Prepared in cooperation with the
NATIONAL PARK SERVICE

LIST OF MAP UNITS

UNCONSOLIDATED SURFICIAL MATERIALS

- Qa — Alluvium (Holocene)
- Qdf — Debris-flow deposits (Holocene)
- Qb — Quartzite block-field deposits (Holocene and Pleistocene)
- Qc — Colluvium (Holocene and Pleistocene)
- Nt — Terrace deposits (Neogene)
- Np — Alluvial-plain deposits (Neogene)
- Nd — Debris-fan deposits (Neogene)
- Nf — Alluvial-fan deposits (Neogene)

VALLEY AND RIDGE PROVINCE

Jurassic Dikes

- Jpd — Peridotite dike (Late Jurassic)
- Jad — Alkalic dikes (Late Jurassic)
- Jd — Diabase dikes (Early Jurassic)

Massanutten Synclinorium

- DSu — Devonian and Silurian rocks, unvidided
- Sm — Massanutten Sandstone (Silurian)

Great Valley and Page Valley Sections

- Om — Martinsburg Formation (Upper and Middle Ordovician)
- Oeln — Edinburg Formation, Lincolnshire Limestone, and New Market Limestone, undivided (Middle Ordovician)
- Ob — Beekmantown Group, undivided (Middle and Lower Ordovician)
- Os — Stonehenge Limestone (Lower Ordovician)
- OCc — Conococheague Limestone (Lower Ordovician and Upper Cambrian)
- Ꞓe — Elbrook Limestone (Upper and Middle Cambrian)
- Ꞓwa — Waynesboro Formation (Lower Cambrian)
- Ꞓt — Tomstown Formation (Lower Cambrian)

BLUE RIDGE PROVINCE

- Ꞓca — Antietam Formation (Lower Cambrian)
- Ꞓch — Harpers Formation (Lower Cambrian)
  - Ꞓchs — Ferruginous metasandstone
- Ꞓcw — Weverton Formation (Lower Cambrian)

Catoctin Formation (Neoproterozoic)

- Zcp — Metavolcanic phyllite
- Zcs — Metasandstone and laminated phyllite
- Zcr — Metarhyolite
- Zcm — Metabasalt
- Zmd — Metadiabase dikes (Neoproterozoic)
- Zsr — Swift Run Formation (Neoproterozoic)
- Zhg — Hornblende metagabbro dikes (Neoproterozoic)
- Zmr — Mechum River Formation (Neoproterozoic)

Robertson River Igneous Suite (Neoproterozoic)

- Zra — Amissville Alkali Feldspar Granite
- Zrb — Battle Mountain Alkali Feldspar Granite
  - Zrbr — Rhyolite and metaconglomerate
  - Zrbf — Felsite
  - Zrbd — Felsic dikes
- Zrh — Hitt Mountain Alkali Feldspar Syenite
- Zrqt — Quartz trachyte
- Zrc — Cobbler Mountain Alkali Feldspar Quartz Syenite
- Zrw — White Oak Alkali Feldspar Granite
- Zrl — Laurel Mills Granite
- Zram — Arrington Mountain Alkali Feldspar Granite
- Zrr — Rivanna Granite
- Zp — Garnet-graphite paragneiss (Neoproterozoic)
- Ybg — Biotite monzogranite-quartz monzodiorite (Mesoproterozoic)
- Yom — Orthopyroxene monzogranite-quartz monzodiorite (Mesoproterozoic)
- Ypb — Megacrystic quartz monzonite (Mesoproterozoic)
- Ybm — Megacrystic biotite monzogranite (Mesoproterozoic)
- Ycg — Crozet Granite (Mesoproterozoic)
- Yor — Old Rag Granite (Mesoproterozoic)
- Yml — Porphyroclastic metagranitoid (Mesoproterozoic)
- Yog — Orthopyroxene granite-monzogranite (Mesoproterozoic)
- Yfh — Flint Hill Gneiss (Mesoproterozoic)
- Yll — Lineated leucogranite gneiss (Mesoproterozoic)
- Yomg — Orthopyroxene monzogranite-quartz monzodiorite gneiss (Mesoproterozoic)
- Yos — Megacrystic orthopyroxene syenogranite-monzogranite gneiss (Mesoproterozoic)
- Ygd — Granodiorite gneiss (Mesoproterozoic)
- Yoq — Orthopyroxene quartz diorite gneiss (Mesoproterozoic)
- Yon — Orthopyroxene syenogranite and monzogranite gneiss (Mesoproterozoic)
- Yod — Orthopyroxene granodiorite gneiss (Mesoproterozoic)
- Ypg — Foliated, garnetiferous, porphyroblastic monzogranite (Mesoproterozoic)
- Ylg — Leucogranite gneiss (Mesoproterozoic)

CORRELATION OF MAP UNITS

(Units with an asterisk have been dated)

UNCONSOLIDATED SURFICIAL MATERIALS

Qa, Qdf, Qb, Qc

Nt, Np, Nd, Nf

VALLEY AND RIDGE PROVINCE

Stratified rocks: DSu, Sm, Om, Oeln, Ob, Os, OCc, Ꞓe, Ꞓwa, Ꞓt

Intrusive rocks: Jpd; Jad* (157±8 to 148±7 Ma); Jd* (200 Ma)

BLUE RIDGE PROVINCE

Intrusive rocks: Zmd, Zhg

Stratified rocks: Ꞓca, Ꞓch, Ꞓchs, Ꞓcw, Zcp, Zcs, Zcr*, Zcm, Zsr, Zmr (about 569 Ma); Zra* (about 700 Ma), Zrbd, Zrbr, Zrbf* (about 702 Ma); Zrb* 705±2 Ma; Zrh* 706±2 Ma; Zrqt* 719±6 to 714±5 Ma; Zrc* 722±3 Ma; Zrw* 724±3 Ma; Zrl* 729±1 Ma; Zram* 730±4 Ma; Zrr* 735±4 Ma; Zp* < 812 Ma; Ybg* 1,040±9 to 1,028±9 Ma; Yom* 1,050±8 to 1,044±6 Ma; Ypb* 1,049±6 Ma; Ybm* 1,057±8 to 1,057±7 Ma; Ycg* 1,060±7 Ma; Yor* 1,063±8 to 1,060±5 Ma; Yml* 1,078±9 Ma; Yog* 1,120±12 to 1,111±16 Ma; Yfh* 1,144±8 Ma; Yll* 1,150±23 Ma; Yomg* 1,158±13 Ma; Yos* 1,166±14 Ma to 1,159±14 Ma; Ygd* 1,161±9 Ma; Yoq* 1,161±10 Ma; Yon* 1,164±8 Ma; Yod* 1,165±7 Ma; Ypg* 1,172±8 Ma; Ylg* 1,183±11 to 1,171±22 Ma

Holocene, Pleistocene	QUATERNARY
Pliocene, Miocene	NEOGENE
Upper Jurassic, Lower Jurassic	JURASSIC
	DEVONIAN
	SILURIAN
Upper Ordovician, Middle Ordovician, Lower Ordovician	ORDOVICIAN
Upper Cambrian, Middle Cambrian, Lower Cambrian	CAMBRIAN
Neoproterozoic	PROTEROZOIC
Mesoproterozoic	PROTEROZOIC

EXPLANATION OF MAP SYMBOLS

Contact—Approximately located; dotted where concealed

FAULTS

(Approximately located; dotted where concealed; queried where uncertain)

- **Thrust fault**—Sawteeth on upper plate
- **Normal fault**—Bar on downthrown side
- **Unclassified fault**—Movement unknown
- **High-strain zone**

PLANAR FEATURES

(May be combined with linear features; where features are combined, intersection of symbols marks point of intersection)

Strike and dip of bedding

- 32 Inclined
- 64 Overturned
- Vertical
- Horizontal

Strike and dip of first-generation (S_1) Paleozoic cleavage and (or) schistosity

- 47 Inclined
- Vertical

Strike and dip of Mesoproterozoic foliation including compositional layering

- 77 Inclined
- Vertical

OTHER FEATURES

- **Location of isotopically dated rock**—See table 1 for sample numbers and dating methods
- **Quarry or mine**—Active and inactive
- **Breccia**—Angular quartzite clasts cemented with manganese and (or) iron-stained silica
- **Stratified slope deposit**—Locations from Smoot (2004)
- **Small sinkhole**—Less than or equal to 50 m² in diameter
- **Large sinkhole**
- **Shenandoah National Park boundary**
- **Skyline Drive**

Table 1. Location of isotopically dated rocks in the Shenandoah National Park Region.

[Uranium-lead (U-Pb) dating techniques are abbreviated as follows: TIMS, thermal ionization mass spectrometry; SHRIMP, sensitive high-resolution ion microprobe. Ages given in millions of years (mega-annum, Ma)]

Sample number	Map symbol	Technique	Age, in Ma
1	Zra	TIMS	700
2	Zrbf	TIMS	702
3	Zrbg	TIMS	705±2
4	Zrqt	SHRIMP	714±5
5	Zrqt	SHRIMP	719±6
6	Zrw	TIMS	724±3
7	Zrl	TIMS	729±1
8	Zram	TIMS	730±4
9	Zp	SHRIMP	<812
10	Zp	SHRIMP	<959
11	Zp	SHRIMP	<997
12	Ybg	SHRIMP	1,028±9
13	Ybm	SHRIMP	1,030±11
14	Ybg (xenolith)	SHRIMP	1,032±10
14	Ybg	SHRIMP	1,040±9
15	Yom	SHRIMP	1,044±6
16	Yom	SHRIMP	1,049±9
17	Yom	SHRIMP	1,050±8
18	Ybm	SHRIMP	1,057±7
19	Ybm	SHRIMP	1,057±8
20	Yor	SHRIMP	1,060±5
21	Ycg	SHRIMP	1,060±7
22	Yor	SHRIMP	1,063±8
23	Yml	SHRIMP	1,078±9
24	Yog	SHRIMP	1,111±16
25	Yog	SHRIMP	1,120±12
26	Yfh	SHRIMP	1,144±8
27	Yll	SHRIMP	1,150±23
28	Yomg	SHRIMP	1,158±13
29	Yos	SHRIMP	1,159±14
30	Ygd	SHRIMP	1,161±9
31	Yoq	SHRIMP	1,161±10
32	Yon	SHRIMP	1,164±8
33	Yod	SHRIMP	1,165±7
34	Yos	SHRIMP	1,166±14
35	Ylg	SHRIMP	1,171±22
36	Ylg (dikes)	SHRIMP	1,175±11
36	Ylg	SHRIMP	1,183±11

FRONT ROYAL FAULT
STANLEY FAULT
SHENANDOAH VALLEY
MASSANUTTEN MOUNTAIN
BLUE RIDGE
Shenandoah
Luray
Elkton
Stanardsville
Madison
Sperryville
Washington
Flint Hill
Linden
Front Royal
Rappahannock River
Rapidan River
Hazel River
Thornton River
Robinson River
Rose River
Staunton River
Moormans River
Mechum River
Rivanna River
Hughes River
Conway River
Page Valley
Swift Run Gap
Skyline Drive
Appalachian Trail
Shenandoah National Park
Big Meadows
Skyline Drive
Luray Caverns
Grottoes
Waynesboro
Stuarts Draft
Afton
Nellysford
Wintergreen
Massanutten Mountain
Fort Valley
Shenandoah Mountain
Blue Ridge Mountains
Swift Run Gap
Chinquapin Hollow
Hawksbill Mountain
Stony Man Mountain
Marys Rock
Old Rag Mountain
Hitt Mountain
Pedlar Mountain
Rockfish Gap
Ivy
Crozet
Charlottesville
Earlysville
Esmont
Scottsville
Schuyler
Arrington
Lovingston
Nellysville
Roseland
Massies Corner
Gordonsville
Orange
Barboursville
Madison
Culpeper
Sperryville
Washington
Flint Hill
Linden
Front Royal
Rappahannock River
Rapidan River
Hazel River
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