DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

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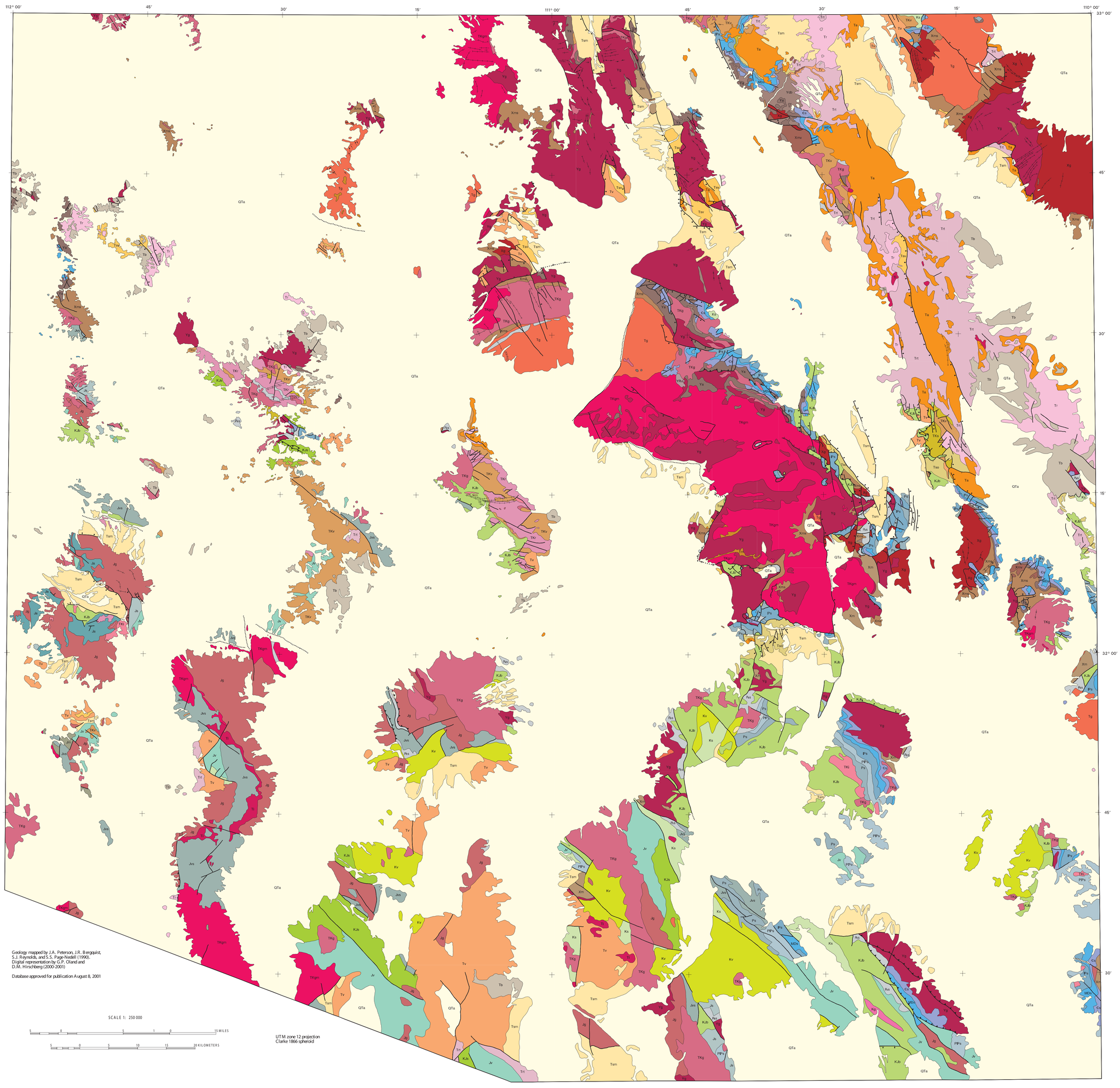

LIST OF MAP UNITS

- QTa - Alluvium and sedimentary rock (Holocene to Middle Miocene)--Unconsolidated to well-consolidated and caliche-cemented sand, silt, and gravel and dissected basin-fill deposits of conglomerate, sandstone, and siltstone with minor lacustrine rocks. Includes Quiburis Formation, Ft. Lowell Formation, and parts of Rillito Andesite (Brown, 1939) and Nogales and Big Dome Formations
- Tsm - Sedimentary rocks (Middle and Early Miocene)--Conglomerate and sandstone that largely postdate the main pulse of middle Tertiary volcanism and that were deposited during middle Tertiary tectonism. Includes lower part of Rillito Andesite (Brown, 1939), Nogales Formation, San Manuel Formation, Ripsey Wash sequence, Hell Hole Conglomerate, Apsey Conglomerate, and lower part of Big Dome Formation
- Tb - Basaltic volcanic rocks (Middle Miocene to Oligocene)--Generally flat-lying to gently dipping flows of basalt and basaltic andesite, with interbedded sedimentary rocks and tuff
- Tsv - Sedimentary, volcaniclastic, and volcanic rocks, undivided (Early Miocene and Oligocene)--Sedimentary and volcaniclastic rocks interbedded with middle Tertiary volcanic rocks. Includes Cloudburst Formation and equivalent rocks, and Wymola Conglomerate (Shafiqullah and others, 1976) near Picacho Peak
- Tv - Volcanic rocks, undivided (Early Miocene and Oligocene)--Includes (1) flows of basalt, andesite, and trachyandesite; (2) lava flows, flow breccia, and ash-flow tuff of rhyolitic, latitic, and dacitic composition; (3) potassium-metasomatized volcanic rocks at Picacho Peak; and (4) subordinate, interbedded sedimentary rocks
- Tr - Rhyolitic volcanic rocks (Early Miocene and Oligocene)--Rhyolitic, latitic, and dacitic lava flows and intrusive rocks with volcanic textures. Includes interbeds of pyroclastic and reworked pyroclastic rocks
- Trt - Rhyolitic tuff (Early Miocene and Oligocene)--Rhyolitic, latitic, and dacitic ash-flow tuff with local ash-flow and tuffaceous sedimentary rocks. Includes several members of Galiuro Volcanics and Recortado ash flow (Bikerman, 1967)
- Ta - Andesitic volcanic rocks (Early Miocene and Oligocene)--Andesite, trachyandesite, and dacite lava flows, agglomerate, and interbedded subordinate clastic and pyroclastic rocks. Includes coarsely plagioclase-porphyritic andesite, informally referred to as a "turkey-track" porphyry
- Ti - Subvolcanic intrusive rocks (Early Miocene and Oligocene)--Basaltic to rhyolitic or aplitic dikes, sills, and plugs with a volcanic or fine-grained granitic texture
- Tg - Granitoid rocks (Early Miocene and Oligocene)--Generally medium-grained biotite granodiorite and granite
- Tm - Mylonitic rocks (Early Miocene and Oligocene)--Mylonitic gneiss and schist exposed beneath Catalina and Picacho detachment faults. Formed by Tertiary mylonitization of Proterozoic crystalline rocks and Tertiary granitoid rocks
- Tso - Sedimentary rocks (Oligocene and latest Eocene)--Conglomerate, sandstone, siltstone, and lacustrine rocks deposited prior to main pulse of middle Tertiary volcanism. Includes Whitetail Conglomerate, Pantano Formation, Mineta Formation (Dickinson and Shafiqullah, 1989) and Three Links Conglomerate
- TKgm - Peraluminous, generally muscovite-bearing granite (Eocene to Late Cretaceous)--Medium- to coarse-grained peraluminous granite with minor amounts of biotite, muscovite, and garnet. Associated with aplite and pegmatite. Includes Wilderness granite (Keith and others, 1980), Wrong Mountain Granite, granite of Derrio Canyon, Pan Tak Granite, and phases of Tea Cup Granodiorite and Texas Canyon Quartz Monzonite
- TKg - Granitoid rocks (Paleocene and Late Cretaceous)--Generally medium- to fine-grained biotite-hornblende granodiorite, granite, diorite, and local gabbro. Commonly porphyritic and associated with copper mineralization. Includes Ruby Star Granodiorite, Amole Granite (Brown, 1939), Texas Canyon Quartz Monzonite, Leatherwood quartz Diorite (Bromfield, 1952), granodiorite of Chirreon Wash, quartz monzonite of Mineral Butte, granite of Sacaton Peak, Copper Creek Granodiorite, and phases of Tea Cup Granodiorite
- TKs - Sedimentary rocks (Paleocene and Late Cretaceous)--Conglomerate, sandstone, siltstone, and shale, locally of a volcaniclastic nature. Includes Clatlin Ranch Formation (Richard and Courtright, 1960) and Cascabel formation
- TKi - Intrusive rocks, undivided (Early Tertiary and Late Cretaceous)--Dikes, sills, and other intrusions of rhyolite to andesite. Includes Amole Latite (Brown, 1939) and porphyritic biotite rhyodacite in Comobabi Mountains
- TKv - Volcanic rocks, undivided (Paleocene and Late Cretaceous)--Andesitic, dacitic, and rhyolitic lava flows, pyroclastic rocks, and local subvolcanic intrusions. Includes Glory Hole Volcanics, Williamson Canyon Volcanics, Muleshoe volcanics, Roskruge Volcanics, and numerous units in the Tucson Mountains, such as the Tucson Mountain Chaos (Courtright, 1958) and andesite megabreccia blocks hosted in a matrix of rhyolitic ash-flow tuff (Cat Mountain Rhyolite (Brown, 1939))
- TKr - Rhyolitic volcanic rocks (Paleocene and Late Cretaceous)--Rhyolitic to dacitic flows, tuff, volcaniclastic rocks, and subvolcanic intrusions. Includes tuff of Confidence Peak, Mount Lord Volcanics, and Cat Mountain Rhyolite (Brown, 1939)
- Ks - Sedimentary rocks (Cretaceous)--Conglomerate, sandstone, and finer grained rocks including American Flag Formation, Pinkard Formation, and rocks of uncertain affinity in southern Winchester Mountains
- Kv - Volcanic rocks (Cretaceous)--Andesite flows and tuffs with intercalated diorite rocks and conglomerate. Rhyodacitic tuffs and flows locally intensely silicified
- Kg - Granitoid rocks (Cretaceous)--Porphyritic granodiorite stocks
- KJb - Bisbee Group and related rocks (Early Late Cretaceous to Late Jurassic)--Sandstone, siltstone, shale, conglomerate, and limestone. Includes Glance Conglomerate and other units of Bisbee Group, Amole Arkose (Brown, 1939), Sand Wells Formation, and correlative rocks in Roskruge, Silver Bell, and Santa Rosa Mountains
- KJs - Sedimentary rocks, undifferentiated (Cretaceous and Jurassic)--Sandstone, siltstone, and conglomerate in Waterman Mountains. Probably contains rocks equivalent to units Kjb and Js
- Js - Sedimentary rocks (Jurassic)--Sandstone, siltstone, conglomerate, and their metamorphic equivalents, including phyllite, quartzite, and schist
- Jvs - Volcanic and sedimentary rocks, undivided (Jurassic)--Rhyolitic flows and tuff, andesitic to trachyandesitic flows and flow breccia, interbedded with mudstone, siltstone, sandstone, and conglomerate. Includes Walnut Gap Volcanics and Sil Nakya and Cocoraque Formations
- Jv - Volcanic rocks (Jurassic)--Rhyolitic, dacitic, and andesitic volcanic flows, flow breccia, and tuff, with local sedimentary rocks
- Ja - Andesitic volcanic rocks (Jurassic)--Andesitic to trachyandesitic flows, flow breccia, tuff, and associated sedimentary rocks
- Jg - Granitoid rocks (Jurassic)--Coarse- to fine-grained granite, granodiorite, quartz syenite, syenodiorite, diorite, and rhyolite, rhyolite porphyry, and aplite intrusions
- Jm - Metamorphic rocks (Jurassic)--Schistose rocks of volcanic, sedimentary, and uncertain origin
- Pzs - Sedimentary rocks, undifferentiated (Paleozoic)-- Limestone, dolomite, sandstone, quartzite, siltstone, shale, and conglomerate commonly metamorphosed to low grade
- PPs - Sedimentary rocks (Permian and Pennsylvanian)--Limestone, dolomite, sandstone, siltstone, and conglomerate of Naco Group
- Ps - Sedimentary rocks (Permian)--Limestone, dolomite, sandstone, and quartzite of upper part of Naco Group. Includes Rainvalley Formation, Concha Limestone, Scherrer Formation, Epitaph Dolomite, and Colina Limestone
- IPs - Sedimentary rocks (Pennsylvanian)--Limestone, dolomite, sandstone, siltstone, and conglomerate of lower part of Naco Group. Includes Earp and Horquilla Formations
- MDs - Sedimentary rocks (Mississippian and Devonian)--Limestone and dolomite with minor shale, siltstone, sandstone, and conglomerate. Includes Black Prince Formation, Escabrosa Limestone, and Martin Formation
- Cs - Sedimentary rocks (Cambrian)--Quartzite, sandstone, shale, conglomerate, limestone, and dolomite. Includes Abrigo Formation and Bolsa Quartzite
- YPs - Sedimentary rocks, undivided (Paleozoic and Middle Proterozoic)--Includes Paleozoic sedimentary rocks and Proterozoic Apache Group, with local diabase
- Ydb - Diabase (Middle Proterozoic)--Dikes and sills of fine- to coarse-grained diabase and associated rocks
- Ya - Apache Group (Middle Proterozoic)--Quartzite, siltstone, mudstone, limestone, and conglomerate. Includes Troy Quartzite, Mescal Limestone, Dripping Spring Formation, and Pioneer Formation
- Yg - Granite (Middle Proterozoic)--Coarse- to medium-grained granite and granodiorite, commonly with megacrysts of K-feldspar. Includes 1.45 Ga Oracle Granite (Peterson, 1938), Ruin Granite and Tungsten King Granite. Many outcrops contain dikes of pegmatite, alaskite, and aplite.
- Xg - Granite (Early Proterozoic)--Undeformed to foliated, medium-grained granodiorite, granite, and quartz diorite. Includes 1.65 Ga Johnny Lyon Granodiorite and correlative rocks
- Xm - Metamorphic rocks, undivided (Early Proterozoic)--Greenschist to lower-amphibolite-facies metasedimentary, metavolcanic, metahypabyssal, and metaplutonic rocks
- Xms - Metasedimentary rocks (Early Proterozoic)--Schist, phyllite, metasandstone, and quartzite, with some metaconglomerate and metavolcanic rocks
- Xmv - Metavolcanic rocks (Early Proterozoic)--Schist, greenstone, and foliated and metamorphosed rhyolitic, dacitic, and andesitic flows, flow breccia, and tuff

- contact
- tectonized (ductile) contact, teeth on upper plate
- fault, unknown offset, dotted where concealed
- thrust fault, teeth on upper plate, dotted where concealed
- detachment fault, hachures on upper plate, dotted where concealed
- low-angle normal fault, hachures on upper plate, dotted where concealed
- fault, bar and ball on downthrown side, dotted where concealed
- dike, mafic composition
- dike, intermediate composition
- dike, felsic composition

Geology mapped by J.A. Peterson, J.R. Bergquist, S.J. Reynolds, and S.S. Page-Nedell (1990).
Digital representation by G.P. Oland and D.M. Hirschberg (2000-2001)

Database approved for publication August 8, 2001

SCALE 1: 250 000

5 0 5 1 0 15 MILES

5 0 5 10 15 20 KILOMETERS

UTM zone 12 projection
Clarke 1866 spheroid

Index map showing map location (shaded)

Digital Geologic Map of the Tucson and Nogales 1° x 2° Quadrangles: A Digital Database for the 1990 Peterson and others' Map

By G.P. Oland and D.M. Hirschberg
Edited by G.J. Orris

2001

This map was printed on an electronic plotter directly from digital files. Dimensional calibration may vary between electronic plotters and between X and Y directions on the same plotter, and paper may change size due to atmospheric conditions; therefore, scale and proportions may not be true on plots of this map. Color also varies between plotters and may need to be adjusted.

Digital files are available on World Wide Web at http://geopubs.wr.usgs.gov/open-file/of01-275

The digital database is not meant to be used or displayed at any scale larger than 1:250,000 (for example, 1:24,000, or 1:125,000).

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