkalinity as bicarbonate; ND, not determined]

SNP No.	Site ID	Site Name	W/S	Date	Time	Temp (°C)	O_2 (mg/l)	pH	Sp Cond (µS/cm)	Q (gpm)	Ca^{2+} (mg/L)	Mg^{2+} (mg/L)	Na^{+} (mg/L)	K^{+} (mg/L)	Cl^{-} (mg/L)	SO_4^{2-} (mg/L)	HCO_3^{-} (mg/L)
SNP-001	1	HQ #1 Well (W-855)	W	4/1/1996	10:30	13.1	4.7	6.83	124.5	ND	9.50	9.90	5.75	0.51	6.29	0.79	78.7
SNP-090	1	HQ #1 Well (W-855)	W	8/27/1997	8:40	14.3	5.1	6.53	162.6	36	10.5	9.7	5.15	0.68	6.54	0.60	81.9
SNP-227	1	HQ #1 Well (W-855)	W	8/16/1999	9:00	13.9	6.1	7.11	200.0	ND	12.3	12.6	7.01	0.70	17.40	1.49	88.7
SNP-002	2	HQ Spring #14-3 - above HQ on Rt 211	S	4/1/1996	13:00	9.8	8.9	6.12	66.0	ND	4.85	2.43	2.78	0.43	5.07	1.43	22.6
SNP-003	3	Hemlock Spring	S	4/1/1996	15:00	7.2	9.4	6.46	20.9	ND	1.37	0.65	0.75	0.09	0.63	1.62	5.4
SNP-108	3	Hemlock Spring	S	9/4/1997	12:00	8.8	10.2	6.71	24.2	ND	1.74	0.75	0.86	0.23	1.54	1.00	7.8
SNP-231	3	Hemlock Spring	S	8/17/1999	9:45	9.7	10.8	6.28	24.9	2.5	2.00	0.87	0.88	0.20	0.62	0.96	9.2
SNP-004	4	Pinnacles Spring #16	S	4/2/1996	9:30	8.1	9.6	5.64	8.2	ND	0.47	0.13	0.88	0.34	0.71	1.03	2.5
SNP-112	4	Pinnacles Spring #16	S	9/4/1997	10:00	11.4	9.1	6.14	11.1	ND	0.39	0.09	0.88	0.46	0.74	0.37	2.7
SNP-006	5	Furnace Spring at Skyland	S	4/2/1996	14:30	7.3	10.0	6.25	40.2	ND	3.68	1.21	1.35	0.18	3.62	2.20	10.2
SNP-089	5	Furnace Spring at Skyland	S	8/27/1997	18:35	8.5	9.6	6.35	52.1	ND	4.58	1.46	1.55	0.20	3.63	2.01	14.3
SNP-125	5	Furnace Spring at Skyland	S	9/11/1997	12:25	8.7	10.1	6.28	48.0	175	4.15	1.30	1.36	0.42	2.85	2.33	13.2
SNP-169	5	Furnace Spring at Skyland	S	9/18/1997	9:15	8.4	10.9	6.20	46.8	ND	4.40	1.37	1.42	0.36	3.49	2.20	13.7
SNP-182	5	Furnace Spring at Skyland	S	3/2/1999	14:35	7.8	10.0	5.65	48.0	ND	4.30	1.39	1.42	0.33	3.19	2.35	13.3
SNP-187	5	Furnace Spring at Skyland	S	4/2/1999	11:20	7.7	9.8	5.87	47.0	ND	4.11	1.35	1.56	0.10	3.39	2.01	12.3
SNP-192	5	Furnace Spring at Skyland	S	4/27/1999	14:40	7.7	10.6	5.70	47.4	ND	4.15	1.31	1.43	0.30	3.58	2.34	12.8
SNP-197	5	Furnace Spring at Skyland	S	5/26/1999	14:50	7.8	10.0	6.56	47.4	ND	4.57	1.38	1.40	0.20	3.59	2.28	13.4
SNP-202	5	Furnace Spring at Skyland	S	6/23/1999	13:40	8.0	9.7	6.65	48.6	ND	4.61	1.44	1.44	0.20	3.70	2.27	13.5
SNP-221	5	Furnace Spring at Skyland	S	7/15/1999	11:45	8.3	10.1	6.77	50.8	ND	4.75	1.54	1.64	0.20	3.88	2.28	14.4
SNP-224	5	Furnace Spring at Skyland	S	8/11/1999	13:30	8.5	9.9	6.63	51.9	ND	4.72	1.51	1.57	0.30	3.91	2.49	14.4
SNP-260	5	Furnace Spring at Skyland	S	9/7/1999	12:45	8.6	10.1	6.34	48.4	150	4.43	1.37	1.47	0.25	3.02	2.54	14.0
SNP-266	5	Furnace Spring at Skyland	S	9/9/1999	12:30	8.4	10.5	5.99	50.1	120	4.64	1.45	1.53	0.23	3.47	2.45	14.4
SNP-271	5	Furnace Spring at Skyland	S	9/22/1999	12:09	8.5	9.6	5.78	45.5	150	3.86	1.23	1.37	0.27	2.69	2.49	12.7
SNP-008	6	Skyland #2 (W-1033)	W	4/2/1996	17:30	9.8	9.0	6.09	44.8	28	4.44	1.18	1.22	0.20	4.00	0.32	14.1
SNP-094	6	Skyland #2 (W-1033)	W	8/28/1997	9:45	11.2	9.8	6.18	54.9	32	5.91	1.02	1.52	0.22	4.01	0.42	17.2
SNP-232	6	Skyland #2 (W-1033)	W	8/17/1999	11:25	13.2	9.9	6.30	55.0	ND	6.20	1.08	1.52	0.30	4.79	0.46	17.5
SNP-009	7	Dundo Spring #29	S	4/3/1996	12:15	9.5	9.4	5.90	15.1	100	0.70	0.38	0.40	0.73	0.78	1.49	3.4
SNP-120	7	Dundo Spring #29	S	9/10/1997	10:30	11.8	9.2	6.00	27.4	ND	1.91	0.80	0.46	1.30	0.93	3.60	5.5
SNP-014	8	Simmons Gap Spring	S	4/4/1996	12:40	8.8	10.5	6.16	36.8	ND	2.38	1.29	1.83	0.21	0.89	3.16	10.6
SNP-131	8	Simmons Gap Spring	S	9/16/1997	13:00	9.8	10.0	6.33	43.4	2.5	3.11	1.58	2.01	0.41	1.04	3.58	15.1
SNP-238	8	Simmons Gap Spring	S	8/18/1999	10:45	9.8	11.0	6.15	44.8	1	3.10	1.55	2.01	0.30	0.96	3.42	15.4
SNP-017	9	Panorama Spring #13-3	S	4/5/1996	9:00	9.0	9.9	6.08	29.0	ND	2.11	0.99	1.21	0.28	0.68	0.12	10.0
SNP-107	9	Panorama Spring #13-3	S	9/3/1997	17:00	11.9	9.7	6.35	33.3	ND	2.31	1.04	1.30	0.40	0.75	0.08	11.5
SNP-018	10	Browntown Valley Overlook Spring	S	4/5/1996	12:40	6.4	10.2	5.97	36.6	ND	2.75	1.14	1.30	0.10	0.79	4.42	7.7
SNP-103	10	Browntown Valley Overlook Spring	S	9/2/1997	9:30	8.8	9.9	5.86	42.0	ND	3.10	1.22	1.38	0.27	0.80	3.74	10.3
SNP-123	10	Browntown Valley Overlook Spring	S	9/11/1997	16:30	8.6	8.0	5.92	43.8	ND	3.07	1.22	1.35	0.25	0.79	3.95	10.6
SNP-139	10	Browntown Valley Overlook Spring	S	9/18/1997	13:30	8.6	9.3	5.99	38.7	8	3.02	1.20	1.36	0.28	0.78	3.93	10.0
SNP-184	10	Browntown Valley Overlook Spring	S	3/3/1999	10:00	8.2	9.1	ND	39.3	ND	3.05	1.22	1.34	0.28	0.83	4.10	9.1
SNP-189	10	Browntown Valley Overlook Spring	S	4/2/1999	15:00	7.5	9.6	ND	39.0	20	2.99	1.21	1.42	<0.1	0.87	4.30	8.1
SNP-193	10	Browntown Valley Overlook Spring	S	4/28/1999	10:30	7.6	9.3	5.33	39.1	15	2.86	1.15	1.32	0.20	0.70	4.22	8.9
SNP-198	10	Browntown Valley Overlook Spring	S	5/27/1999	9:05	7.7	8.7	6.22	38.8	8	3.17	1.22	1.28	0.10	0.73	4.02	9.5
SNP-204	10	Browntown Valley Overlook Spring	S	6/24/1999	11:55	8.1	8.1	5.86	39.5	3	3.19	1.23	1.33	0.20	0.74	3.96	9.7
SNP-219	10	Browntown Valley Overlook Spring	S	7/14/1999	14:35	8.3	9.1	6.37	40.4	3	3.26	1.32	1.51	<0.1	0.80	3.96	10.1
SNP-225	10	Browntown Valley Overlook Spring	S	8/12/1999	9:20	8.7	10.3	6.10	41.2	1.5	3.14	1.30	1.43	0.10	0.75	3.94	10.5

Table 14. Summary of field parameters and major-element chemistry--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	Temp (°C)	O_2 (mg/l)	pH	Sp Cond (µS/cm)	Q (gpm)	Ca^{2+} (mg/L)	Mg^{2+} (mg/L)	Na^{+} (mg/L)	K^{+} (mg/L)	Cl^{-} (mg/L)	SO_4^{2-} (mg/L)	HCO_3^{-} (mg/L)
SNP-262	10	Browntown Valley Overlook Spring	S	9/7/1999	16:30	9.0	10.2	5.57	42.4	25	3.35	1.31	1.38	0.15	0.91	4.84	9.9
SNP-268	10	Browntown Valley Overlook Spring	S	9/10/1999	8:25	9.3	9.3	5.65	40.4	30	3.18	1.23	1.30	0.17	0.86	4.74	9.6
SNP-273	10	Browntown Valley Overlook Spring	S	9/22/1999	15:45	9.7	8.9	5.72	40.1	30	2.94	1.17	1.30	0.21	0.74	4.85	9.2
SNP-021	11	Camp Hoover Spring #2	S	4/8/1996	14:30	8.8	8.8	6.27	34.2	ND	2.52	1.36	1.38	0.21	0.67	0.10	16.7
SNP-116	11	Camp Hoover Spring #2	S	9/9/1997	14:00	10.1	9.5	6.19	37.1	ND	3.01	1.34	1.47	0.32	1.04	0.20	16.8
SNP-234	11	Camp Hoover Spring #2	S	8/17/1999	14:35	11.4	10.6	6.27	38.2	ND	2.90	1.44	1.49	0.30	1.87	0.24	17.1
SNP-022	12	Davids Spring	S	4/8/1996	17:15	9.7	8.5	5.84	35.3	ND	3.07	0.99	1.43	0.27	2.75	0.13	11.3
SNP-110	12	Davids Spring	S	9/4/1997	18:00	9.9	8.5	5.87	35.0	ND	2.85	0.90	1.22	0.38	1.69	0.11	12.1
SNP-243	12	Davids Spring	S	8/20/1999	11:05	9.8	8.4	5.60	34.9	5.6	3.10	0.97	1.28	0.30	1.73	0.10	12.8
SNP-024	13	Dickeys Ridge Spring	S	4/10/1996	11:30	7.4	9.9	6.02	30.1	ND	1.87	0.65	1.76	0.38	1.19	0.79	7.3
SNP-129	13	Dickeys Ridge Spring	S	9/12/1997	10:00	11.4	8.8	6.03	38.6	ND	2.81	0.72	2.21	0.58	1.27	0.20	11.1
SNP-130	13	Dickeys Ridge Spring	S	9/12/1997	9:45	13.5	8.5	5.52	34.1	ND	2.41	0.76	1.80	0.52	1.15	0.64	11.2
SNP-246	13	Dickeys Ridge Spring (pipe 2)	S	8/20/1999	17:00	10.3	10.8	6.05	39.3	3	3.00	0.77	2.35	0.60	1.34	2.94	11.3
SNP-025	14	Gravel Spring NE	S	4/10/1996	14:30	9.2	9.3	6.21	48.7	ND	4.10	1.60	1.77	0.26	1.09	1.35	17.7
SNP-101	14	Gravel Spring NE	S	9/2/1997	11:00	10.5	9.0	6.15	57.3	ND	5.07	1.78	1.94	0.38	1.14	0.99	22.4
SNP-026	15	Pass Mountain Overlook Spring	S	4/10/1996	17:50	8.0	9.1	6.00	18.2	ND	1.14	0.52	0.79	0.11	0.87	0.03	6.8
SNP-100	15	Pass Mountain Overlook Spring	S	9/2/1997	16:00	12.5	8.7	6.09	21.5	ND	1.55	0.59	0.94	0.12	0.95	0.04	9.7
SNP-250	15	Pass Mountain Overlook Spring	S	8/23/1999	15:30	14.5	9.3	6.51	20.4	0.1	ND	ND	ND	ND	ND	ND	ND
SNP-027	16	Swift Run Gap Spring #27	S	4/11/1996	10:00	8.8	8.8	5.77	19.6	ND	1.28	0.34	1.08	0.33	0.56	0.22	4.5
SNP-133	16	Swift Run Gap Spring #27	S	9/16/1997	10:30	11.2	8.4	5.73	19.0	ND	1.36	0.33	1.02	0.45	0.66	0.23	4.9
SNP-239	16	Swift Run Gap Spring #27	S	8/19/1999	13:45	10.8	9.4	5.70	19.2	4	1.30	0.31	1.03	0.40	0.56	0.16	5.0
SNP-028	17	Dean Mountain/South River Spring	S	4/11/1996	12:00	7.2	9.9	5.90	41.4	ND	3.24	1.33	1.56	0.31	1.08	0.73	12.1
SNP-115	17	Dean Mountain/South River Spring	S	9/5/1997	14:00	9.7	9.3	6.12	43.8	ND	3.30	1.28	1.67	0.29	1.06	0.89	13.0
SNP-240	17	Dean Mountain/South River Spring	S	8/19/1999	15:40	9.8	10.0	6.11	38.7	1.5	3.10	1.20	1.60	0.20	1.00	0.70	12.6
SNP-029	18	Baldface Mountain Spring	S	4/11/1996	14:00	7.2	10.6	6.40	26.6	ND	1.92	0.71	1.42	0.18	0.75	2.24	7.9
SNP-030	19	Hazeltop Ridge Overlook Spring	S	4/11/1996	18:30	7.7	10.4	6.05	33.4	ND	2.48	0.95	1.13	0.14	0.69	1.74	5.6
SNP-032	20	Byrds Nest #4/Beahms Gap Spring	S	4/12/1996	9:40	9.2	10.6	6.12	31.2	ND	2.67	1.06	1.39	0.28	1.00	0.59	13.8
SNP-104	20	Byrds Nest #4/Beahms Gap Spring	S	9/3/1997	12:00	10.7	9.8	6.00	37.2	5	2.89	1.07	1.34	0.42	0.99	0.44	15.2
SNP-242	20	Byrds Nest #4/Beahms Gap Spring	S	8/20/1999	8:45	10.4	10.2	6.05	34.7	1.8	2.80	1.17	1.43	0.30	0.92	0.47	15.1
SNP-034	21	Byrds Nest #3 Spring	S	4/12/1996	15:20	9.2	10.1	5.67	26.2	ND	1.74	0.52	1.23	0.66	0.86	0.12	3.8
SNP-109	21	Byrds Nest #3 Spring	S	9/4/1997	8:30	9.4	9.7	5.60	27.9	ND	1.84	0.54	1.20	0.77	0.89	0.18	4.2
SNP-127	21	Byrds Nest #3 Spring	S	9/11/1997	14:30	9.2	9.2	5.68	28.9	ND	1.65	0.51	1.14	0.79	0.90	0.12	3.8
SNP-138	21	Byrds Nest #3 Spring	S	9/18/1997	11:00	9.9	9.7	5.69	27.0	24	1.81	0.52	1.23	0.71	0.90	0.13	4.1
SNP-183	21	Byrds Nest #3 Spring	S	3/2/1999	16:50	9.3	9.7	5.42	27.9	ND	1.68	0.53	1.19	0.82	0.98	0.14	3.9
SNP-188	21	Byrds Nest #3 Spring	S	4/2/1999	12:50	9.4	9.5	5.21	27.2	20	1.63	0.53	1.30	0.70	0.91	0.12	4.1
SNP-194	21	Byrds Nest #3 Spring	S	4/28/1999	17:25	9.9	9.3	5.29	27.4	24	1.63	0.50	1.18	0.80	0.90	0.12	3.9
SNP-199	21	Byrds Nest #3 Spring	S	5/27/1999	11:22	9.6	9.5	5.75	26.7	20	1.74	0.52	1.16	0.70	0.90	0.11	3.9
SNP-203	21	Byrds Nest #3 Spring	S	6/24/1999	9:05	9.5	9.5	6.26	27.2	20	1.74	0.52	1.17	0.70	0.93	0.12	3.8
SNP-218	21	Byrds Nest #3 Spring	S	7/14/1999	11:34	9.5	9.6	5.80	27.3	14	1.77	0.54	1.32	0.60	0.90	0.13	3.9
SNP-226	21	Byrds Nest #3 Spring	S	8/12/1999	12:00	9.7	10.3	5.68	27.6	10	1.64	0.52	1.21	0.70	0.90	0.10	3.9
SNP-261	21	Byrds Nest #3 Spring	S	9/7/1999	14:20	9.6	9.9	5.42	28.2	22.5	1.73	0.53	1.20	0.73	0.90	0.11	3.9
SNP-267	21	Byrds Nest #3 Spring	S	9/9/1999	14:30	9.5	10.2	5.59	28.3	17.5	1.70	0.52	1.23	0.73	0.92	0.10	3.9
SNP-272	21	Byrds Nest #3 Spring	S	9/22/1999	13:45	9.6	9.3	5.46	29.6	27.5	1.66	0.50	1.18	0.74	0.89	0.14	4.1
SNP-035	22	Big Meadows #9 Well	W	4/15/1996	11:20	9.5	8.7	6.16	28.9	ND	2.25	0.93	1.05	0.26	2.07	0.07	11.1
SNP-096	22	Big Meadows #9 Well	W	8/28/1997	13:30	11.0	10.1	6.26	33.4	34	2.65	0.96	1.04	0.29	1.91	0.06	12.5
SNP-036	23	Big Meadows #14 Well	W	4/15/1996	14:00	9.5	8.9	6.85	61.1	ND	4.91	3.19	1.95	0.22	2.39	0.08	32.0
SNP-092	23	Big Meadows #14 Well	W	8/28/1997	11:30	10.3	9.3	6.76	65.6	84	5.31	3.05	1.72	0.31	2.48	0.06	33.3
SNP-233	23	Big Meadows #14 Well	W	8/17/1999	12:50	11.3	12.1	7.06	65.4	ND	5.20	3.22	2.23	0.40	1.84	0.26	35.6
SNP-038	24	Hogback Spring #5	S	4/16/1996	11:45	8.7	10.2	5.87	13.6	ND	0.56	0.21	0.98	0.26	0.75	0.89	3.0
SNP-039	25	Elkwallow Well (W-1703)	W	4/16/1996	16:00	10.3	9.4	6.56	72.4	ND	6.30	2.99	2.55	0.25	1.26	3.32	30.4

Table 14. Summary of field parameters and major-element chemistry--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	Temp (°C)	O_2 (mg/l)	pH	Sp Cond (µS/cm)	Q (gpm)	Ca^{2+} (mg/L)	Mg^{2+} (mg/L)	Na^{+} (mg/L)	K^{+} (mg/L)	Cl^{-} (mg/L)	SO_4^{2-} (mg/L)	HCO_3^{-} (mg/L)
SNP-086	25	Elkwallow Well (W-1703)	W	8/26/1997	18:30	10.9	9.7	6.40	85.9	10	7.20	3.17	2.40	0.25	1.27	3.58	34.1
SNP-228	25	Elkwallow Well (W-1703)	W	8/16/1999	11:45	11.4	9.1	6.62	89.2	ND	8.00	3.70	2.61	0.30	1.15	3.36	41.0
SNP-041	26	Hightop Hut Spring	S	4/17/1996	15:15	9.9	8.8	6.06	56.1	ND	4.77	1.75	2.46	0.21	0.78	2.09	18.6
SNP-132	26	Hightop Hut Spring	S	9/16/1997	15:45	10.2	8.5	6.23	66.6	ND	6.29	2.15	2.69	0.28	0.97	1.53	25.7
SNP-043	27	Pass Mountain Hut Spring	S	4/18/1996	9:15	8.6	8.2	5.77	29.6	ND	2.05	0.96	1.20	0.20	0.97	0.05	8.3
SNP-105	27	Pass Mountain Hut Spring	S	9/3/1997	14:10	11.3	9.2	6.08	35.4	ND	2.11	0.89	1.09	0.26	0.91	0.05	8.6
SNP-048	31	Dickeys Ridge Well (W-1346)	W	4/19/1996	14:40	12.9	5.9	8.31	134.1	ND	17.30	4.17	4.19	0.31	1.41	2.87	73.6
SNP-084	31	Dickeys Ridge Well (W-1346)	W	8/26/1997	10:50	13.4	6.7	8.18	144.1	ND	18.00	3.99	3.62	0.43	1.30	2.78	78.7
SNP-230	31	Dickeys Ridge Well (W-1346)	W	8/16/1999	16:15	14.2	7.4	8.18	138.1	ND	17.20	3.97	3.58	0.30	0.98	0.12	77.3
SNP-050	33	Domestic well #1	W	4/24/1996	9:50	13.2	5.4	7.10	534.0	ND	75.9	29.4	2.36	1.24	5.18	7.78	359.0
SNP-051	34	Domestic well #2	W	4/24/1996	14:55	14.8	5.2	7.17	530.0	ND	66.5	32.9	4.99	0.74	17.6	16.7	301.0
SNP-052	35	White Oak Cabin Spring	S	4/25/1996	10:35	8.9	9.7	6.13	36.9	ND	3.34	1.10	1.23	0.14	3.44	2.23	8.5
SNP-111	35	White Oak Cabin Spring	S	9/4/1997	15:55	13.7	8.8	6.81	36.6	ND	3.07	0.98	1.09	0.28	2.47	1.98	8.8
SNP-053	36	Big Meadows #1 Well (W-1701)	W	4/25/1996	16:30	9.6	8.1	6.21	34.5	ND	2.83	1.46	1.27	0.22	0.79	0.09	16.9
SNP-083	36	Big Meadows #1 Well (W-1701)	W	9/17/1997	16:30	10.2	8.1	6.20	35.2	4.5	3.01	1.43	1.20	0.16	0.85	0.04	17.5
SNP-037	37	HQ #2 Well (W-851)	W	4/16/1996	9:45	13.1	1.9	6.12	156.4	ND	12.1	8.6	5.40	1.97	7.71	3.84	79.3
SNP-087	37	HQ #2 Well (W-851)	W	8/27/1997	10:30	16.3	4.3	6.01	164.2	710	12.5	8.2	4.82	1.71	4.24	3.11	80.5
SNP-007	38	Skyland #5	W	4/2/1996	16:00	8.3	9.2	6.34	57.2	ND	6.12	1.60	1.31	0.11	1.61	1.33	25.4
SNP-088	38	Skyland #5	W	8/27/1997	17:10	9.6	8.6	5.85	75.4	16	7.32	2.11	1.43	0.25	1.91	1.80	33.7
SNP-005	39	Pinnacles Well (W-3288)	W	4/2/1996	12:00	9.4	8.8	5.71	47.3	ND	3.78	1.08	1.62	0.52	0.94	0.16	7.2
SNP-091	39	Pinnacles Well (W-3288)	W	8/27/1997	12:45	10.1	9.1	5.78	51.1	715	3.75	1.00	1.38	0.55	0.91	0.15	7.0
SNP-019	40	Mathews Arm Spring Range View Cabin	S	4/5/1996	14:35	7.9	10.0	6.05	52.6	30	4.48	1.83	1.55	0.46	0.97	0.87	14.5
SNP-102	40	Mathews Arm Spring Range View Cabin	S	9/2/1997	13:30	12.5	8.3	6.03	51.1	ND	4.12	1.71	1.63	0.44	1.10	0.38	15.1
SNP-031	41	Lewis Mountain Spring #25-2	S	4/11/1996	16:30	8.0	7.5	6.07	19.2	ND	1.15	0.31	1.05	0.27	1.46	2.66	2.7
SNP-114	41	Lewis Mountain Spring #25-2	S	9/5/1997	11:00	10.1	8.8	6.38	23.1	ND	1.59	0.35	1.18	0.43	2.18	2.11	3.6
SNP-054	42	Old Rag Shelter Spring	S	4/26/1996	14:30	9.9	9.8	5.92	27.0	ND	1.87	0.51	1.90	0.57	1.16	2.35	7.2
SNP-118	42	Old Rag Shelter Spring	S	9/9/1997	18:00	15.2	5.8	8.70	29.2	ND	1.75	0.52	1.78	0.73	1.13	1.89	8.8
SNP-015	43	Loft Mountain Overlook Spring	S	4/4/1996	15:30	8.3	10.3	6.02	65.5	ND	4.85	2.32	2.74	0.29	0.69	6.99	14.4
SNP-121	43	Loft Mountain Overlook Spring	S	9/10/1997	17:00	13.7	6.8	6.02	81.9	ND	6.51	2.65	2.98	0.54	1.21	6.73	24.2
SNP-016	44	Loft Mountain Spring	S	4/4/1996	17:30	9.0	10.0	6.14	50.1	ND	4.21	1.53	1.80	0.29	0.91	0.88	11.3
SNP-122	44	Loft Mountain Spring	S	9/10/1997	15:00	11.1	9.2	5.85	51.4	3.3	4.25	1.44	1.41	0.54	0.91	3.46	11.7
SNP-013	45	Simmons Gap Well (W-1704)	W	4/4/1996	9:30	12.0	6.6	7.34	119.5	25	7.67	6.68	6.02	0.35	2.01	3.15	57.7
SNP-099	45	Simmons Gap Well (W-1704)	W	8/29/1997	10:00	12.1	8.0	7.13	129.1	26	8.55	6.40	5.63	0.47	2.02	2.67	60.9
SNP-137	46	Yeager's Spring (Luray)	S	9/17/1997	13:10	14.4	5.6	7.28	273.0	ND	38.3	8.9	3.83	2.45	5.63	10.09	149.3
SNP-248	46	Yeager's Spring (Luray)	S	8/23/1999	11:20	12.8	5.6	7.56	319.6	2900	42.3	10.8	4.28	2.10	7.69	11.07	171.0
SNP-042	47	Lewis Mountain Well (W-1072)	W	4/17/1996	18:20	9.6	9.3	5.72	24.3	ND	1.53	0.57	0.77	0.59	0.76	3.88	4.7
SNP-095	47	Lewis Mountain Well (W-1072)	W	8/28/1997	15:45	10.7	12.0	6.30	45.8	10	3.91	1.56	1.22	0.64	0.97	2.97	18.3
SNP-140	47	Lewis Mountain Well (W-1072)	W	9/19/1997	9:30	9.9	9.7	5.94	28.4	15	2.29	0.82	0.87	0.75	0.90	3.39	8.3
SNP-170	48	Bear Lithia Spring	S	9/8/1997	17:15	12.2	ND	ND	186.3	ND	20.4	10.0	1.44	1.72	1.60	3.28	113.7
SNP-255	48	Bear Lithia Spring	S	9/2/1999	10:20	12.1	7.4	7.94	193.6	ND	20.6	10.6	1.23	1.60	1.67	3.12	116.2
SNP-046	49	Mathews Arm Well (W-856)	W	4/19/1996	10:40	10.8	8.1	6.39	79.9	ND	5.95	4.25	3.09	0.31	1.28	1.54	39.9
SNP-085	49	Mathews Arm Well (W-856)	W	8/26/1997	15:05	10.8	8.5	6.35	86.0	28	6.30	4.06	2.66	0.48	1.24	1.65	42.0
SNP-229	49	Mathews Arm Well (W-856)	W	8/16/1999	13:10	13.0	9.1	6.37	80.0	ND	5.90	3.96	2.92	0.40	1.45	1.68	40.7
SNP-011	50	Loft Mountain Well #1 (W-715)	W	4/3/1996	15:45	10.6	7.8	7.18	63.6	ND	5.41	2.22	3.50	0.32	0.83	0.68	30.7
SNP-098	50	Loft Mountain Well #1 (W-715)	W	8/29/1997	14:00	10.9	8.6	6.82	70.8	168	6.29	2.23	3.39	0.45	0.91	0.61	33.9
SNP-235	50	Loft Mountain Well #1 (W-715)	W	8/17/1999	18:15	11.8	9.5	7.14	68.1	ND	6.10	2.27	3.32	0.40	0.90	0.64	34.7
SNP-010	51	Loft Mountain Well #2 (W-754)	W	4/3/1996	14:30	10.7	9.5	6.49	34.9	ND	3.14	0.75	1.01	0.49	0.82	2.61	12.1
SNP-097	51	Loft Mountain Well #2 (W-754)	W	8/29/1997	12:30	10.6	11.6	6.30	51.3	ND	5.13	1.11	1.58	0.67	0.86	4.05	19.0
SNP-236	51	Loft Mountain Well #2 (W-754)	W	8/18/1999	8:35	11.4	9.9	7.47	74.4	ND	8.90	1.36	2.97	0.60	0.79	3.46	36.4
SNP-012	52	Ivy Creek Shelter Spring	S	4/3/1996	18:00	8.7	9.6	6.27	50.4	ND	3.66	1.58	2.10	0.18	0.84	4.66	10.0

Table 14. Summary of field parameters and major-element chemistry--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	Temp (°C)	O_2 (mg/l)	pH	Sp Cond (µS/cm)	Q (gpm)	Ca^{++} (mg/L)	Mg^{++} (mg/L)	Na^{+} (mg/L)	K^{+} (mg/L)	Cl^{-} (mg/L)	SO_4^{--} (mg/L)	HCO_3^{-} (mg/L)
SNP-119	52	Ivy Creek Shelter Spring	S	9/10/1997	12:00	9.2	9.9	5.97	65.2	ND	5.37	2.15	2.29	0.27	0.87	3.84	13.8
SNP-237	52	Ivy Creek Shelter Spring	S	8/18/1999	10:20	9.2	10.2	5.70	58.9	2	4.50	1.88	2.39	0.20	0.74	3.48	13.7
SNP-113	53	Lewis Mountain Spring #25	S	9/5/1997	9:30	9.5	9.8	5.98	24.9	8	1.65	0.37	1.29	0.33	2.07	2.14	4.0
SNP-241	53	Lewis Mountain Spring #25	S	8/19/1999	18:05	9.7	10.4	5.93	24.4	6	1.70	0.37	1.30	0.30	1.92	2.37	4.4
SNP-033	54	Elkwallow Spring #8	S	4/12/1996	12:30	9.3	9.4	6.01	48.7	ND	4.13	1.35	2.47	0.40	0.99	3.13	14.0
SNP-106	54	Elkwallow Spring #8	S	9/3/1997	9:00	9.8	8.3	5.78	54.7	ND	4.27	1.38	2.22	0.39	1.12	2.22	15.4
SNP-244	54	Elkwallow Spring #8	S	8/20/1999	13:50	10.1	9.7	5.69	53.5	6	4.40	1.44	2.35	0.40	1.11	2.25	15.7
SNP-136	55	Hite Spring (Luray)	S	9/17/1997	11:40	13.0	6.1	7.66	238.5	ND	28.4	11.4	4.54	2.59	6.06	16.26	132.0
SNP-247	55	Hite Spring (Luray)	S	8/23/1999	8:56	13.2	7.7	8.00	274.1	ND	28.4	12.4	4.90	2.40	7.17	17.32	134.7
SNP-040	56	HQ Spring #14-1	S	4/17/1996	9:15	8.1	10.2	6.43	74.7	ND	5.23	3.60	3.43	0.28	1.19	5.55	35.2
SNP-117	56	HQ Spring #14-1	S	9/9/1997	9:10	14.1	9.5	7.20	98.1	6	7.94	3.76	3.58	0.51	7.83	0.43	39.4
SNP-249	56	HQ Spring #14-1	S	8/23/1999	14:10	16.0	9.5	6.81	105.2	7.2	8.40	4.22	4.25	0.60	12.15	0.54	37.9
SNP-023	57	Indian Run Shelter Spring	S	4/9/1996	13:00	9.0	9.8	5.86	33.5	ND	2.18	0.74	1.95	0.71	1.03	0.48	8.9
SNP-128	57	Indian Run Shelter Spring	S	9/12/1997	13:30	9.7	9.5	5.78	34.0	ND	2.40	0.74	1.87	0.82	1.22	0.54	10.4
SNP-251	57	Indian Run Shelter Spring	S	8/23/1999	18:15	10.5	10.0	5.68	35.6	1	2.60	0.78	1.89	0.80	1.14	0.49	9.8
SNP-252	58	Town of Elkton Spring	S	9/1/1999	10:25	13.5	8.0	7.66	214.6	30	22.9	12.1	0.86	2.40	1.24	1.62	135.2
SNP-253	59	Town of Elkton well	W	9/1/1999	11:15	14.3	7.2	7.66	288.0	ND	41.2	9.6	1.84	1.50	5.55	3.63	158.6
SNP-254	60	Town of Grottoes #2	W	9/1/1999	15:00	13.9	8.9	8.10	215.2	ND	26.2	10.2	0.64	2.30	1.05	5.78	130.3
SNP-256	61	Blue Ridge School #5	W	9/2/1999	12:30	16.7	4.6	7.14	232.9	ND	30.5	2.5	14.90	0.90	4.25	5.25	131.8
SNP-257	62	Town of Washington #3	W	9/2/1999	15:45	14.7	0.2	7.23	159.3	ND	18.2	3.6	6.95	3.50	4.39	6.71	85.2
SNP-263	63	Mountain side Market	W	9/8/1999	9:00	17.3	2.4	6.98	116.5	ND	10.4	3.5	5.75	1.50	2.07	3.30	61.1
SNP-134	64	Hudson Spring (Luray)	S	9/17/1997	9:45	14.2	7.2	7.33	294.4	ND	44.2	9.5	3.30	2.56	5.29	5.55	173.6
SNP-180	64	Hudson Spring (Luray)	S	3/2/1999	10:10	14.1	6.8	7.54	292.2	ND	43.6	9.7	3.63	2.64	4.99	5.43	173.0
SNP-185	64	Hudson Spring (Luray)	S	4/2/1999	8:40	14.2	6.5	7.50	293.8	ND	41.3	9.3	3.34	2.70	6.27	4.97	173.7
SNP-190	64	Hudson Spring (Luray)	S	4/27/1999	9:40	14.2	6.9	7.40	292.6	ND	42.3	9.4	3.34	2.60	5.61	5.92	174.6
SNP-195	64	Hudson Spring (Luray)	S	5/26/1999	10:00	14.3	6.9	7.85	288.4	ND	41.7	9.4	3.27	2.50	5.60	5.89	172.6
SNP-200	64	Hudson Spring (Luray)	S	6/23/1999	9:30	14.2	6.8	7.84	290.7	ND	42.7	9.6	3.36	2.60	5.61	5.89	172.7
SNP-217	64	Hudson Spring (Luray)	S	7/14/1999	9:30	14.2	6.8	8.14	292.7	ND	42.0	9.9	3.71	2.70	5.60	5.83	173.3
SNP-222	64	Hudson Spring (Luray)	S	8/11/1999	9:15	14.2	6.7	7.78	294.8	ND	41.5	9.5	3.49	2.50	5.16	5.64	173.0
SNP-258	64	Hudson Spring (Luray)	S	9/7/1999	9:30	14.2	6.9	7.51	299.4	ND	41.6	9.5	3.37	2.50	5.71	5.95	173.6
SNP-264	64	Hudson Spring (Luray)	S	9/9/1999	9:05	14.2	7.0	7.49	299.1	ND	41.6	9.5	3.43	2.50	5.78	5.71	174.0
SNP-269	64	Hudson Spring (Luray)	S	9/22/1999	9:00	14.1	6.6	7.27	305.1	ND	42.0	9.6	3.54	2.64	5.83	5.89	175.6
SNP-020	65	Lewis Spring	S	4/8/1996	10:30	8.5	9.9	5.95	33.7	ND	2.64	1.11	1.20	0.21	3.80	0.27	8.1
SNP-093	65	Lewis Spring	S	8/28/1997	17:05	9.5	10.1	5.76	39.1	ND	2.86	1.21	1.23	0.36	2.75	0.24	9.7
SNP-124	65	Lewis Spring	S	9/11/1997	9:35	9.6	8.9	5.74	40.9	ND	3.00	1.24	1.24	0.39	2.69	0.29	9.9
SNP-126	65	Lewis Spring	S	9/11/1997	10:50	9.8	10.0	ND	41.6	ND	3.07	1.27	1.28	0.33	2.72	0.27	10.3
SNP-135	65	Lewis Spring	S	9/17/1997	16:00	9.6	9.9	5.87	36.5	ND	2.87	1.21	1.23	0.35	2.73	0.22	9.9
SNP-181	65	Lewis Spring	S	3/2/1999	12:30	9.0	9.6	5.95	36.9	ND	2.78	1.19	1.19	0.42	2.51	0.29	9.2
SNP-186	65	Lewis Spring	S	4/2/1999	10:10	8.9	9.9	5.52	36.6	ND	2.75	1.20	1.33	0.10	2.54	0.30	8.7
SNP-191	65	Lewis Spring	S	4/27/1999	13:00	9.2	9.8	5.17	37.1	ND	2.80	1.19	1.18	0.40	2.76	0.27	9.5
SNP-196	65	Lewis Spring	S	5/26/1999	12:55	9.0	10.2	5.73	37.0	ND	3.02	1.22	1.17	0.20	3.15	0.27	9.7
SNP-201	65	Lewis Spring	S	6/23/1999	11:50	9.1	9.8	6.30	37.3	ND	3.04	1.22	1.23	0.30	2.83	0.30	9.8
SNP-220	65	Lewis Spring	S	7/15/1999	9:25	9.2	9.7	6.86	38.2	ND	3.05	1.30	1.37	0.20	2.82	0.29	9.9
SNP-223	65	Lewis Spring	S	8/11/1999	11:35	9.4	10.4	6.27	38.7	ND	2.89	1.25	1.26	0.30	2.72	0.27	10.0
SNP-259	65	Lewis Spring	S	9/7/1999	11:00	9.6	10.8	5.56	39.2	150	3.08	1.27	1.26	0.29	2.70	0.38	9.6
SNP-265	65	Lewis Spring	S	9/9/1999	10:40	9.6	10.1	5.58	38.7	150	3.06	1.27	1.23	0.28	2.67	0.48	9.8
SNP-270	65	Lewis Spring	S	9/22/1999	10:40	9.6	9.9	5.43	39.5	165	2.83	1.20	1.22	0.31	2.57	0.48	9.4
VR-01	66	Town of Stanley # 3	W	7/6/1999	12:30	15.3	7.7	7.80	241.0	25	26.5	14.8	0.75	1.68	0.89	0.52	159.6
VR-02	67	Town of Shenandoah # 5	W	7/6/1999	16:15	13.4	7.4	7.50	343.0	150	42.4	17.5	1.27	2.62	2.02	2.00	219.9
VR-03	68	Wanyesboro Jefferson Rd # 1	W	7/7/1999	10:35	13.2	6.9	7.80	132.0	800	14.6	7.5	1.26	1.27	2.05	3.39	77.2

Table 14. Summary of field parameters and major-element chemistry--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	Temp (°C)	O_2 (mg/l)	pH	Sp Cond (µS/cm)	Q (gpm)	Ca^{2+} (mg/L)	Mg^{2+} (mg/L)	Na^{+} (mg/L)	K^{+} (mg/L)	Cl^{-} (mg/L)	SO_4^{2-} (mg/L)	HCO_3^{-} (mg/L)
VR-04	69	Coyner Spring	S	7/7/1999	14:00	12.7	7.4	7.69	186.0	ND	21.8	10.4	1.19	1.81	1.71	10.3	105.4
VR-06	71	Town of Shenandoah # 2	W	7/8/1999	16:20	12.0	7.3	7.33	302.0	95	48.5	10.6	1.04	2.23	1.66	1.98	206.6
VR-07	72	Town of Shenandoah # 3	W	7/8/1999	18:20	12.3	6.3	7.41	294.0	128	39.7	15.9	0.92	2.29	1.48	2.40	203.0
VR-08	73	Town of Stanley # 6	W	7/9/1999	10:15	15.4	5.7	7.54	285.0	400	37.4	11.1	4.79	2.99	7.35	8.75	162.9
VR-09	74	Town of Stanley # 5	W	7/9/1999	13:00	14.1	7.0	7.75	249.0	32	33.9	8.6	3.84	2.71	6.64	6.08	137.4
VR-10	75	Town of Stanley # 4	W	7/9/1999	15:00	13.7	6.1	7.63	313.0	100	41.0	11.2	5.92	2.44	11.89	8.43	164.6
VR-11	76	Town of Stanley # 2	W	7/9/1999	16:45	12.9	7.4	7.68	235.0	25	29.5	12.6	0.81	2.36	0.91	0.57	157.7

Table 15. Summary of minor-element chemistry

[W, well; S, spring; Sr, strontium, SiO_2, silica; Fe, iron; NO_3 as N, dissolved nitrate as nitrogen; Mn, manganese; mg/L, milligrams per liter; ND not determined]

SNP No.	Site ID	Site Name	W/S	Date	Time	Sr (mg/L)	SiO_2 (mg/L)	Fe (mg/L)	Mn (mg/L)	NO_3 as N (mg/L)
SNP-001	1	HQ #1 Well (W-855)	W	4/1/1996	10:30	0.023	23.2	0.020	<0.004	1.26
SNP-090	1	HQ #1 Well (W-855)	W	8/27/1997	8:40	0.024	27.2	0.015	<0.003	1.20
SNP-227	1	HQ #1 Well (W-855)	W	8/16/1999	9:00	0.028	26.1	0.02	0.001	1.18
SNP-002	2	HQ Spring #14-3 - above HQ on Rt 211	S	4/1/1996	13:00	0.022	14.8	0.010	<0.004	0.60
SNP-003	3	Hemlock Spring	S	4/1/1996	15:00	0.004	5.2	<0.008	<0.004	0.32
SNP-108	3	Hemlock Spring	S	9/4/1997	12:00	0.004	7.3	<0.007	<0.003	0.35
SNP-231	3	Hemlock Spring	S	8/17/1999	9:45	0.005	7.6	<0.02	<0.001	0.29
SNP-004	4	Pinnacles Spring #16	S	4/2/1996	9:30	0.003	5.2	<0.008	<0.004	0.07
SNP-112	4	Pinnacles Spring #16	S	9/4/1997	10:00	0.003	6.1	<0.007	<0.003	<0.10
SNP-006	5	Furnace Spring at Skyland	S	4/2/1996	14:30	0.009	7.0	<0.008	<0.004	0.52
SNP-089	5	Furnace Spring at Skyland	S	8/27/1997	18:35	0.010	8.7	<0.007	<0.003	0.60
SNP-125	5	Furnace Spring at Skyland	S	9/11/1997	12:25	0.009	7.9	<0.007	<0.003	0.55
SNP-169	5	Furnace Spring at Skyland	S	9/18/1997	9:15	0.010	8.0	<0.007	<0.003	0.56
SNP-182	5	Furnace Spring at Skyland	S	3/2/1999	14:35	0.010	8.2	<0.01	<0.001	0.50
SNP-187	5	Furnace Spring at Skyland	S	4/2/1999	11:20	0.011	8.0	<0.01	<0.001	0.51
SNP-192	5	Furnace Spring at Skyland	S	4/27/1999	14:40	0.011	8.1	<0.01	<0.001	0.50
SNP-197	5	Furnace Spring at Skyland	S	5/26/1999	14:50	0.010	8.3	<0.01	<0.001	0.50
SNP-202	5	Furnace Spring at Skyland	S	6/23/1999	13:40	0.009	8.4	<0.01	0.002	0.49
SNP-221	5	Furnace Spring at Skyland	S	7/15/1999	11:45	0.011	8.7	<0.01	0.005	0.56
SNP-224	5	Furnace Spring at Skyland	S	8/11/1999	13:30	0.011	8.8	<0.01	<0.001	0.58
SNP-260	5	Furnace Spring at Skyland	S	9/7/1999	12:45	0.010	8.1	<0.01	<0.001	0.51
SNP-266	5	Furnace Spring at Skyland	S	9/9/1999	12:30	0.010	8.3	<0.01	<0.001	0.49
SNP-271	5	Furnace Spring at Skyland	S	9/22/1999	12:09	0.007	7.9	<0.01	<0.001	0.44
SNP-008	6	Skyland #2 (W-1033)	W	4/2/1996	17:30	0.010	6.3	<0.008	<0.004	0.60
SNP-094	6	Skyland #2 (W-1033)	W	8/28/1997	9:45	0.013	8.3	0.007	<0.003	0.70
SNP-232	6	Skyland #2 (W-1033)	W	8/17/1999	11:25	0.013	7.9	<0.02	<0.001	0.70
SNP-009	7	Dundo Spring #29	S	4/3/1996	12:15	0.003	2.8	0.011	<0.004	<0.10
SNP-120	7	Dundo Spring #29	S	9/10/1997	10:30	0.008	2.5	0.035	<0.003	0.14
SNP-014	8	Simmons Gap Spring	S	4/4/1996	12:40	0.009	10.9	<0.008	<0.004	0.57
SNP-131	8	Simmons Gap Spring	S	9/16/1997	13:00	0.010	13.2	<0.007	<0.003	0.56
SNP-238	8	Simmons Gap Spring	S	8/18/1999	10:45	0.011	13.9	<0.02	<0.001	0.46
SNP-017	9	Panorama Spring #13-3	S	4/5/1996	9:00	0.011	9.3	0.010	<0.004	0.89
SNP-107	9	Panorama Spring #13-3	S	9/3/1997	17:00	0.010	11.2	<0.007	<0.003	0.81
SNP-018	10	Browntown Valley Overlook Spring	S	4/5/1996	12:40	0.010	8.4	0.016	<0.004	0.84
SNP-103	10	Browntown Valley Overlook Spring	S	9/2/1997	9:30	0.010	10.9	<0.007	<0.003	0.87
SNP-123	10	Browntown Valley Overlook Spring	S	9/11/1997	16:30	0.009	10.5	<0.007	<0.003	0.80
SNP-139	10	Browntown Valley Overlook Spring	S	9/18/1997	13:30	0.009	10.4	<0.007	<0.003	0.83
SNP-184	10	Browntown Valley Overlook Spring	S	3/3/1999	10:00	0.010	10.3	<0.01	<0.001	0.81
SNP-189	10	Browntown Valley Overlook Spring	S	4/2/1999	15:00	0.010	10.1	<0.01	<0.001	0.81
SNP-193	10	Browntown Valley Overlook Spring	S	4/28/1999	10:30	0.010	10.2	<0.01	<0.001	0.80
SNP-198	10	Browntown Valley Overlook Spring	S	5/27/1999	9:05	0.010	10.4	<0.01	<0.001	0.80
SNP-204	10	Browntown Valley Overlook Spring	S	6/24/1999	11:55	0.009	11.0	<0.01	0.003	0.80
SNP-219	10	Browntown Valley Overlook Spring	S	7/14/1999	14:35	0.011	11.4	<0.01	0.004	0.83
SNP-225	10	Browntown Valley Overlook Spring	S	8/12/1999	9:20	0.011	11.8	<0.01	<0.001	0.85
SNP-262	10	Browntown Valley Overlook Spring	S	9/7/1999	16:30	0.010	10.0	<0.01	<0.001	0.64
SNP-268	10	Browntown Valley Overlook Spring	S	9/10/1999	8:25	0.009	9.8	<0.01	<0.001	0.60
SNP-273	10	Browntown Valley Overlook Spring	S	9/22/1999	15:45	0.007	9.9	<0.01	0.001	0.55
SNP-021	11	Camp Hoover Spring #2	S	4/8/1996	14:30	0.010	10.9	<0.008	<0.004	0.23
SNP-116	11	Camp Hoover Spring #2	S	9/9/1997	14:00	0.010	13.2	<0.007	<0.003	0.45
SNP-234	11	Camp Hoover Spring #2	S	8/17/1999	14:35	0.011	13.2	<0.02	<0.001	0.19
SNP-022	12	Davids Spring	S	4/8/1996	17:15	0.014	7.1	<0.008	<0.004	0.72
SNP-110	12	Davids Spring	S	9/4/1997	18:00	0.012	8.2	<0.007	<0.003	0.50
SNP-243	12	Davids Spring	S	8/20/1999	11:05	0.014	8.6	<0.02	<0.001	0.51
SNP-024	13	Dickeys Ridge Spring	S	4/10/1996	11:30	0.012	9.9	0.020	0.005	0.88
SNP-129	13	Dickeys Ridge Spring	S	9/12/1997	10:00	0.014	14.2	<0.007	<0.003	1.39
SNP-130	13	Dickeys Ridge Spring	S	9/12/1997	9:45	0.013	12.6	0.023	<0.003	0.74
SNP-246	13	Dickeys Ridge Spring (pipe 2)	S	8/20/1999	17:00	0.016	14.4	<0.02	<0.001	0.81
SNP-025	14	Gravel Spring NE	S	4/10/1996	14:30	0.020	11.7	0.010	<0.004	1.29
SNP-101	14	Gravel Spring NE	S	9/2/1997	11:00	0.021	15.0	<0.007	<0.003	1.21
SNP-026	15	Pass Mountain Overlook Spring	S	4/10/1996	17:50	0.009	6.4	<0.008	<0.004	0.08
SNP-100	15	Pass Mountain Overlook Spring	S	9/2/1997	16:00	0.011	8.5	<0.007	0.004	0.16
SNP-027	16	Swift Run Gap Spring #27	S	4/11/1996	10:00	0.010	7.2	<0.008	<0.004	0.83
SNP-133	16	Swift Run Gap Spring #27	S	9/16/1997	10:30	0.010	8.7	<0.007	<0.003	0.68
SNP-239	16	Swift Run Gap Spring #27	S	8/19/1999	13:45	0.010	8.4	<0.02	<0.001	0.64
SNP-028	17	Dean Mountain/South River Spring	S	4/11/1996	12:00	0.016	8.8	0.013	<0.004	1.62
SNP-115	17	Dean Mountain/South River Spring	S	9/5/1997	14:00	0.016	10.7	<0.007	<0.003	1.36
SNP-240	17	Dean Mountain/South River Spring	S	8/19/1999	15:40	0.014	10.4	<0.02	<0.001	1.09

Table 15. Summary of minor-element chemistry--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	Sr (mg/L)	SiO_2 (mg/L)	Fe (mg/L)	Mn (mg/L)	NO_3 as N (mg/L)
SNP-029	18	Baldface Mountain Spring	S	4/11/1996	14:00	0.008	8.2	<0.008	<0.004	0.35
SNP-030	19	Hazeltop Ridge Overlook Spring	S	4/11/1996	18:30	0.010	6.0	<0.008	<0.004	1.64
SNP-032	20	Byrds Nest #4/Beahms Gap Spring	S	4/12/1996	9:40	0.014	10.6	<0.008	<0.004	0.37
SNP-104	20	Byrds Nest #4/Beahms Gap Spring	S	9/3/1997	12:00	0.012	12.7	<0.007	<0.003	0.42
SNP-242	20	Byrds Nest #4/Beahms Gap Spring	S	8/20/1999	8:45	0.014	13.3	<0.02	0.001	0.41
SNP-034	21	Byrds Nest #3 Spring	S	4/12/1996	15:20	0.011	6.0	<0.008	<0.004	1.64
SNP-109	21	Byrds Nest #3 Spring	S	9/4/1997	8:30	0.012	7.0	<0.007	<0.003	1.55
SNP-127	21	Byrds Nest #3 Spring	S	9/11/1997	14:30	0.010	6.8	<0.007	<0.003	1.52
SNP-138	21	Byrds Nest #3 Spring	S	9/18/1997	11:00	0.012	7.2	<0.007	<0.003	1.55
SNP-183	21	Byrds Nest #3 Spring	S	3/2/1999	16:50	0.011	7.2	<0.01	0.007	1.47
SNP-188	21	Byrds Nest #3 Spring	S	4/2/1999	12:50	0.012	7.3	<0.01	<0.001	1.47
SNP-194	21	Byrds Nest #3 Spring	S	4/28/1999	17:25	0.012	7.4	<0.01	<0.001	1.47
SNP-199	21	Byrds Nest #3 Spring	S	5/27/1999	11:22	0.011	7.3	<0.01	<0.001	1.51
SNP-203	21	Byrds Nest #3 Spring	S	6/24/1999	9:05	0.010	7.3	<0.01	0.003	1.51
SNP-218	21	Byrds Nest #3 Spring	S	7/14/1999	11:34	0.012	7.5	<0.01	0.005	1.53
SNP-226	21	Byrds Nest #3 Spring	S	8/12/1999	12:00	0.012	7.6	<0.01	<0.001	1.54
SNP-261	21	Byrds Nest #3 Spring	S	9/7/1999	14:20	0.011	7.2	<0.01	<0.001	1.52
SNP-267	21	Byrds Nest #3 Spring	S	9/9/1999	14:30	0.011	7.2	<0.01	<0.001	1.59
SNP-272	21	Byrds Nest #3 Spring	S	9/22/1999	13:45	0.009	7.2	<0.01	0.002	1.54
SNP-035	22	Big Meadows #9 Well	W	4/15/1996	11:20	0.011	8.5	<0.008	<0.004	0.18
SNP-096	22	Big Meadows #9 Well	W	8/28/1997	13:30	0.011	11.6	<0.007	<0.003	0.28
SNP-036	23	Big Meadows #14 Well	W	4/15/1996	14:00	0.015	12.7	<0.008	<0.004	0.19
SNP-092	23	Big Meadows #14 Well	W	8/28/1997	11:30	0.014	14.5	0.014	<0.003	0.22
SNP-233	23	Big Meadows #14 Well	W	8/17/1999	12:50	0.016	15.2	<0.02	<0.001	0.19
SNP-038	24	Hogback Spring #5	S	4/16/1996	11:45	0.004	5.7	<0.008	<0.004	0.16
SNP-039	25	Elkwallow Well (W-1703)	W	4/16/1996	16:00	0.019	13.0	0.040	<0.004	1.52
SNP-086	25	Elkwallow Well (W-1703)	W	8/26/1997	18:30	0.020	15.4	0.090	0.008	1.35
SNP-228	25	Elkwallow Well (W-1703)	W	8/16/1999	11:45	0.022	16.7	<0.02	0.002	1.32
SNP-041	26	Hightop Hut Spring	S	4/17/1996	15:15	0.019	12.6	<0.008	<0.004	1.74
SNP-132	26	Hightop Hut Spring	S	9/16/1997	15:45	0.022	16.6	<0.007	<0.003	2.04
SNP-043	27	Pass Mountain Hut Spring	S	4/18/1996	9:15	0.014	7.5	0.013	0.007	1.18
SNP-105	27	Pass Mountain Hut Spring	S	9/3/1997	14:10	0.013	9.2	<0.007	<0.003	1.02
SNP-048	31	Dickeys Ridge Well (W-1346)	W	4/19/1996	14:40	0.079	16.2	0.010	<0.004	0.76
SNP-084	31	Dickeys Ridge Well (W-1346)	W	8/26/1997	10:50	0.070	17.3	0.018	<0.003	0.79
SNP-230	31	Dickeys Ridge Well (W-1346)	W	8/16/1999	16:15	0.073	17.6	<0.02	<0.001	0.45
SNP-050	33	Domestic well #1	W	4/24/1996	9:50	0.061	6.2	0.077	0.008	1.53
SNP-051	34	Domestic well #2	W	4/24/1996	14:55	0.043	6.4	0.067	0.006	9.80
SNP-052	35	White Oak Cabin Spring	S	4/25/1996	10:35	0.009	6.1	0.014	<0.005	0.56
SNP-111	35	White Oak Cabin Spring	S	9/4/1997	15:55	0.006	7.0	<0.007	<0.003	0.51
SNP-053	36	Big Meadows #1 Well (W-1701)	W	4/25/1996	16:30	0.014	10.1	0.017	0.010	0.31
SNP-083	36	Big Meadows #1 Well (W-1701)	W	9/17/1997	16:30	0.014	11.9	0.018	0.005	0.34
SNP-037	37	HQ #2 Well (W-851)	W	4/16/1996	9:45	0.029	21.5	0.287	0.011	1.09
SNP-087	37	HQ #2 Well (W-851)	W	8/27/1997	10:30	0.025	23.7	0.135	0.017	1.19
SNP-007	38	Skyland #5	W	4/2/1996	16:00	0.018	10.8	0.029	0.007	0.66
SNP-088	38	Skyland #5	W	8/27/1997	17:10	0.018	12.5	0.087	0.013	0.63
SNP-005	39	Pinnacles Well (W-3288)	W	4/2/1996	12:00	0.019	6.9	0.008	<0.004	3.64
SNP-091	39	Pinnacles Well (W-3288)	W	8/27/1997	12:45	0.018	7.8	<0.007	<0.003	3.35
SNP-019	40	Mathews Arm Spring Range View Cabin	S	4/5/1996	14:35	0.020	8.6	0.010	<0.004	2.42
SNP-102	40	Mathews Arm Spring Range View Cabin	S	9/2/1997	13:30	0.017	10.6	<0.007	<0.003	2.08
SNP-031	41	Lewis Mountain Spring #25-2	S	4/11/1996	16:30	0.007	4.4	<0.008	<0.004	0.09
SNP-114	41	Lewis Mountain Spring #25-2	S	9/5/1997	11:00	0.008	5.8	<0.007	<0.003	0.11
SNP-054	42	Old Rag Shelter Spring	S	4/26/1996	14:30	0.010	9.6	0.015	<0.005	0.28
SNP-118	42	Old Rag Shelter Spring	S	9/9/1997	18:00	0.009	11.3	<0.007	0.008	0.30
SNP-015	43	Loft Mountain Overlook Spring	S	4/4/1996	15:30	0.015	13.9	0.010	<0.004	1.95
SNP-121	43	Loft Mountain Overlook Spring	S	9/10/1997	17:00	0.017	16.9	0.030	0.004	1.83
SNP-016	44	Loft Mountain Spring	S	4/4/1996	17:30	0.013	7.4	<0.008	<0.004	2.67
SNP-122	44	Loft Mountain Spring	S	9/10/1997	15:00	0.013	7.6	0.009	0.013	1.68
SNP-013	45	Simmons Gap Well (W-1704)	W	4/4/1996	9:30	0.017	21.6	0.013	0.013	2.26
SNP-099	45	Simmons Gap Well (W-1704)	W	8/29/1997	10:00	0.016	22.2	0.011	<0.003	2.05
SNP-137	46	Yeager's Spring (Luray)	S	9/17/1997	13:10	0.234	11.0	0.033	0.005	1.56
SNP-248	46	Yeager's Spring (Luray)	S	8/23/1999	11:20	0.295	10.9	0.03	0.004	1.81
SNP-042	47	Lewis Mountain Well (W-1072)	W	4/17/1996	18:20	0.008	4.2	0.149	0.009	0.10
SNP-095	47	Lewis Mountain Well (W-1072)	W	8/28/1997	15:45	0.009	8.5	0.035	<0.003	0.13
SNP-140	47	Lewis Mountain Well (W-1072)	W	9/19/1997	9:30	0.009	5.5	0.016	<0.003	<0.10
SNP-170	48	Bear Lithia Spring	S	8/6/1997	17:15	0.046	11.1	0.014	<0.003	0.36
SNP-255	48	Bear Lithia Spring	S	9/2/1999	10:20	0.052	11.0	0.02	<0.001	0.38
SNP-046	49	Mathews Arm Well (W-856)	W	4/19/1996	10:40	0.018	17.1	0.015	<0.004	1.17
SNP-085	49	Mathews Arm Well (W-856)	W	8/26/1997	15:05	0.016	18.3	0.013	<0.003	0.74
SNP-229	49	Mathews Arm Well (W-856)	W	8/16/1999	13:10	0.017	18.5	<0.02	<0.001	0.73
SNP-011	50	Loft Mountain Well #1 (W-715)	W	4/3/1996	15:45	0.020	15.6	0.013	<0.004	0.90
SNP-098	50	Loft Mountain Well #1 (W-715)	W	8/29/1997	14:00	0.021	18.3	<0.007	<0.003	0.90

Table 15. Summary of minor-element chemistry--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	Sr (mg/L)	SiO_2 (mg/L)	Fe (mg/L)	Mn (mg/L)	NO_3 as N (mg/L)
SNP-235	50	Loft Mountain Well #1 (W-715)	W	8/17/1999	18:15	0.022	18.0	<0.02	<0.001	0.97
SNP-010	51	Loft Mountain Well #2 (W-754)	W	4/3/1996	14:30	0.014	6.5	<0.008	<0.004	0.13
SNP-097	51	Loft Mountain Well #2 (W-754)	W	8/29/1997	12:30	0.020	9.5	0.009	<0.003	0.28
SNP-236	51	Loft Mountain Well #2 (W-754)	W	8/18/1999	8:35	0.046	12.5	<0.02	<0.001	0.34
SNP-012	52	Ivy Creek Shelter Spring	S	4/3/1996	18:00	0.008	9.3	<0.008	<0.004	1.92
SNP-119	52	Ivy Creek Shelter Spring	S	9/10/1997	12:00	0.010	13.5	0.011	<0.003	2.86
SNP-237	52	Ivy Creek Shelter Spring	S	8/18/1999	10:20	0.009	13.6	<0.02	<0.001	2.44
SNP-113	53	Lewis Mountain Spring #25	S	9/5/1997	9:30	0.009	6.1	<0.007	<0.003	0.14
SNP-241	53	Lewis Mountain Spring #25	S	8/19/1999	18:05	0.009	6.0	<0.02	<0.001	0.12
SNP-033	54	Elkwallow Spring #8	S	4/12/1996	12:30	0.016	12.5	<0.008	<0.004	1.95
SNP-106	54	Elkwallow Spring #8	S	9/3/1997	9:00	0.016	14.8	<0.007	<0.003	1.56
SNP-244	54	Elkwallow Spring #8	S	8/20/1999	13:50	0.018	15.0	<0.02	<0.001	1.68
SNP-136	55	Hite Spring (Luray)	S	9/17/1997	11:40	0.331	12.4	0.025	0.004	0.86
SNP-247	55	Hite Spring (Luray)	S	8/23/1999	8:56	0.333	12.3	0.03	0.002	0.85
SNP-040	56	HQ Spring #14-1	S	4/17/1996	9:15	0.021	23.2	0.069	<0.004	0.35
SNP-117	56	HQ Spring #14-1	S	9/9/1997	9:10	0.030	26.7	<0.007	<0.003	0.47
SNP-249	56	HQ Spring #14-1	S	8/23/1999	14:10	0.034	23.6	<0.02	<0.001	0.45
SNP-023	57	Indian Run Shelter Spring	S	4/9/1996	13:00	0.015	10.9	<0.008	<0.004	1.24
SNP-128	57	Indian Run Shelter Spring	S	9/12/1997	13:30	0.014	12.5	0.009	<0.003	1.07
SNP-251	57	Indian Run Shelter Spring	S	8/23/1999	18:15	0.017	12.8	<0.02	<0.001	1.26
SNP-252	58	Town of Elkton Spring	S	9/1/1999	10:25	0.020	12.4	<0.02	<0.001	0.13
SNP-253	59	Town of Elkton well	W	9/1/1999	11:15	0.087	9.7	0.02	0.004	2.64
SNP-254	60	Town of Grottoes #2	W	9/1/1999	15:00	0.137	10.9	0.02	<0.001	0.14
SNP-256	61	Blue Ridge School #5	W	9/2/1999	12:30	0.223	27.8	0.03	0.193	0.00
SNP-257	62	Town of Washington #3	W	9/2/1999	15:45	0.067	28.0	0.22	0.113	0.00
SNP-263	63	Mountain side Market	W	9/8/1999	9:00	0.095	25.2	<0.02	<0.001	0.29
SNP-134	64	Hudson Spring (Luray)	S	9/17/1997	9:45	0.234	12.3	0.036	0.004	0.61
SNP-180	64	Hudson Spring (Luray)	S	3/2/1999	10:10	0.230	13.0	<0.01	<0.001	0.59
SNP-185	64	Hudson Spring (Luray)	S	4/2/1999	8:40	0.239	12.2	0.018	<0.001	0.60
SNP-190	64	Hudson Spring (Luray)	S	4/27/1999	9:40	0.238	12.1	<0.01	<0.001	0.61
SNP-195	64	Hudson Spring (Luray)	S	5/26/1999	10:00	0.235	12.1	0.021	<0.001	0.59
SNP-200	64	Hudson Spring (Luray)	S	6/23/1999	9:30	0.221	12.4	0.019	0.006	0.60
SNP-217	64	Hudson Spring (Luray)	S	7/14/1999	9:30	0.248	12.6	0.027	0.008	0.59
SNP-222	64	Hudson Spring (Luray)	S	8/11/1999	9:15	0.229	12.5	<0.01	<0.001	0.59
SNP-258	64	Hudson Spring (Luray)	S	9/7/1999	9:30	0.227	12.2	0.01	0.002	0.58
SNP-264	64	Hudson Spring (Luray)	S	9/9/1999	9:05	0.231	12.4	0.01	0.003	0.57
SNP-269	64	Hudson Spring (Luray)	S	9/22/1999	9:00	0.232	12.6	0.01	0.002	0.60
SNP-020	65	Lewis Spring	S	4/8/1996	10:30	0.011	6.3	<0.008	<0.004	0.52
SNP-093	65	Lewis Spring	S	8/28/1997	17:05	0.012	7.6	<0.007	<0.003	0.91
SNP-124	65	Lewis Spring	S	9/11/1997	9:35	0.012	7.6	<0.007	<0.003	1.03
SNP-126	65	Lewis Spring	S	9/11/1997	10:50	0.013	8.0	0.008	<0.003	1.04
SNP-135	65	Lewis Spring	S	9/17/1997	16:00	0.012	7.7	<0.007	<0.003	0.93
SNP-181	65	Lewis Spring	S	3/2/1999	12:30	0.012	7.4	<0.01	0.001	0.90
SNP-186	65	Lewis Spring	S	4/2/1999	10:10	0.013	7.6	<0.01	<0.001	0.97
SNP-191	65	Lewis Spring	S	4/27/1999	13:00	0.013	7.6	<0.01	<0.001	0.92
SNP-196	65	Lewis Spring	S	5/26/1999	12:55	0.012	7.7	<0.01	<0.001	0.94
SNP-201	65	Lewis Spring	S	6/23/1999	11:50	0.011	7.9	<0.01	<0.001	0.94
SNP-220	65	Lewis Spring	S	7/15/1999	9:25	0.013	8.0	<0.01	0.005	0.94
SNP-223	65	Lewis Spring	S	8/11/1999	11:35	0.013	8.1	<0.01	<0.001	0.96
SNP-259	65	Lewis Spring	S	9/7/1999	11:00	0.012	7.7	<0.01	0.000	1.09
SNP-265	65	Lewis Spring	S	9/9/1999	10:40	0.012	7.8	<0.01	0.000	1.02
SNP-270	65	Lewis Spring	S	9/22/1999	10:40	0.010	7.6	<0.01	0.003	1.09
VR-01	66	Town of Stanley # 3	W	7/6/1999	12:30	0.016	11.5	<0.02	0.001	0.05
VR-02	67	Town of Shenandoah # 5	W	7/6/1999	16:15	0.046	12.0	<0.02	0.003	0.76
VR-03	68	Wanyesboro Jefferson Rd # 1	W	7/7/1999	10:35	0.019	7.6	<0.02	0.002	0.47
VR-04	69	Coyner Spring	S	7/7/1999	14:00	0.091	9.4	<0.02	0.002	0.59
VR-06	71	Town of Shenandoah # 2	W	7/8/1999	16:20	0.116	10.2	0.03	0.003	0.22
VR-07	72	Town of Shenandoah # 3	W	7/8/1999	18:20	0.055	10.6	<0.02	0.003	0.23
VR-08	73	Town of Stanley # 6	W	7/9/1999	10:15	0.178	13.6	<0.02	0.005	0.27
VR-09	74	Town of Stanley # 5	W	7/9/1999	13:00	0.169	14.2	0.02	0.002	1.68
VR-10	75	Town of Stanley # 4	W	7/9/1999	15:00	0.108	11.5	<0.02	0.003	1.73
VR-11	76	Town of Stanley # 2	W	7/9/1999	16:45	0.016	13.0	<0.02	0.002	0.05

Table 16. Summary of trace-element chemistry

[W, well; S, spring; Al, aluminum; B, boron; Ba, barium; Li, lithium; Zn, zinc; Pb, lead; Cu, copper; Ni, nickel; Rb, rubidium; V, vanadium; mg/L, milligrams per liter; mg/L, micrograms per liter; ND, not determined]

SNP No.	Site ID	Site Name	W/S	Date	Time	Al (mg/L)	B (mg/L)	Ba (mg/L)	Li (mg/L)	Zn (µg/L)	Pb (µg/L)	Cu (µg/L)	Ni (µg/L)	Rb (µg/L)	V (µg/L)
SNP-001	1	HQ #1 Well (W-855)	W	4/1/1996	10:30	0.005	0.015	ND	0.021	ND	ND	ND	ND	ND	ND
SNP-090	1	HQ #1 Well (W-855)	W	8/27/1997	8:40	0.008	0.012	<0.001	0.001	226	1.00	5.1	<0.1	0.3	1.3
SNP-227	1	HQ #1 Well (W-855)	W	8/16/1999	9:00	<0.001	<0.02	<0.001	0.002	86	0.43	2.7	<0.1	0.4	1.7
SNP-002	2	HQ Spring #14-3 - above HQ on Rt 211	S	4/1/1996	13:00	0.009	0.006	ND	0.026	ND	ND	ND	ND	ND	ND
SNP-003	3	Hemlock Spring	S	4/1/1996	15:00	<0.005	0.006	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-108	3	Hemlock Spring	S	9/4/1997	12:00	0.002	0.008	0.004	<0.001	<1	<0.1	0.3	<0.1	0.1	0.4
SNP-231	3	Hemlock Spring	S	8/17/1999	9:45	<0.001	<0.02	0.005	<0.001	<1	0.07	0.3	<0.1	0.1	0.3
SNP-004	4	Pinnacles Spring #16	S	4/2/1996	9:30	0.008	0.007	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-112	4	Pinnacles Spring #16	S	9/4/1997	10:00	0.006	0.007	0.004	<0.001	1	<0.1	2.9	<0.1	1.4	<0.1
SNP-006	5	Furnace Spring at Skyland	S	4/2/1996	14:30	<0.005	0.008	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-089	5	Furnace Spring at Skyland	S	8/27/1997	18:35	0.003	0.005	0.007	<0.001	2	<0.1	0.1	0.2	0.2	0.2
SNP-125	5	Furnace Spring at Skyland	S	9/11/1997	12:25	0.006	0.006	0.007	<0.001	1	<0.1	0.1	0.2	0.2	0.2
SNP-169	5	Furnace Spring at Skyland	S	9/18/1997	9:15	0.005	0.005	0.008	<0.001	1	<0.1	0.3	0.2	0.2	0.2
SNP-182	5	Furnace Spring at Skyland	S	3/2/1999	14:35	<0.001	<0.01	0.006	<0.001	2	<0.05	0.1	0.3	0.2	0.2
SNP-187	5	Furnace Spring at Skyland	S	4/2/1999	11:20	0.007	<0.02	0.007	<0.001	<1	<0.05	0.7	0.3	0.2	0.2
SNP-192	5	Furnace Spring at Skyland	S	4/27/1999	14:40	<0.001	<0.02	0.007	<0.001	<1	<0.05	0.7	0.3	0.2	0.3
SNP-197	5	Furnace Spring at Skyland	S	5/26/1999	14:50	<0.001	<0.02	0.006	<0.001	1	0.07	0.1	<0.1	0.2	0.3
SNP-202	5	Furnace Spring at Skyland	S	6/23/1999	13:40	<0.001	<0.02	0.006	<0.001	<1	0.06	0.2	0.2	0.2	0.2
SNP-221	5	Furnace Spring at Skyland	S	7/15/1999	11:45	<0.001	<0.02	0.006	<0.001	<1	<0.05	0.2	0.2	3.5	0.3
SNP-224	5	Furnace Spring at Skyland	S	8/11/1999	13:30	0.001	<0.02	0.006	<0.001	<1	0.06	0.2	0.2	0.2	0.2
SNP-260	5	Furnace Spring at Skyland	S	9/7/1999	12:45	<0.001	<0.02	0.007	<0.001	<1	<0.05	0.6	0.3	0.2	0.2
SNP-266	5	Furnace Spring at Skyland	S	9/9/1999	12:30	<0.001	<0.02	0.007	<0.001	<1	<0.05	0.2	0.3	0.2	0.2
SNP-271	5	Furnace Spring at Skyland	S	9/22/1999	12:09	<0.001	<0.02	0.007	<0.001	<1	<0.05	0.1	0.3	0.2	0.2
SNP-008	6	Skyland #2 (W-1033)	W	4/2/1996	17:30	<0.005	0.005	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-094	6	Skyland #2 (W-1033)	W	8/28/1997	9:45	0.003	0.006	0.008	<0.001	16	0.20	7.5	0.3	0.2	<0.1
SNP-232	6	Skyland #2 (W-1033)	W	8/17/1999	11:25	<0.001	<0.02	0.008	<0.001	10	0.98	10.9	0.2	0.2	<0.1
SNP-009	7	Dundo Spring #29	S	4/3/1996	12:15	0.020	0.011	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-120	7	Dundo Spring #29	S	9/10/1997	10:30	0.056	0.008	0.031	<0.001	2	0.20	0.7	0.2	0.7	<0.1
SNP-014	8	Simmons Gap Spring	S	4/4/1996	12:40	0.006	0.006	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-131	8	Simmons Gap Spring	S	9/16/1997	13:00	0.004	0.007	0.012	<0.001	<1	0.10	0.2	<0.1	0.2	0.6
SNP-238	8	Simmons Gap Spring	S	8/18/1999	10:45	<0.001	<0.02	0.011	<0.001	<1	<0.05	0.2	<0.1	0.1	0.6
SNP-017	9	Panorama Spring #13-3	S	4/5/1996	9:00	<0.005	0.007	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-107	9	Panorama Spring #13-3	S	9/3/1997	17:00	0.003	0.007	0.018	<0.001	2	<0.1	8.7	<0.1	0.3	0.5
SNP-018	10	Browntown Valley Overlook Spring	S	4/5/1996	12:40	0.007	0.007	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-103	10	Browntown Valley Overlook Spring	S	9/2/1997	9:30	0.006	0.008	0.005	<0.001	1	<0.1	0.8	0.3	0.1	0.3
SNP-123	10	Browntown Valley Overlook Spring	S	9/11/1997	16:30	0.005	0.008	0.005	<0.001	1	<0.1	0.9	0.3	0.1	0.3
SNP-139	10	Browntown Valley Overlook Spring	S	9/18/1997	13:30	0.005	0.006	0.005	<0.001	1	<0.1	1.0	0.3	0.1	0.2
SNP-184	10	Browntown Valley Overlook Spring	S	3/3/1999	10:00	0.001	<0.01	0.005	<0.001	2	<0.05	1.1	0.4	0.1	0.2
SNP-189	10	Browntown Valley Overlook Spring	S	4/2/1999	15:00	0.008	<0.02	0.005	<0.001	1	0.12	1.7	0.4	0.2	0.2
SNP-193	10	Browntown Valley Overlook Spring	S	4/28/1999	10:30	<0.001	<0.02	0.004	<0.001	<1	<0.05	1.1	0.4	0.1	0.3
SNP-198	10	Browntown Valley Overlook Spring	S	5/27/1999	9:05	0.001	<0.02	0.005	<0.001	2	0.06	0.9	0.2	0.1	0.3
SNP-204	10	Browntown Valley Overlook Spring	S	6/24/1999	11:55	<0.001	<0.02	0.005	<0.001	<1	<0.05	0.8	0.3	0.1	0.3
SNP-219	10	Browntown Valley Overlook Spring	S	7/14/1999	14:35	<0.001	<0.02	0.005	<0.001	1	0.09	1.1	0.3	0.1	0.4
SNP-225	10	Browntown Valley Overlook Spring	S	8/12/1999	9:20	0.001	<0.02	0.005	<0.001	3	<0.05	0.6	0.3	0.1	0.3
SNP-262	10	Browntown Valley Overlook Spring	S	9/7/1999	16:30	0.002	<0.02	0.006	<0.001	1	<0.05	2.0	0.4	0.1	0.2
SNP-268	10	Browntown Valley Overlook Spring	S	9/10/1999	8:25	0.002	<0.02	0.006	<0.001	1	<0.05	1.3	0.4	0.1	0.2
SNP-273	10	Browntown Valley Overlook Spring	S	9/22/1999	15:45	0.002	<0.02	0.006	<0.001	1	<0.05	1.1	0.4	0.1	0.2

Table 16. Summary of trace-element chemistry--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	Al (mg/L)	B (mg/L)	Ba (mg/L)	Li (mg/L)	Zn (µg/L)	Pb (µg/L)	Cu (µg/L)	Ni (µg/L)	Rb (µg/L)	V (µg/L)
SNP-021	11	Camp Hoover Spring #2	S	4/8/1996	14:30	<0.005	0.007	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-116	11	Camp Hoover Spring #2	S	9/9/1997	14:00	0.002	0.005	0.006	<0.001	1	<0.1	3.7	0.2	0.2	0.5
SNP-234	11	Camp Hoover Spring #2	S	8/17/1999	14:35	<0.001	<0.02	0.006	<0.001	<1	0.09	0.3	<0.1	0.1	0.6
SNP-022	12	Davids Spring	S	4/8/1996	17:15	<0.005	0.009	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-110	12	Davids Spring	S	9/4/1997	18:00	0.005	0.004	0.026	<0.001	3	<0.1	0.4	0.1	0.3	0.5
SNP-243	12	Davids Spring	S	8/20/1999	11:05	<0.001	<0.02	0.025	<0.001	1	<0.05	0.6	<0.1	0.3	0.5
SNP-024	13	Dickeys Ridge Spring	S	4/10/1996	11:30	0.031	0.007	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-129	13	Dickeys Ridge Spring	S	9/12/1997	10:00	0.004	0.005	0.011	<0.001	1	<0.1	0.5	<0.1	0.2	0.1
SNP-130	13	Dickeys Ridge Spring	S	9/12/1997	9:45	0.014	0.005	0.009	<0.001	2	0.70	0.8	0.1	0.4	0.1
SNP-246	13	Dickeys Ridge Spring (pipe 2)	S	8/20/1999	17:00	<0.001	<0.02	0.011	<0.001	<1	<0.05	0.4	<0.1	0.2	0.1
SNP-025	14	Gravel Spring NE	S	4/10/1996	14:30	0.007	0.008	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-101	14	Gravel Spring NE	S	9/2/1997	11:00	0.004	0.003	0.014	<0.001	2	0.20	0.4	0.2	0.2	0.8
SNP-026	15	Pass Mountain Overlook Spring	S	4/10/1996	17:50	<0.005	0.005	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-100	15	Pass Mountain Overlook Spring	S	9/2/1997	16:00	0.002	0.003	0.010	<0.001	683	0.20	15.5	0.2	<0.1	0.1
SNP-027	16	Swift Run Gap Spring #27	S	4/11/1996	10:00	0.005	0.008	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-133	16	Swift Run Gap Spring #27	S	9/16/1997	10:30	0.007	0.006	0.014	<0.001	1	<0.1	0.2	<0.1	0.4	0.2
SNP-239	16	Swift Run Gap Spring #27	S	8/19/1999	13:45	<0.001	<0.02	0.013	<0.001	<1	0.06	<0.1	1.2	0.3	0.2
SNP-028	17	Dean Mountain/South River Spring	S	4/11/1996	12:00	0.006	0.009	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-115	17	Dean Mountain/South River Spring	S	9/5/1997	14:00	0.003	0.006	0.019	<0.001	3	<0.1	0.2	0.2	0.2	0.1
SNP-240	17	Dean Mountain/South River Spring	S	8/19/1999	15:40	<0.001	<0.02	0.015	<0.001	<1	<0.05	0.3	0.1	0.2	0.1
SNP-029	18	Baldface Mountain Spring	S	4/11/1996	14:00	<0.005	0.005	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-030	19	Hazeltop Ridge Overlook Spring	S	4/11/1996	18:30	<0.005	<0.005	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-032	20	Byrds Nest #4/Beahms Gap Spring	S	4/12/1996	9:40	0.005	0.005	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-104	20	Byrds Nest #4/Beahms Gap Spring	S	9/3/1997	12:00	0.005	0.005	0.016	<0.001	155	0.10	19.0	<0.1	0.3	0.7
SNP-242	20	Byrds Nest #4/Beahms Gap Spring	S	8/20/1999	8:45	<0.001	<0.02	0.016	<0.001	2	<0.05	0.3	<0.1	0.3	0.8
SNP-034	21	Byrds Nest #3 Spring	S	4/12/1996	15:20	0.008	0.009	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-109	21	Byrds Nest #3 Spring	S	9/4/1997	8:30	0.003	0.006	0.017	<0.001	2	<0.1	0.3	0.1	2.3	0.1
SNP-127	21	Byrds Nest #3 Spring	S	9/11/1997	14:30	0.004	0.007	0.017	<0.001	2	<0.1	0.4	<0.1	2.3	<0.1
SNP-138	21	Byrds Nest #3 Spring	S	9/18/1997	11:00	0.002	0.004	0.017	<0.001	2	<0.1	0.3	<0.1	2.3	<0.1
SNP-183	21	Byrds Nest #3 Spring	S	3/2/1999	16:50	0.003	<0.01	0.016	<0.001	2	<0.05	0.3	0.2	2.1	<0.1
SNP-188	21	Byrds Nest #3 Spring	S	4/2/1999	12:50	0.009	<0.02	0.016	<0.001	<1	<0.05	0.7	0.1	2.3	0.1
SNP-194	21	Byrds Nest #3 Spring	S	4/28/1999	17:25	0.003	<0.02	0.016	<0.001	1	0.05	0.7	0.1	2.3	0.1
SNP-199	21	Byrds Nest #3 Spring	S	5/27/1999	11:22	0.003	<0.02	0.016	<0.001	1	0.18	0.5	<0.1	2.3	0.2
SNP-203	21	Byrds Nest #3 Spring	S	6/24/1999	9:05	0.003	<0.02	0.016	<0.001	<1	0.13	0.4	0.1	2.2	<0.1
SNP-218	21	Byrds Nest #3 Spring	S	7/14/1999	11:34	0.003	<0.02	0.016	<0.001	<1	0.06	0.3	0.1	2.2	0.1
SNP-226	21	Byrds Nest #3 Spring	S	8/12/1999	12:00	0.004	<0.02	0.016	<0.001	1	0.07	0.8	<0.1	2.3	<0.1
SNP-261	21	Byrds Nest #3 Spring	S	9/7/1999	14:20	0.002	<0.02	0.016	<0.001	<1	<0.05	0.4	<0.1	2.2	<0.1
SNP-267	21	Byrds Nest #3 Spring	S	9/9/1999	14:30	0.002	<0.02	0.016	<0.001	<1	<0.05	0.3	<0.1	2.3	<0.1
SNP-272	21	Byrds Nest #3 Spring	S	9/22/1999	13:45	0.002	<0.02	0.016	<0.001	<1	<0.05	0.4	0.1	2.3	<0.1
SNP-035	22	Big Meadows #9 Well	W	4/15/1996	11:20	<0.005	0.007	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-096	22	Big Meadows #9 Well	W	8/28/1997	13:30	0.001	0.009	0.002	<0.001	128	1.40	1.2	<0.1	<0.1	0.9
SNP-036	23	Big Meadows #14 Well	W	4/15/1996	14:00	<0.005	0.006	ND	0.021	ND	ND	ND	ND	ND	ND
SNP-092	23	Big Meadows #14 Well	W	8/28/1997	11:30	0.003	0.007	0.015	<0.001	181	0.83	1.0	<0.1	0.2	0.8
SNP-233	23	Big Meadows #14 Well	W	8/17/1999	12:50	<0.001	<0.02	0.001	<0.001	33	0.42	0.8	<0.1	<0.1	1.3
SNP-038	24	Hogback Spring #5	S	4/16/1996	11:45	<0.005	0.008	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-039	25	Elkwallow Well (W-1703)	W	4/16/1996	16:00	<0.005	0.008	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-086	25	Elkwallow Well (W-1703)	W	8/26/1997	18:30	0.004	0.005	0.009	<0.001	860	<0.1	2.0	0.4	0.2	0.7
SNP-228	25	Elkwallow Well (W-1703)	W	8/16/1999	11:45	<0.001	<0.02	0.006	<0.001	653	0.23	1.5	0.2	0.2	1.6
SNP-041	26	Hightop Hut Spring	S	4/17/1996	15:15	0.005	0.008	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-132	26	Hightop Hut Spring	S	9/16/1997	15:45	0.003	0.006	0.010	<0.001	2	<0.1	4.9	0.1	0.1	1.0

Table 16. Summary of trace-element chemistry--Continued

SNP No.	Site ID	Site Name	W/S	Date	Time	Al (mg/L)	B (mg/L)	Ba (mg/L)	Li (mg/L)	Zn (µg/L)	Pb (µg/L)	Cu (µg/L)	Ni (µg/L)	Rb (µg/L)	V (µg/L)
SNP-043	27	Pass Mountain Hut Spring	S	4/18/1996	9:15	<0.005	0.005	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-105	27	Pass Mountain Hut Spring	S	9/3/1997	14:10	0.000	0.007	0.021	<0.001	14	<0.1	2.6	<0.1	0.3	0.2
SNP-048	31	Dickeys Ridge Well (W-1346)	W	4/19/1996	14:40	<0.005	0.010	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-084	31	Dickeys Ridge Well (W-1346)	W	8/26/1997	10:50	0.014	0.006	0.004	0.001	78	1.40	1.3	<0.1	0.6	3.2
SNP-230	31	Dickeys Ridge Well (W-1346)	W	8/16/1999	16:15	<0.001	<0.02	0.003	0.001	41	1.10	0.5	<0.1	0.5	3.3
SNP-050	33	Domestic well #1	W	4/24/1996	9:50	0.035	0.014	ND	0.304	ND	ND	ND	ND	ND	ND
SNP-051	34	Domestic well #2	W	4/24/1996	14:55	0.017	0.011	ND	0.268	ND	ND	ND	ND	ND	ND
SNP-052	35	White Oak Cabin Spring	S	4/25/1996	10:35	0.008	0.009	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-111	35	White Oak Cabin Spring	S	9/4/1997	15:55	0.005	0.006	0.006	<0.001	1	0.20	3.3	0.1	0.2	0.2
SNP-053	36	Big Meadows #1 Well (W-1701)	W	4/25/1996	16:30	0.006	0.007	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-083	36	Big Meadows #1 Well (W-1701)	W	9/17/1997	16:30	0.001	0.011	0.008	<0.001	2	<0.1	0.6	<0.1	0.2	0.7
SNP-037	37	HQ #2 Well (W-851)	W	4/16/1996	9:45	0.013	0.013	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-087	37	HQ #2 Well (W-851)	W	8/27/1997	10:30	0.008	0.013	0.007	0.001	1330	<0.1	1.3	3.1	0.2	0.4
SNP-007	38	Skyland #5	W	4/2/1996	16:00	<0.005	0.006	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-088	38	Skyland #5	W	8/27/1997	17:10	0.007	0.005	<0.001	0.001	2500	<0.1	0.3	0.7	<0.1	<0.1
SNP-005	39	Pinnacles Well (W-3288)	W	4/2/1996	12:00	0.025	0.005	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-091	39	Pinnacles Well (W-3288)	W	8/27/1997	12:45	0.005	0.008	0.021	<0.001	1020	2.60	4.0	<0.1	1.0	<0.1
SNP-019	40	Mathews Arm Spring Range View Cabin	S	4/5/1996	14:35	0.006	0.012	n.d.	<0.020	ND	ND	ND	ND	ND	ND
SNP-102	40	Mathews Arm Spring Range View Cabin	S	9/2/1997	13:30	0.016	0.002	0.012	<0.001	4	0.20	5.6	0.3	0.3	0.3
SNP-031	41	Lewis Mountain Spring #25-2	S	4/11/1996	16:30	0.008	0.009	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-114	41	Lewis Mountain Spring #25-2	S	9/5/1997	11:00	0.003	0.008	0.018	<0.001	2	<0.1	0.9	<0.1	0.3	<0.1
SNP-054	42	Old Rag Shelter Spring	S	4/26/1996	14:30	0.012	0.013	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-118	42	Old Rag Shelter Spring	S	9/9/1997	18:00	0.005	0.006	0.006	<0.001	143	0.20	6.4	0.1	0.3	0.1
SNP-015	43	Loft Mountain Overlook Spring	S	4/4/1996	15:30	0.006	0.007	n.d.	<0.020	ND	ND	ND	ND	ND	ND
SNP-121	43	Loft Mountain Overlook Spring	S	9/10/1997	17:00	0.007	0.012	0.015	<0.001	3	<0.1	0.7	0.1	0.2	1.2
SNP-016	44	Loft Mountain Spring	S	4/4/1996	17:30	<0.005	0.005	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-122	44	Loft Mountain Spring	S	9/10/1997	15:00	0.031	0.010	0.056	<0.001	25	<0.1	4.4	0.1	0.3	0.6
SNP-013	45	Simmons Gap Well (W-1704)	W	4/4/1996	9:30	<0.005	0.008	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-099	45	Simmons Gap Well (W-1704)	W	8/29/1997	10:00	0.008	0.006	0.004	<0.001	57	0.30	<0.1	<0.1	0.2	4.0
SNP-137	46	Yeager's Spring (Luray)	S	9/17/1997	13:10	0.004	0.009	0.043	0.002	<1	0.40	3.1	0.1	2.1	0.3
SNP-248	46	Yeager's Spring (Luray)	S	8/23/1999	11:20	<0.001	<0.02	0.044	0.003	<1	<0.05	0.3	<0.1	2.3	0.2
SNP-042	47	Lewis Mountain Well (W-1072)	W	4/17/1996	18:20	<0.005	0.010	ND	0.022	ND	ND	ND	ND	ND	ND
SNP-095	47	Lewis Mountain Well (W-1072)	W	8/28/1997	15:45	0.001	0.009	0.009	<0.001	51	<0.1	1.7	0.1	0.3	0.2
SNP-140	47	Lewis Mountain Well (W-1072)	W	9/19/1997	9:30	0.004	0.007	0.010	<0.001	25	0.10	1.7	0.2	0.3	<0.1
SNP-170	48	Bear Lithia Spring	S	9/8/1997	17:15	0.002	0.010	0.033	0.004	2	<0.1	0.2	<0.1	1.9	0.2
SNP-255	48	Bear Lithia Spring	S	9/2/1999	10:20	0.001	<0.02	0.032	0.004	2	<0.05	0.9	<0.1	2.2	0.3
SNP-046	49	Mathews Arm Well (W-856)	W	4/19/1996	10:40	<0.005	0.021	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-085	49	Mathews Arm Well (W-856)	W	8/26/1997	15:05	0.009	0.013	0.006	<0.001	53	0.30	5.3	0.4	0.3	1.1
SNP-229	49	Mathews Arm Well (W-856)	W	8/16/1999	13:10	<0.001	<0.02	0.005	<0.001	349	0.42	2.6	0.8	0.2	1.3
SNP-011	50	Loft Mountain Well #1 (W-715)	W	4/3/1996	15:45	<0.005	0.008	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-098	50	Loft Mountain Well #1 (W-715)	W	8/29/1997	14:00	0.007	0.006	0.044	<0.001	25	0.20	0.8	<0.1	0.1	0.3
SNP-235	50	Loft Mountain Well #1 (W-715)	W	8/17/1999	18:15	<0.001	<0.02	0.043	0.001	85	0.21	1.3	<0.1	0.1	0.2
SNP-010	51	Loft Mountain Well #2 (W-754)	W	4/3/1996	14:30	<0.005	0.005	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-097	51	Loft Mountain Well #2 (W-754)	W	8/29/1997	12:30	0.004	0.007	0.020	<0.001	150	0.60	0.5	<0.1	0.2	0.2
SNP-236	51	Loft Mountain Well #2 (W-754)	W	8/18/1999	8:35	<0.001	<0.02	0.043	<0.001	40	0.24	0.2	<0.1	0.1	0.5
SNP-012	52	Ivy Creek Shelter Spring	S	4/3/1996	18:00	0.005	0.007	ND	<0.020	ND	ND	ND	ND	ND	ND
SNP-119	52	Ivy Creek Shelter Spring	S	9/10/1997	12:00	0.005	0.001	0.016	<0.001	2	<0.1	<0.1	<0.1	0.1	1
SNP-237	52	Ivy Creek Shelter Spring	S	8/18/1999	10:20	<0.001	<0.02	0.014	<0.001	<1	0.08	0.3	<0.1	0.1	1.3
SNP-113	53	Lewis Mountain Spring #25	S	9/5/1997	9:30	0.003	0.008	0.018	<0.001	1	0.30	0.4	<0.1	0.3	<0.1
SNP-241	53	Lewis Mountain Spring #25	S	8/19/1999	18:05	0.001	<0.02	0.018	<0.001	<1	0.31	0.7	<0.1	0.3	0.1

Table 17. Summary of isotopic data (δ^2H, $\delta^{18}O$, ^3H) for surface-water samples

[per mil, parts per thousand; TU, Tritium Unit, 1 TU=1atom of ^3H in 10^{18} atoms of H; µs/cm, microsiemens per centimeter at 25° Celsius; $\delta=((R_{sample}/R_{standard})-1)x1000$, where R is an isotope ratio; ND, not determined]

SNP No.	Site ID	Site Name	Date	Time	Elev (ft)	Temp (°C)	Sp Cond 1996 (uS/cm)	Sp Cond 1997 (uS/cm)	^3H (TU)	^3H Error (+/- TU)	δ^2H (per mil)	$\delta^{18}O$ (per mil)
SNP-065	80	(C01) Tributary of East Hawksbill Creek	4/9/1996	16:26	1060	ND	ND	98.5	9.4	0.5	-52.4	-8.5
SNP-151	80	(C01) Tributary of East Hawksbill Creek	9/8/1997	12:15	1060	17.9	98.5	ND	10.7	0.5	-48.5	-8.0
SNP-066	81	(C02) East Hawksbill Creek (Hollow Run)	4/9/1996	16:33	1250	ND	99.0	65.5	8.6	0.5	-52.9	-8.5
SNP-152	81	(C02) East Hawksbill Creek (Hollow Run)	9/8/1997	12:38	1250	17.0	65.5	ND	9.3	0.4	-48.4	-7.9
SNP-067	82	(C03) Hawksbill Creek	4/9/1996	16:52	1600	ND	180.9	106.3	9.4	0.5	-50.9	-8.6
SNP-153	83	(C03b) Hawksbill Creek @ Rt 737	9/8/1997	13:30	1264	18.5	106.3	ND	9.1	0.4	-47.7	-8.2
SNP-068	84	(C04) Naked Creek	4/9/1996	17:34	1085	ND	ND	181.2	10.2	0.6	-49.2	-8.4
SNP-154	84	(C04) Naked Creek	9/8/1997	14:30	1085	23.9	181.2	ND	10.2	0.5	-42.7	-6.6
SNP-069	85	(C05) South Branch Naked Run	4/9/1996	17:43	1195	ND	ND	50.5	8.6	0.5	-49.5	-8.3
SNP-155	85	(C05) South Branch Naked Run	9/8/1997	14:45	1195	20.6	50.5	ND	9.4	0.4	-45.2	-7.2
SNP-070	86	(C06) Elk Run	4/9/1996	18:03	1055	ND	ND	113.3	8.6	0.4	-48.7	-8.1
SNP-156	86	(C06) Elk Run	9/8/1997	15:10	1055	21.8	113.3	ND	9.8	0.5	-45.0	-7.1
SNP-071	87	(C07) Conway River	4/9/1996	18:35	585	ND	144.7	70.2	9.9	0.5	-45.6	-7.7
SNP-157	87	(C07) Conway River	9/8/1997	12:50	585	23.8	70.2	ND	10.7	0.5	-38.7	-6.7
SNP-072	88	(C08) Rapidan River	4/9/1996	19:03	795	ND	80.1	29.0	9.8	0.5	-45.7	-7.8
SNP-158	88	(C08) Rapidan River	9/8/1997	12:00	795	22.1	29.0	ND	10.2	0.5	-43.2	-7.4
SNP-073	89	(C09) Robinson River	4/9/1996	19:47	690	ND	73.8	52.2	9.3	0.5	-48.6	-8.0
SNP-159	89	(C09) Robinson River	9/8/1997	13:15	690	20.2	52.2	ND	10.7	0.5	-43.1	-7.2
SNP-074	90	(C10) Hughes River	4/9/1996	20:08	780	ND	149.4	31.9	8.5	0.5	-49.0	-8.1
SNP-160	90	(C10) Hughes River	9/8/1997	10:40	780	18.9	31.9	ND	10.0	0.5	-44.5	-7.5
SNP-055	91	(N01) Jeremys Run	4/9/1996	16:30	635	ND	ND	257.5	10.9	0.5	-53.6	-8.8
SNP-141	91	(N01) Jeremys Run	9/8/1997	11:40	635	19.9	257.5	ND	7.4	0.4	-48.1	-7.6
SNP-056	92	(N02) Overall Run	4/9/1996	16:44	585	ND	ND	192.1	8.3	0.4	-53.6	-8.8
SNP-142	92	(N02) Overall Run	9/8/1997	11:15	585	18.2	192.1	ND	2.4	0.4	-52.6	-8.2
SNP-057	93	(N03) Flint Run	4/9/1996	16:53	710	ND	ND	226.4	8.7	0.4	-54.8	-8.9
SNP-143	94	(N03b) Flint Run	9/8/1997	10:53	695	19.1	226.4	ND	9.5	0.5	-43.0	-6.4
SNP-058	95	(N04) Greasy Run	4/9/1996	17:21	1130	ND	ND	123.0	9.1	0.4	-53.1	-8.7
SNP-144	95	(N04) Greasy Run	9/8/1997	10:20	1130	17.9	123.0	ND	11.0	0.5	-48.5	-8.0
SNP-059	96	(N05) Broad Run	4/9/1996	17:38	970	ND	ND	157.8	10.2	0.4	-52.5	-8.6
SNP-145	97	(N05b) Broad Run	9/8/1997	9:50	1043	17.5	157.8	ND	10.0	0.4	-48.1	-8.0
SNP-060	98	(N06) Dry Run	4/9/1996	17:49	935	ND	ND	100.7	10.0	0.5	-54.8	-9.0
SNP-146	98	(N06) Dry Run	9/8/1997	9:08	935	17.6	100.7	ND	9.4	0.4	-49.5	-8.1
SNP-061	99	(N07) Hittles Mill Stream	4/9/1996	18:43	640	ND	ND	124.1	9.7	0.5	-50.9	-8.2
SNP-147	99	(N07) Hittles Mill Stream	9/8/1997	9:00	640	18.5	124.1	ND	11.9	0.5	-40.1	-6.7
SNP-062	100	(N08) Rush River	4/9/1996	19:10	770	ND	125.4	200.2	11.4	0.5	-47.8	-8.1
SNP-148	100	(N08) Rush River	9/8/1997	9:25	770	18.5	200.2	ND	11.5	0.5	-41.8	-7.0
SNP-063	101	(N09) Piney River	4/9/1996	19:30	780	ND	ND	86.7	10.2	0.5	-48.5	-8.0
SNP-149	101	(N09) Piney River	9/8/1997	9:50	780	17.9	86.7	ND	12.0	0.5	-43.1	-7.3
SNP-064	102	(N10) Thornton River	4/9/1996	19:45	955	ND	131.7	78.0	10.0	0.5	-46.8	-7.9
SNP-150	102	(N10) Thornton River	9/8/1997	10:05	955	17.5	78.0	ND	10.7	0.5	-45.7	-7.7
SNP-075	103	(S01) Hawksbill Creek 340 Bridge	4/15/1996	15:37	970	ND	ND	100.8	9.4	0.5	-48.2	-7.9
SNP-161	103	(S01) Hawksbill Creek 340 Bridge	9/8/1997	15:40	970	19.9	100.8	ND	9.0	0.4	-44.8	-7.2
SNP-076	104	(S02) Big Run	4/15/1996	15:46	1020	ND	ND	34.2	8.2	0.5	-48.7	-8.0
SNP-162	105	(S02b) Madison Run	9/8/1997	16:30	1371	18.3	34.2	ND	9.3	0.4	-45.8	-7.3
SNP-077	106	(S03) Mine Branch	4/15/1996	16:00	1515	ND	ND	18.5	8.1	0.4	-49.9	-8.1
SNP-163	106	(S03) Mine Branch	9/8/1997	15:45	1515	17.7	18.5	ND	8.2	0.4	-49.0	-7.8
SNP-078	107	(S04) Sawmill Run	4/15/1996	16:45	1520	ND	ND	23.0	8.5	0.4	-47.8	-7.8
SNP-164	107	(S04) Sawmill Run	9/8/1997	15:20	1520	16.2	23.0	ND	8.8	0.4	-49.2	-8.1
SNP-079	108	(S05) Lickinghole Creek	4/15/1996	17:20	895	ND	ND	98.8	9.4	0.4	-41.8	-7.2
SNP-165	108	(S05) Lickinghole Creek	9/8/1997	14:50	895	19.7	98.8	ND	11.4	0.5	-40.6	-6.9
SNP-080	109	(S06) Doyles River	4/15/1996	17:56	940	ND	ND	61.1	9.7	0.4	-44.9	-7.5
SNP-166	109	(S06) Doyles River	9/8/1997	14:15	940	19.9	61.1	ND	12.4	0.5	-41.3	-7.1
SNP-081	110	(S07) Buck Mountain Creek	4/15/1996	18:18	570	ND	ND	59.8	10.1	0.5	-40.2	-7.1
SNP-167	110	(S07) Buck Mountain Creek	9/8/1997	13:55	570	21.7	59.8	ND	12.3	0.5	-37.1	-6.2
SNP-082	111	(S08) Haneytown Creek	4/15/1996	18:35	630	ND	113.0	90.0	9.2	0.4	-44.5	-7.4
SNP-168	111	(S08) Haneytown Creek	9/8/1997	13:25	630	21.8	90.0	ND	10.4	0.5	-38.3	-6.6