



WESTERN SACRAMENTO VALLEY AND COAST RANGE BORDER	NORTHEASTERN SACRAMENTO VALLEY AND CASCADE RANGE BORDER	EASTERN SACRAMENTO VALLEY AND SIERRA NEVADA BORDER
<p><b>Recent</b></p> <p><b>Qr</b> River deposits Sand, gravel, silt, and minor amounts of clay deposited in flood basins during flood stages of major streams. Generally of low permeability.</p> <p><b>Qcb</b> Flood-basin deposits Largely silt and clay deposited in flood basins during flood stages of major streams. Generally of low permeability.</p> <p><b>Qa</b> Alluvial-fan deposits Heterogeneous fluvial sediments ranging from clay and silt to coarse sand and gravel. Permeability extremely variable from place to place.</p>	<p><b>Recent</b></p> <p><b>Qr</b> River deposits Sand, gravel, silt, and minor amounts of clay deposited in flood basins during flood stages of major streams. Highly permeable.</p> <p><b>Qa</b> Alluvial-fan deposits Heterogeneous fluvial sediments ranging from clay and silt to coarse sand and gravel. Permeability extremely variable from place to place.</p> <p><b>Qv</b> Victor formation and related deposits Lenticular silt, sand, gravel, and clay deposited by streams draining the Cascade Range. At most places moderately permeable throughout.</p> <p><b>Qc</b> Fonglomerate from the Cascade Range Sand, gravel, and silt consisting of volcanic detritus derived from the Tuzac formation. Moderately permeable.</p> <p><b>Qtl</b> Laguna formation and related continental deposits Silt, sand, clay, unsorted gravel. Comprises Laguna formation and, locally, post-Laguna gravel deposits of Quaternary age. At most places only moderately permeable.</p>	<p><b>Recent</b></p> <p><b>Qr</b> River deposits Sand, gravel, silt, and minor amounts of clay deposited in flood basins during flood stages of major streams. Generally of low permeability.</p> <p><b>Qcb</b> Flood-basin deposits Largely silt and clay deposited in flood basins during flood stages of major streams. Generally of low permeability.</p> <p><b>Qa</b> Alluvial-fan deposits Heterogeneous fluvial sediments ranging from clay and silt to coarse sand and gravel. Permeability extremely variable from place to place.</p> <p><b>Qv</b> Victor formation and related deposits Lenticular silt, sand, gravel, and clay deposited by streams draining the Sierra Nevada. At most places moderately permeable throughout.</p> <p><b>Qtl</b> Laguna formation and related continental deposits Silt, sand, clay, unsorted gravel. Comprises Laguna formation and, locally, Arroyo Seco gravel and gravel deposits of unsorted age in Mokelumne area, includes unsorted equivalent of these formations to the north. At most places only moderately permeable.</p>
<p><b>Platocene and Recent</b></p> <p><b>Qb</b> Red Bluff formation and related terrace deposits Poorly sorted gravel having reddish silty or sandy matrix. Locally may contain small lenses of bedded water.</p> <p><b>Qtw</b> Tehama formation and related continental sediments Comprises Tehama formation and, locally, post-Red Bluff(?) formation, and is called Corvina member of the Tehama formation.</p>	<p><b>Platocene and Recent</b></p> <p><b>Qv</b> Victor formation and related deposits Lenticular silt, sand, gravel, and clay deposited by streams draining the Cascade Range. At most places moderately permeable throughout.</p> <p><b>Qc</b> Fonglomerate from the Cascade Range Sand, gravel, and silt consisting of volcanic detritus derived from the Tuzac formation. Moderately permeable.</p> <p><b>Qtl</b> Laguna formation and related continental deposits Silt, sand, clay, unsorted gravel. Comprises Laguna formation and, locally, post-Laguna gravel deposits of Quaternary age. At most places only moderately permeable.</p>	<p><b>Platocene and Recent</b></p> <p><b>Qv</b> Victor formation and related deposits Lenticular silt, sand, gravel, and clay deposited by streams draining the Sierra Nevada. At most places moderately permeable throughout.</p> <p><b>Qtl</b> Laguna formation and related continental deposits Silt, sand, clay, unsorted gravel. Comprises Laguna formation and, locally, Arroyo Seco gravel and gravel deposits of unsorted age in Mokelumne area, includes unsorted equivalent of these formations to the north. At most places only moderately permeable.</p>
<p><b>Platocene</b></p> <p><b>Ti</b> Tehama formation Silt, sand, gravel, and clay, locally cemented, derived from Coast Range basal part contains Nondak tuff members and similar porous tuff in southern part of Sacramento Valley. Permeability variable, generally less than that of overlying alluvial-fan deposits.</p> <p><b>Ts</b> Sedimentary rocks of volcanic origin Shistose, sandstone, shale, and conglomerate made up largely of andesitic detritus. Poorly permeable; contains somewhat brackish water beneath Sacramento Valley.</p> <p><b>Tb</b> Basalt Flows, dikes, and sills of single basalt locally containing olivine. Generally not water bearing.</p>	<p><b>Platocene</b></p> <p><b>Tu</b> Tuzac formation Volcanic breccia and tuff-breccia, volcanic sandstone, and conglomerate tuff. Includes silt and clay, locally basalt flows. Includes Nondak tuff member near base and locally a basalt flow at base. Moderately permeable, except for tuff-breccia and breccia, which act as confining beds beneath rocks.</p> <p><b>Ts</b> Sedimentary rocks, undifferentiated Poorly to well consolidated sandstone and conglomerate, tuff-breccia, and tuff; predominantly andesitic; underlies basalt at Table Mountain and Campbell Hills. Generally not water bearing.</p> <p><b>Tb</b> Basalt Flows, dikes, and sills of single basalt at Table Mountain and Campbell Hills. Generally not water bearing.</p>	<p><b>Platocene</b></p> <p><b>Tu</b> Tuzac formation Volcanic breccia and tuff-breccia, volcanic sandstone, and conglomerate tuff. Includes silt and clay, locally basalt flows. Includes Nondak tuff member near base and locally a basalt flow at base. Moderately permeable, except for tuff-breccia and breccia, which act as confining beds beneath rocks.</p> <p><b>Ts</b> Sedimentary rocks, undifferentiated Poorly to well consolidated sandstone, sandstone, conglomerate, and shale; andesitic and tuffaceous. Includes Mokelumne and Valley Spring formations; Sutter formation at Sutter Buttes; tuff at Oroville; consists of Bards Creek and various other unsorted fragmental volcanic rocks. Permeability quite variable. In south-central part of valley lower part of sand contains water of poor quality.</p> <p><b>Ts</b> Sedimentary rocks, undifferentiated Poorly to well consolidated sandstone, sandstone, conglomerate, and shale; andesitic and tuffaceous. Includes Mokelumne and Valley Spring formations; Sutter formation at Sutter Buttes; tuff at Oroville; consists of Bards Creek and various other unsorted fragmental volcanic rocks. Permeability quite variable. In south-central part of valley lower part of sand contains water of poor quality.</p>
<p><b>Platocene and Pliocene(?) to Pleistocene(?)</b></p> <p><b>Ti</b> Tehama formation Silt, sand, gravel, and clay, locally cemented, derived from Coast Range basal part contains Nondak tuff members and similar porous tuff in southern part of Sacramento Valley. Permeability variable, generally less than that of overlying alluvial-fan deposits.</p> <p><b>Ts</b> Sedimentary rocks of volcanic origin Shistose, sandstone, shale, and conglomerate made up largely of andesitic detritus. Poorly permeable; contains somewhat brackish water beneath Sacramento Valley.</p> <p><b>Tb</b> Basalt Flows, dikes, and sills of single basalt locally containing olivine. Generally not water bearing.</p>	<p><b>Platocene and Pliocene(?) to Pleistocene(?)</b></p> <p><b>Tu</b> Tuzac formation Volcanic breccia and tuff-breccia, volcanic sandstone, and conglomerate tuff. Includes silt and clay, locally basalt flows. Includes Nondak tuff member near base and locally a basalt flow at base. Moderately permeable, except for tuff-breccia and breccia, which act as confining beds beneath rocks.</p> <p><b>Ts</b> Sedimentary rocks, undifferentiated Poorly to well consolidated sandstone and conglomerate, tuff-breccia, and tuff; predominantly andesitic; underlies basalt at Table Mountain and Campbell Hills. Generally not water bearing.</p> <p><b>Tb</b> Basalt Flows, dikes, and sills of single basalt at Table Mountain and Campbell Hills. Generally not water bearing.</p>	<p><b>Platocene and Pliocene(?) to Pleistocene(?)</b></p> <p><b>Tu</b> Tuzac formation Volcanic breccia and tuff-breccia, volcanic sandstone, and conglomerate tuff. Includes silt and clay, locally basalt flows. Includes Nondak tuff member near base and locally a basalt flow at base. Moderately permeable, except for tuff-breccia and breccia, which act as confining beds beneath rocks.</p> <p><b>Ts</b> Sedimentary rocks, undifferentiated Poorly to well consolidated sandstone, sandstone, conglomerate, and shale; andesitic and tuffaceous. Includes Mokelumne and Valley Spring formations; Sutter formation at Sutter Buttes; tuff at Oroville; consists of Bards Creek and various other unsorted fragmental volcanic rocks. Permeability quite variable. In south-central part of valley lower part of sand contains water of poor quality.</p> <p><b>Ts</b> Sedimentary rocks, undifferentiated Poorly to well consolidated sandstone, sandstone, conglomerate, and shale; andesitic and tuffaceous. Includes Mokelumne and Valley Spring formations; Sutter formation at Sutter Buttes; tuff at Oroville; consists of Bards Creek and various other unsorted fragmental volcanic rocks. Permeability quite variable. In south-central part of valley lower part of sand contains water of poor quality.</p>
<p><b>Upper Cretaceous</b></p> <p><b>Kc</b> Chico formation Marine clastic sedimentary rocks consisting mostly of siltstone, sandstone, and shale. Virtually impermeable; contains connate saline water.</p> <p><b>Ks</b> Shasta series Marine clastic sedimentary rock consisting of siltstone, shale, and sandstone. Virtually impermeable; contains connate saline water.</p>	<p><b>Upper Cretaceous</b></p> <p><b>Kc</b> Chico formation Marine clastic sedimentary rocks consisting of sandstone, sandy shale, carbonaceous shale, and conglomerate. Virtually impermeable; contains connate saline water.</p> <p><b>Ks</b> Shasta series Marine clastic sedimentary rock consisting of siltstone, shale, and sandstone. Virtually impermeable; contains connate saline water.</p>	<p><b>Upper Cretaceous</b></p> <p><b>Kc</b> Chico formation Marine clastic sedimentary rocks consisting of shale, siltstone, sandstone, and conglomerate. Virtually impermeable; contains connate saline water.</p> <p><b>Ks</b> Shasta series Marine clastic sedimentary rock consisting of siltstone, shale, and sandstone. Virtually impermeable; contains connate saline water.</p>
<p><b>Lower Cretaceous</b></p> <p><b>Ks</b> Shasta series Marine clastic sedimentary rock consisting of siltstone, shale, and sandstone. Virtually impermeable; contains connate saline water.</p>	<p><b>Lower Cretaceous</b></p> <p><b>Ks</b> Shasta series Marine clastic sedimentary rock consisting of siltstone, shale, and sandstone. Virtually impermeable; contains connate saline water.</p>	<p><b>Lower Cretaceous</b></p> <p><b>Ks</b> Shasta series Marine clastic sedimentary rock consisting of siltstone, shale, and sandstone. Virtually impermeable; contains connate saline water.</p>
<p><b>pre-Tertiary</b></p> <p><b>Pt</b> Basement complex of the Sierra Nevada block Metamorphosed igneous and sedimentary rocks of late Paleozoic and early Mesozoic age and terrane igneous rocks of Late Jurassic and Cretaceous age. Not water bearing except where unroofed or fractured.</p>	<p><b>pre-Tertiary</b></p> <p><b>Pt</b> Basement complex of the Sierra Nevada block Metamorphosed igneous and sedimentary rocks of late Paleozoic and early Mesozoic age and terrane igneous rocks of Late Jurassic and Cretaceous age. Not water bearing except where unroofed or fractured.</p>	<p><b>pre-Tertiary</b></p> <p><b>Pt</b> Basement complex of the Sierra Nevada block Metamorphosed igneous and sedimentary rocks of late Paleozoic and early Mesozoic age and terrane igneous rocks of Late Jurassic and Cretaceous age. Not water bearing except where unroofed or fractured.</p>

**GEOLOGIC MAP OF THE SACRAMENTO VALLEY, CALIFORNIA**

Scale 1:250,000

CONTOUR INTERVALS 20 AND 100 FEET  
DATUM IS MEAN SEA LEVEL

Scale 0 4 8 12 16 MILES

Base by Topographic Division, U.S. Geological Survey, 1958

Geology in part by F. H. Clined and G. H. Davis, 1945, in Sutter Buttes area after H. W. Johnson (1933), on west side of valley north of Cache Creek modified after unpublished maps of U.S. Bureau of Reclamation and Standard Oil Co. of California; on east side of valley south of Cache Creek after F. H. Clined and G. H. Davis (1939); on west side of valley south of Cache Creek after Theobald and others (1956)