USGS
science for a changing world

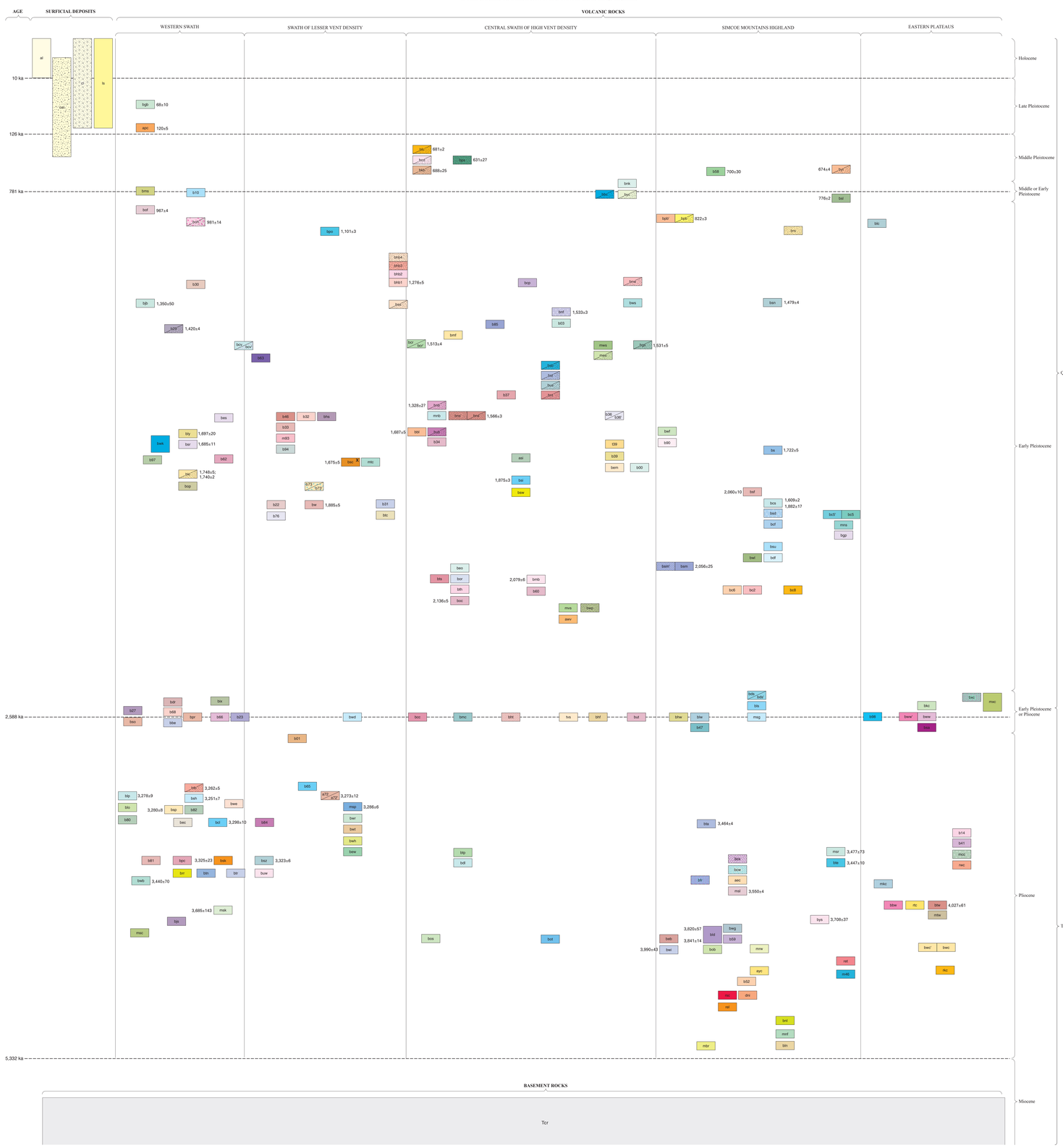
U.S. Department of the Interior
U.S. Geological Survey

Prepared in cooperation with the
Water Resources Program of the Yakama Nation

Scientific Investigations Map 3315
Sheet 3 of 3
Pamphlet accompanies map

CORRELATION OF MAP UNITS

[Radioisotopic ages (ka) shown for dated units, rounded from table 1. Stipple indicates units partly or wholly pyroclastic. See DESCRIPTION OF MAP UNITS for specific unit age assignments]



LIST OF MAP UNITS

[Stipple indicates partly or wholly pyroclastic. See DESCRIPTION OF MAP UNITS for specific age unit assignments]

SURFICIAL DEPOSITS AND BASEMENT ROCKS

- al — **Alluvium and silt deposits (Holocene)**
- Qal — **Older alluvium (Holocene and Pleistocene)**
- Qcl — **Colluvium and talus (Holocene and Pleistocene)**
- ls — **Landslide deposits (Holocene and Pleistocene)**
- Tcr — **Columbia River Basalt Group (Miocene)**

VOLCANIC ROCKS

[Listed alphabetically by three-letter map-unit label]

- aec — **Trachyandesite east of Castle Rock (Pliocene)**
- apc — **Trachyandesite of Parrott Crossing (late Pleistocene)**
- asi — **Trachyandesite of Simon Butte (early Pleistocene)**
- awv — **Trachyandesite west of Vessey Springs (early Pleistocene)**
- ayc — **Trachyandesite of Yatama Creek (Pliocene)**
- a372 / a372 — **Trachyandesite of Cone 3972 (Pliocene)**
- bcb — **Trachybasalt of Bowman Creek divide (middle or early Pleistocene)**
- bbe — **Trachybasalt east of Bear Creek (early Pleistocene or Pliocene)**
- bbl — **Trachybasalt of Blue Creek (early Pleistocene)**
- bbw — **Basalt west of Bergie Springs (Pliocene)**
- bcc — **Trachybasalt of Clock Creek (early Pleistocene or Pliocene)**
- bcd / bcd — **Trachybasalt of Cedar Creek (middle Pleistocene)**
- bcf — **Trachybasalt of South Fork Camp (early Pleistocene)**
- bcl — **Trachybasalt of Campbell Line (Pliocene)**
- bcp — **Trachybasalt of cinder pits west of Vessey Springs (early Pleistocene)**
- bcr / bcr — **Trachybasalt of Coyote Springs Road (early Pleistocene)**
- bcs — **Basalt of Camas Patch (early Pleistocene)**
- bcv / bcv — **Trachybasalt of Cedar Valley Road (early Pleistocene)**
- bcw — **Basalt west of Castle Rock (Pliocene)**
- bda / bda — **Trachybasalt of Castle Rock (Pliocene)**
- bc2 — **Trachybasalt of Cone 3572 (early Pleistocene)**
- bc5 / bc5 — **Trachybasalt of Cone 3895 (early Pleistocene)**
- bc6 — **Trachybasalt of Cone 3606 (early Pleistocene)**
- bc8 — **Trachybasalt of Cone 3580 (early Pleistocene)**
- bdf — **Trachybasalt of Dry Creek Falls (early Pleistocene)**
- bdl — **Basalt of Delancy Spring (Pliocene)**
- bdr — **Trachybasalt of Deer Creek (early Pleistocene or Pliocene)**
- bds / bds — **Trachybasalt south of Dry Creek (early Pleistocene or Pliocene)**
- beb — **Basalt east of Bowman Creek (Pliocene)**
- bec — **Trachybasalt of Elk Creek (Pliocene)**
- bem — **Trachybasalt east of McKays Butte (early Pleistocene)**
- beo — **Trachybasalt east of Olney Creek (early Pleistocene)**
- bes — **Trachybasalt east of Schafer Creek (early Pleistocene)**
- bew — **Basalt east of White Creek (Pliocene)**
- bfc — **Trachybasalt of Featherbed Creek (middle Pleistocene)**
- bfr — **Feldspar-rich trachybasalt north and south of Smith Butte (Pliocene)**
- bgb — **Basalt of Glaciate Butte (late Pleistocene)**
- bgs — **Basalt of Spring Creek gravel pit (early Pleistocene)**
- bgt / bgt — **Trachybasalt of Graham Spring (early Pleistocene)**
- bhb / bhb2 / bhb3 / bhb4 — **Trachybasalt of Haggerty Butte (early Pleistocene)**
- bhf — **Trachybasalt of Hoppers Flat (early Pleistocene or Pliocene)**
- bhs — **Trachybasalt of Hog Swamp (early Pleistocene)**
- bht — **Trachybasalt at Tepee Creek headwaters (early Pleistocene or Pliocene)**
- bhw — **Basalt at White Fir Creek headwaters (early Pleistocene or Pliocene)**
- bix — **Basalt of IXL Crossing Road (early Pleistocene or Pliocene)**
- bjb — **Basalt of Jungle Butte (early Pleistocene)**
- bjs — **Trachybasalt of Jungle Spring (Pliocene)**
- bkb — **Trachybasalt of Kaiser Butte (middle Pleistocene)**
- bkc — **Trachybasalt of Kaushki Creek (early Pleistocene or Pliocene)**
- bkl / bkl — **Trachybasalt of Klose Butte (early Pleistocene)**
- blc — **Basalt of Logy Creek confluence (early Pleistocene)**
- bld — **Basalt and basaltic andesite of Logy Creek divide (Pliocene)**
- bln — **Basalt of lower North Fork Logy Creek (Pliocene)**
- blo — **Basalt of Lost Springs (Pliocene)**
- blp — **Trachybasalt of Lincoln Plateau (Pliocene)**
- bls — **Basalt of Logy Creek-Spring Creek divide (early Pleistocene or Pliocene)**
- blw — **Trachybasalt west of South Fork Logy Creek (early Pleistocene or Pliocene)**
- bly — **Trachybasalt of Lyon Spring (early Pleistocene)**
- bmb — **Trachybasalt of McKays Butte (early Pleistocene)**
- bmc — **Basalt east of Mike Coon Hillside (early Pleistocene or Pliocene)**
- bmf — **Trachybasalt of Middle Fork Dry Creek (early Pleistocene)**
- bms — **Basalt of McCumber Spring (middle or early Pleistocene)**
- bnb / bnb — **Trachybasalt north of Blue Creek (early Pleistocene)**
- bnf — **Trachybasalt of North Fork Dry Creek (early Pleistocene)**
- bnk — **Basalt north of Kinney Creek (middle or early Pleistocene)**
- bnl — **Basalt of North Fork Logy Creek (Pliocene)**
- bns / bns — **Trachybasalt north of Sheep Creek (early Pleistocene)**
- bnt / bnt — **Trachybasalt north of Twentyfive Mile Creek (early Pleistocene)**
- bnw / bnw — **Trachybasalt northwest of Stagman Butte (early Pleistocene)**
- bob — **Basalt of Old Indian Treaty Boundary (Pliocene)**
- boc — **Trachybasalt of Olney Creek (early Pleistocene)**
- bof — **Basalt of Outlet Falls (early Pleistocene)**
- boh / boh — **Trachybasalt of Oak Hill (early Pleistocene)**
- bop — **Trachybasalt of Old Peavine Ridge Road (early Pleistocene)**
- bor — **Trachybasalt of Oak Spring Road (early Pleistocene)**
- bos — **Basalt of upper Summit Creek (Pliocene)**
- bpf — **Basalt of Twentyfive Mile Creek (Pliocene)**
- bph / bph — **Trachybasalt of Potato Butte (early Pleistocene)**
- bpc — **Trachybasalt of Pole Creek Road (Pliocene)**
- bpo — **Trachybasalt of Poland Butte (early Pleistocene)**
- bpr — **Trachybasalt of Peavine Ridge Spring (early Pleistocene or Pliocene)**
- bps — **Trachybasalt of Pretty Swamp (middle Pleistocene)**
- brr — **Basalt of River Route Road (Pliocene)**
- brs / brs — **Trachybasalt of Satus Ranger Station Road (early Pleistocene)**
- bsi — **Trachybasalt of Smith Butte (early Pleistocene)**
- bsk — **Basalt of Satus Creek (early Pleistocene or Pliocene)**
- bsh / bsh — **Trachybasalt of Sheep Butte (early Pleistocene)**
- bsc — **Trachybasalt of Summit Creek (early Pleistocene)**
- bsd — **Trachybasalt and basalt of South Fork Dry Creek (early Pleistocene)**
- bsf — **Trachybasalt of Starvation Flats (early Pleistocene)**
- bsh — **Trachybasalt and basalt of Schafer Creek (Pliocene)**
- bsi — **Trachybasalt and basalt of Simon Butte (early Pleistocene)**
- bsk — **Basalt southeast of Klose Butte (Pliocene)**
- bsl — **Trachybasalt of South Fork Logy Creek (middle or early Pleistocene)**
- bsm / bsm — **Trachybasalt of Stagman Butte (early Pleistocene)**
- bsn — **Trachybasalt north of Smith Butte (early Pleistocene)**
- bso — **Trachybasalt southwest of Oak Hill (early Pleistocene or Pliocene)**
- bsp — **Trachybasalt east of Schafer Pocket (Pliocene)**
- bsr — **Trachybasalt of Shamrock Spring (early Pleistocene)**
- bss / bss — **Basalt south of Summit Creek (early Pleistocene)**
- bst / bst — **Trachybasalt of Stag trig (early Pleistocene)**
- bsu — **Basalt of upper Spring Creek (early Pleistocene)**
- bsw — **Basalt west of Simon Butte (early Pleistocene)**
- btd — **Trachybasalt of Schwartz Line (Pliocene)**
- bta — **Trachybasalt of Tannawasha Pasture (Pliocene)**
- btb / btb — **Trachybasalt and basalt of Twin Buttes (Pliocene)**
- btc — **Basalt of Tepee Creek (early Pleistocene)**
- bte — **Trachybasalt of Tenie Creek (Pliocene)**
- bth — **Basalt of Toppenish Ridge (early Pleistocene)**
- btn — **Basalt north of Trout Creek (Pliocene)**
- btp — **Trachybasalt of Toppenish Creek (Pliocene)**
- btr — **Basalt of Trout Creek (Pliocene)**
- bts — **Trachybasalt south of Toppenish Ridge (early Pleistocene)**
- btw — **Basalt west of Tannawasha Pasture (Pliocene)**
- bub / bub — **Trachybasalt of upper Blue Creek (early Pleistocene)**
- bus / bus — **Basalt of upper Sheep Creek (early Pleistocene)**
- but — **Trachybasalt of upper Twentyfive Mile Creek (early Pleistocene or Pliocene)**
- buw — **Trachybasalt of upper White Creek (Pliocene)**
- bw — **Basalt and trachybasalt of White Creek (early Pleistocene)**
- bwb — **Basalt of Wellenbrock Spring (Pliocene)**
- bwc / bwc — **Basalt of Wilson Charley Canyon Road (Pliocene)**
- bwd — **Trachybasalt of White Deer Road (early Pleistocene or Pliocene)**
- bwe — **Basaltic trachyandesite east of White Creek (Pliocene)**
- bwf — **Basalt west of White Fir Creek (early Pleistocene)**
- bwg — **Basalt west of Garner Camp (Pliocene)**
- bwh — **Trachybasalt of White Deer Creek (Pliocene)**
- bwi — **Trachybasalt of West Indian Rock (Pliocene)**
- bwk — **Trachybasalt west of West Fork White Creek (early Pleistocene)**
- bwl — **Trachybasalt of Wall Canyon (early Pleistocene)**
- bwp — **Basalt west of Poker Spring (early Pleistocene)**
- bwr — **Trachybasalt and basaltic trachyandesite of West Road (Pliocene)**
- bws — **Trachybasalt west of Stagman Butte (early Pleistocene)**
- bwt — **Trachybasalt west of Toppenish Creek (Pliocene)**
- bww / bww — **Basalt west of Wilson Charley Canyon (early Pleistocene or Pliocene)**
- bxc — **Trachybasalt of Section Corner Creek (early Pleistocene or Pliocene)**
- byc / byc — **Trachybasalt of Yeackel Camp (middle or early Pleistocene)**
- bys — **Basalt of South Fork Yatama Creek (Pliocene)**
- byt / byt — **Trachybasalt of Yatama Creek (middle Pleistocene)**
- b00 — **Trachybasalt of Cone 3600 (early Pleistocene)**
- b01 — **Trachybasalt of Cone 3801 (Pliocene)**
- b03 — **Basalt of Cone 4003 (early Pleistocene)**
- b10 — **Trachybasalt of Cone 3010 (middle or early Pleistocene)**
- b14 — **Basalt of Shield 3114 (Pliocene)**
- b22 — **Basalt of Cone 3122 (early Pleistocene)**
- b23 — **Basalt of Cone 2823 (early Pleistocene or Pliocene)**
- b27 — **Basalt of Cone 2784 (early Pleistocene or Pliocene)**
- b29 / b29 — **Basalt and trachybasalt of Hill 2946 (early Pleistocene)**
- b30 — **Trachybasalt of Cone 3066 (early Pleistocene)**
- b31 — **Basalt of Cone 3185 (early Pleistocene)**
- b32 — **Trachybasalt of Cone 3632 (early Pleistocene)**
- b33 — **Trachybasalt of Cone 3303 (early Pleistocene)**
- b34 — **Trachybasalt of Cone 3401 (early Pleistocene)**
- b36 / b36 — **Trachybasalt of Road Junction 3666 (early Pleistocene)**
- b37 — **Trachybasalt of Shield 3794 (early Pleistocene)**
- b39 — **Basalt of Cone 3963 (early Pleistocene)**
- b41 — **Trachybasalt of Crag 3541 (Pliocene)**
- b46 — **Trachybasalt of Cone 3346 (early Pleistocene)**
- b47 — **Basalt of Cone 5147 (early Pleistocene or Pliocene)**
- b52 — **Basalt of Knob 5268 (Pliocene)**
- b58 — **Trachybasalt of Cone 5822 (middle Pleistocene)**
- b59 — **Basalt and trachybasalt of Cone 5659 (Pliocene)**
- b60 — **Basalt of Cone 3560 (early Pleistocene)**
- b62 — **Trachybasalt of Cone 2862 (early Pleistocene)**
- b63 — **Trachybasalt of Cone 2763 (early Pleistocene)**
- b65 — **Trachybasalt of Cone 2865 (Pliocene)**
- b66 — **Trachybasalt of Cone 2663 (early Pleistocene or Pliocene)**
- b68 — **Basalt of Shield 2368 (early Pleistocene or Pliocene)**
- b73 / b73 — **Basalt and trachybasalt of Cone 2873 (early Pleistocene)**
- b76 — **Trachybasalt of Cone 3176 (early Pleistocene)**
- b80 — **Trachybasalt of Cone 2880 (Pliocene)**
- b81 — **Basalt of Crossing 2081 (Pliocene)**
- b82 — **Trachybasalt of Cone 2582 (Pliocene)**
- b84 — **Trachybasalt of Hill 3484 (Pliocene)**
- b85 — **Trachybasalt of Cone 3985 (early Pleistocene)**
- b90 — **Trachybasalt of Cone 3590 (early Pleistocene)**
- b94 — **Basalt of Cone 3294 (early Pleistocene)**
- b97 — **Trachybasalt of Cone 3197 (early Pleistocene)**
- b98 — **Trachybasalt of Knob 3598 (early Pleistocene or Pliocene)**
- dns — **Trachydacite north of Indian Rock (Pliocene)**
- mbr — **Basaltic trachyandesite of Boundary Road (Pliocene?)**
- mcc — **Basaltic andesite of Section Corner Creek (Pliocene)**
- mec / mec — **Basaltic trachyandesite east of Sheep Butte (early Pleistocene)**
- mkc — **Basaltic andesite of Kuoshi Creek (Pliocene)**
- mnb — **Basaltic trachyandesite north of Blue Creek (early Pleistocene)**
- mnf — **Basaltic trachyandesite of North Fork Logy Creek (Pliocene)**
- mns — **Basaltic trachyandesite north of Spring Creek (early Pleistocene)**
- mnw — **Basaltic andesite west of Satus Ranger Station (Pliocene)**
- msc — **Basaltic andesite of Surveyors Creek (Pliocene)**
- msg — **Basaltic trachyandesite of South Fork Springs (early Pleistocene or Pliocene)**
- msk — **Basaltic andesite of Signal Peak (Pliocene)**
- msl — **Basaltic trachyandesite of South Fork Logy Creek (Pliocene)**
- msp — **Basaltic trachyandesite of Signal Peak Road (Pliocene)**
- msr — **Basaltic trachyandesite of Satus Ranger Station (Pliocene)**
- msc — **Basaltic trachyandesite of Tepee Creek (early Pleistocene)**
- mtw — **Basaltic andesite west of Tannawasha Pasture (Pliocene)**
- mvs — **Trachybasalt and basaltic trachyandesite south of Vessey Springs (early Pleistocene)**
- mwb — **Basaltic trachyandesite west of Smith Butte (early Pleistocene)**
- mxc — **Basaltic trachyandesite of Section Corner Creek (early Pleistocene or Pliocene)**
- oak — **Basaltic andesite of Hill 4600 (Pliocene)**
- rh93 — **Basaltic trachyandesite and trachyandesite of Hill 3293 (early Pleistocene)**
- rel — **Rhyolite east of Lakebeds (Pliocene)**
- ret — **Rhyolite east of Tadpole Lake (Pliocene)**
- rkc — **Rhyolite of Kuoshi Creek (Pliocene)**
- rsc — **Rhyolite of Satus Creek (Pliocene)**
- rtc — **Rhyolite of Tenie Creek (Pliocene)**
- rwc — **Rhyolite of Wilson Charley Canyon (Pliocene)**
- tvs — **Trachyte south of Vessey Springs (early Pleistocene or Pliocene)**
- t39 — **Trachyte of Cone 3963 (early Pleistocene)**

EXPLANATION OF MAP SYMBOLS

- **Contact**—Dashed where approximately located. Internal contact defines flow boundaries. Relative unit ages: **y**, younger; **o**, older. Scratch boundary shows where detailed mapping ends
- **Oblique-slip fault**—Dashed where approximately located; dotted where concealed. Arrows show right-lateral offset; ball and bar on downthrown block
- **Anticline**—Dotted where concealed
- **Dike**
- **Volcanic vent**—Does not include craters and fissures
- **Volcanic fissure vent**
- **Lava flow direction**
- **Plagioclase-rich cumulate**—Found in unit bsc exposed on west wall of Summit Creek gorge
- **Pyroclastic deposit**
- **Head or main scarp of landslide**—Hachures point downslope. Arrow shows direction of movement
- **Gravel pit**
- **Spring**

Photograph showing stack of four thin Simcoe lava flows on east rim of Klickitat River gorge, midway between its White Creek and Summit Creek tributaries (fig. 3). Nearly aphyric flows, each 8–20 m thick, are mapped as trachybasalt of Schafer Creek (3.25 Ma); they flowed southwest across low-relief surface of Miocene Columbia River Basalt Group. Simcoe lavas commonly form relatively thin rimrock stacks atop Columbia River Basalt Group. Viewed northeastward in image, 50–70 m of Simcoe lavas rest on 250-m-thick exposure of Columbia River Basalt Group, which here includes several members of Wanapum and Saddle Mountains Basalts (Bentley and others, 1980).

Photograph showing intracanyon stack of thin lava flows mapped as basalt of Outlet Falls (0.97 Ma), viewed northward at confluence of Outlet Creek and Klickitat River gorge. At left, 150-m-thick stack of ~30 flows rests on Miocene Columbia River Basalt Group (beneath talus) and supports extensive low-relief plateau above rim. At right, beyond Klickitat River and River Route Road, low amphitheater is landslide complex at Borde Flats, above which rimrock is basalt of Pole Creek Road (3.3 Ma).

Photograph showing semi-arid plateaus typical of northeast part of Simcoe Mountains volcanic field. View southwestward upstream along Logy Creek near confluence of Spring Creek (at right). Gorge of Logy Creek is ~150 m deep, walled mostly by Miocene Columbia River Basalt Group. Numerous ledges low on gorge walls and in foreground are remnants of intracanyon lava flows of trachybasalt of Yatama Creek (~674 ka), one of youngest units in volcanic field. Thin rimrocks on both sides of gorge are lava flows of basalt of South Fork Yatama Creek (~3.7 Ma), one of oldest Simcoe units. In background, 20 km southwest, forested Simcoe Mountains composite shield rises as high as 1,000 m above plateau.

Photograph showing Indian Rock composite multi-vent shield volcano, draping Simcoe Mountains anticline, viewed northward from farmlands 2 km west of Goldendale. High point on skyline (elevation 1,775 m) is Indian Rock vent for subalkaline basalt (~4 Ma); it stands 19 km north of camera (elevation 500 m). Much of shield is subalkaline and 4.0–3.4 Ma, but numerous scoria cones on its flanks produced mafic alkaline lavas in interval 0.9–0.6 Ma. Products of Simcoe Mountains volcanic field cover almost entire field of view, although Miocene Columbia River Basalt Group is well exposed along anticlinal crest to east and west. Large scoria cone, 200 m high at left, is trachybasaltic Jackknife Butte, which erupted ~714 ka. On skyline directly above Jackknife Butte is Potato Butte, a trachybasaltic scoria cone dated at ~822 ka. Small east-facing step on central skyline is Lakebeds fault scarp; high point on its west rim is trachybasaltic Cone 5822 (unit b58; ~700 ka).

Photograph showing bench-forming intracanyon lava flows at confluence of Satus Creek and Wilson Charley Canyon. View is toward northwest, across Highway 97 (hidden on canyon floor of Satus Creek) and up Wilson Charley Canyon, the 300-m-high wall that consists of Miocene Columbia River Basalt Group lavas. Bench with grassy strip has 15-m-high rim ledge of phenocryst-rich basaltic unit **bww**, which here overlies 70-m scarp that consists of 10 thin flows of exceptionally fluid, low-potassium basalt of Satus Creek (unit **bsa**). Both units flowed down Wilson Charley Canyon, and unit **bsa** continued from the confluence for at least 9 km farther down Satus Creek (to the right). Because both basalts are near the canyon floor, they are probably early Pleistocene, younger than most eruptive products of the Simcoe Mountains volcanic field.

Geologic Map of the Simcoe Mountains Volcanic Field, Main Central Segment, Yakama Nation, Washington

By
Wes Hildreth and Judy Fierstein

2015

ISSN 2329-131 (print)
ISSN 2329-1230 (online)
http://dx.doi.org/10.3133/sim3315

For sale by U.S. Geological Survey, Information Services, Box 25286, Federal Center, Denver, CO 80225, 1-888-ASK-USGS

Digital files available at http://dx.doi.org/10.3133/sim3315 or http://pubs.usgs.gov/sim/3315/

Suggested citation: Hildreth, Wes, and Fierstein, Judy, 2015, Geologic map of the Simcoe Mountains volcanic field, main central segment, Yakama Nation, Washington: U.S. Geological Survey Scientific Investigations Map 3315, scale 1:24,000, 3 sheets, pamphlet 76 p., http://dx.doi.org/10.3133/sim3315.