Figure 5. Recent U.S. Geological Survey geologic map data for the northern Shenandoah Valley, showing spring locations

White Hall 1:24,000 quadrangle, Doctor, D.H., Weary, D.J., Orndorff, R.C. and Parker, R.A. preliminary geologic map.

Winchester 1:24,000 quadrangle, Orndorff, R.C., Weary, D.J., and Parker, R.A., 2003, Geologic map of the Winchester quadrangle, Frederick County, Virginia: U.S. Geological Survey Open-File Report 03-461, scale 1:24,000, http://pubs.usgs.gov/of/2003/of03-461/

WEST VIRGINIA

VIRGINIA

Welltown Syncline

sinkholes focused near axis of large syncline

City of Winchester, VA

Middletown 1:24,000 quadrangle, Orndorff, R.C., Epstein, J.B., and McDowell, R.C., 1999, Geologic Map of the Middletown quadrangle, Frederick, Shenandoah, and Warren Counties, Virginia: U.S. Geological Survey Geologic Quadrangle Map GQ-1803, scale 1:24,000

Stephenson 1:24, 000 quadrangle, Weary, D.J., preliminary geologic map

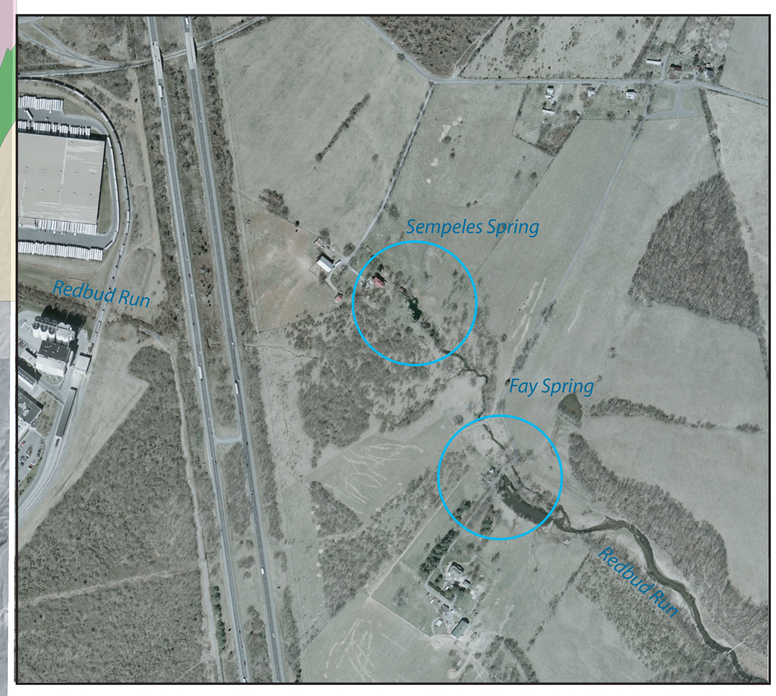
Custom 10 Meter DEM produced by U.S. Geological Survey Geographic Discipline, Rolla, MO

2 1 0 2 Miles

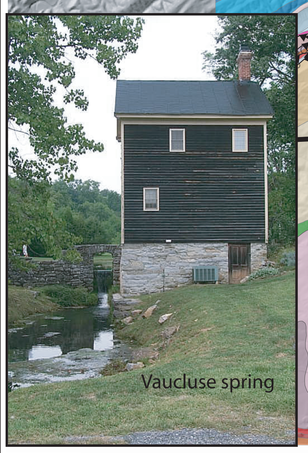
Stephens City 1:24, 000 quadrangle, Weary, D.J., Orndorff, R.C., and Aleman-Gonzalez, W., 2006, Geologic map of the Stephens City quadrangle, Clarke, Frederick, and Warren Counties, VA: U.S. Geological Survey Open-File Report 2006-1173, scale 1:24,000. http://pubs.usgs.gov/of/2006/1173/.

Redbud Run				Fay Spring			
Meas. No.	Date	Discharge (ft^3/sec)	Discharge (gpm)	Meas. No.	Date	Discharge (ft^3/sec)	Discharge (gpm)
1	20050728	3.01	1,351	20	20050728	1.23	552
2	20050913	1.9	853	21	20050913	0.81	364
3	20060119	3.8	1,706	22	20060112	1.34	736
4	20060405	3.31	1,486	23	20060405	1.19	534
5	20060831	1.67	750	24	20060831	0.634	285
6	20070110	5.2	2,334	25	20070110	1.56	700

Flow measurements at Redbud Run above Fay Spring (nearly all flow is from Semples Spring under base flow conditions) and at Fay Spring



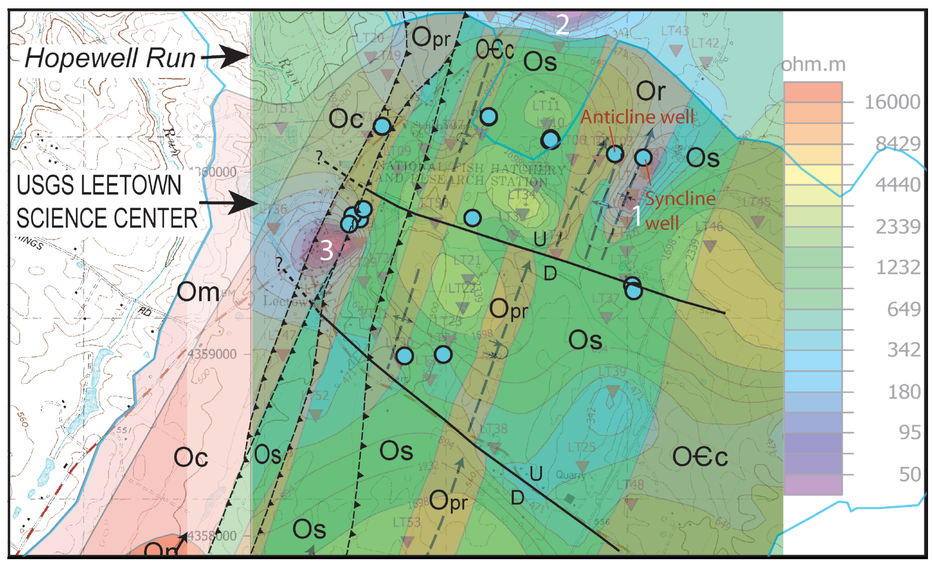
Aerial photograph of the area of Fay and Sempeles springs and Redbud Run. Interstate 81 in left portion of photo. These two springs supply nearly all the water flowing in Redbud Run during base flow conditions.



- Qa Alluvium
- Dh Hampshire Formation
- Df Foreknobs Formation
- Dc Chemung Formation
- lss lower sandstone of the Foreknobs Formation
- uss upper sandstone of the Foreknobs Formation
- Db Brallier Formation
- Dm Mahantango Formation
- Dmn Marcellus Shale and Needmore Shale undivided
- Dmr Marcellus Shale
- Dmcl Mahantango Formation, Clearville Siltstone Member
- Dms Mahantango Formation and Needmore Shale undivided
- Dn Needmore Shale
- DSoh Oriskany Sandstone and Helderberg Group undivided
- DSow Oriskany Sandstone through Wills Creek Formation undivided
- DSls Devonian and Silurian limestones undivided
- Sw Wills Creek Formation
- Swbm Wills Creek, Bloomsburg and McKenzie Formations unidivided
- Sbr Bloomsburg Formation through Rose Hill Formation undivided
- Skr Keefer Sandstone and Rose Hill Formation undivided
- St Tuscarora Sandstone
- Ojo Juniata Formation and Oswego Sandstone undivided
- Oo Oswego Sandstone
- Om Martinsburg Formation
- Oms Martinsburg Formation, Stickley Run Member
- Oe Edinburg Limestone
- Ol Lincolnshire Limestone
- On New Market Limestone
- Op Pinesburg Station Dolomite
- Opr Pinesburg Station Dolomite and Rockdale Run Formation undivided
- Or Rockdale Run Formation
- Os Stonehenge Limestone
- OCc Conococheague Limestone
- Ce Elbrook Limestone

- Spring location
- Sinkholes
- Thrust faults
- Strike-slip, normal, or reverse faults

Figure 6. Audio magneto-telluric (AMT) map of the vicinity of the U.S. Geological Survey Leetown Science Center, Jefferson County, WV overlain on new bedrock geologic map (U.S. Geological Survey unpublished data). This is a map of electrical resistivity at a depth of 60 meters below the surface. Areas of blue to purple colors indicate low resistivity which is interpreted to indicate relatively higher quantities of ground-water. Notice the correspondence of the resistivity patterns with the geologic structures. Base map is the USGS Middleway 1:24,000 quadrangle.



The U.S. Geological Survey is continuing geologic mapping and ground-water studies in the northern Shenandoah Valley with a focus on characterizing and explaining the geologic control over ground-water movement and storage at multiple scales. Activities include:

-new, high-resolution (1:24,000 scale) geologic mapping with an emphasis on hydrogeologic and karst features

-acquisition of high-resolution geographic data such as DEM's and LIDAR (where available) for identification of geomorphic features indicating faults, fractures, spring locations, etc.

-acquisition and consideration of various hydrologic data including: age of waters, spring and stream hydrographs, water temperatures in springs and wells, and dye traces

-geophysical surveys using audio magneto-telluric soundings to image the electromagnetic characteristics of the subsurface, which is related to geologic structure and water content

-contribution of geologic data to hydrologic models being developed or refined in various areas and scales in the Shenandoah Valley