

The Smoke Creek Dike Swarm, Northwestern Nevada

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The Smoke Creek dike swarm is a previously undocumented system of north-trending feeder dikes that is best exposed in the Smoke Creek drainage in the southern Buffalo Hills of northwestern Nevada. The dike swarm extends over a north-south distance of 13 km and occupies an area of at least 50 km². At its maximum density, the swarm contains 16 dikes/km. Individual dikes can be exposed for up to 1.75 km along strike and vary in width from 0.5 to 25 m. They are typically basaltic trachyandesites, with subordinate basaltic dikes, that are identical in composition to the ~500-m-thick succession of thin lava flows that they intrude in the Smoke Creek region.

Local vents with abundant bomb- and lapilli-size scoria fragments are partially buried and interbedded within this sequence of lava flows, suggesting that the fissure-filling intrusions were flow-feeding dikes that erupted at the surface periodically to form linear vent systems in the form of aligned scoria cones. The Smoke Creek flow-and-dike complex is buried to the north by Miocene-to-Pliocene high-alumina olivine tholeiites. The stratigraphic position of the Smoke Creek lavas, together with their overall mildly alkaline to calc-alkaline chemistry, suggests that they are equivalent in age to Oligo-Miocene lavas found elsewhere in the Cascade back-arc region of the northern Basin-and-Range Province.

As such, the Smoke Creek dike swarm may be part of a much larger swarm that has been identified as far north as Abert Rim in southern Oregon, over a north-south distance of 220 km (Scarberry et al., 2009). Although recent studies suggest that significant Basin-and-Range extension did not begin in this area until after ~12 Ma (e.g., Colgan et al., 2004), the identification of such an extensive system of dikes suggests that a much older period of regional east-west extension was the prevailing stress regime in the back-arc region of southern Oregon and northern Nevada during the Oligo-Miocene.