

MAP SHOWING OUTCROPS AND LITHOLOGY OF INTRUSIVE ROCKS,
BASIN AND RANGE PROVINCE AND VICINITY, TRANS-PECOS TEXAS

Compiled by Christopher D. Henry and Gail L. Fisher,
Texas Bureau of Economic Geology

INTRODUCTION

This map report is one of a series of geologic and hydrologic maps covering all or parts of the States within the Basin and Range province of the western United States, resulting from work under the U.S. Geological Survey's program for geologic and hydrologic evaluation of the Basin and Range province to identify potentially suitable regions for future study relative to isolation of high-level nuclear waste (Bedinger, Sargent, and Reed, 1984).

This map report on the intrusive rocks of Trans-Pecos Texas was prepared from published maps and reports utilizing the project guidelines of Sargent and Bedinger (1984). On the map the outcrops of igneous intrusive rocks are grouped in numbered county areas, and in the Description of Map Units, the geologic, and, if available, radiometric age, type of intrusive body, lithologic composition, identity of the geologic units intruded, and the sources of data on the rocks in each county area are discussed.

The intrusive igneous rocks of the Trans-Pecos region are alkaline in character. The rocks in the western part are largely metaluminous and those in the eastern part, peralkaline and feldspathoidal (Barker, 1977, 1979).

The intrusions include both those related to volcanic calderas and those not related. The former are principally resurgent domes and ring-fracture intrusions associated with the large calderas shown on the map. The resurgent domes probably are offshoots of magma chambers underlying the calderas. The non-caldera-related intrusions include concordant and semi-concordant bodies, such as sills, laccoliths, and trap-door laccoliths, and non-concordant bodies, such as stocks and dikes. Some stocks may actually be laccoliths, but the exact shape of the bodies is not readily determined on outcrop.

All but two of the intrusions in the Trans-Pecos region are of Tertiary age. The Red Bluff Granite (Thomann, 1981) in the Franklin Mountains and small outcrops of granite on the south flanks of the Hueco Mountains are of Precambrian age. The silicic, igneous rocks were intruded mainly during the Oligocene, between 38 and 28 million years ago (Henry and McDowell, 1982). Intrusion of mafic rocks also occurred principally within the same time period, but the activity continued on a diminishing scale into the Miocene.

DESCRIPTION OF MAP UNITS

County- area number	Map symbol	Latitude (North) Longitude (West)	Geologic and radiometric age in millions of years (m.y.)	Intrusive type, lithology, and comments	References for county area
MAP SHEET 1 (Part of Van Horn - El Paso Sheet)					
CULBERSON COUNTY (C)					
C-1	Ts	31°26' 104°54'	Oligocene 36.7±0.4, 36.2±0.4 m.y. (C.D. Henry, Texas Bureau of Economic Geology, unpublished data)	Stock, syenite, intruded Permian Hueco Limestone; considerable hydrothermal alteration.	King, 1965; Sharp, 1979
C-2	Tqm	31°26' 104°53'	Oligocene 34.5±0.5 m.y. (C.D. Henry, unpublished data)	Stock, breccia pipe, breccia-quartz monzonite, intruded Permian Hueco Limestone; considerable hydrothermal alteration.	King, 1965; Sharp, 1979
C-3	Tb	31°00' 104°54'	Tertiary	Sill, basalt, intruded between schists of Pre- cambrian Carrizo Mountain Group and Precambrian(?) Van Horn Sandstone.	King, 1965
EL PASO COUNTY (E)					
E-1	Ts	31°53' 106°34'	Tertiary	Stock, syenite, surrounded by Quaternary and Tertiary basin fill.	Hoffer, 1970
E-2	Ts	31°52' 106°33'	Tertiary	Stock, syenite, intruded Cretaceous sedimentary rocks.	Hoffer, 1970
E-3	Ts	31°47' 106°30'	Tertiary 48.3±2.3 m.y.	Stock, syenite, intruded Cretaceous Boquillas Formation.	Hoffer, 1970
E-4	Ts	31°58' 106°05'	Tertiary	Stock, syenite, mostly surrounded by alluvium; roof pendant of Permian Hueco Limestone.	Wise, 1977
E-5	Tt	31°57' 106°04'	Tertiary	Stock, trachyte, sur- rounded by alluvium.	Wise, 1977
E-6	Ts	31°59' 106°03'	Tertiary	Sill, syenite; rock above sill is Permian Hueco Limestone, below is Pennsylvanian Magdalena Formation.	Wise, 1977
E-7	Ts	31°58' 106°02'	Tertiary	Sill-laccolith, syenite, rock above sill is Permian Hueco Limestone, below is Pennsylvanian Magdalena Formation.	Wise, 1977
E-8	Ts	31°55' 106°03'	Tertiary ~36 m.y.	Stock, syenite, surrounded by alluvium.	Wise, 1977

E-9	Ts	31°55' 106°01'	Tertiary	Sill, syenite; rock above sill is Permian Hueco Limestone, below Pennsylvanian Magdalena Formation.	Wise, 1977
E-10	Ts	31°55' 106°29'	Precambrian ~950 m.y.	Stock (Red Bluff Granite), intrusive equivalent of rhyolites of Thunderbird Group, which it intrudes along with Precambrian marble, quartzite, and basalt.	Denison and Hetherington, 1969; Thomann, 1981

HUDSPETH COUNTY (H)

H-1	Ts	31°59' 105°59'	Tertiary	Laccolith, syenite, intruded Permian Hueco Limestone.	Wise, 1977
H-2	Ts	31°57' 105°58'	Tertiary 34.3±0.5 m.y. (F.W. McDowell, University of Texas, Austin, unpublished data)	Stock, syenite, intruded Permian Hueco Limestone.	Wise, 1977
H-3	Ts	31°54' 105°58'	Tertiary	Sill, syenite, intruded Permian Hueco Limestone.	Wise, 1977
H-4	Tfs	32°00' 105°33'	Tertiary	Laccolith, nepheline syenite, intruded Permian and Cretaceous rocks.	Barker and others, 1977
H-5	Tfs	31°59' 105°31'	Tertiary	Sills, nepheline syenite, intruded Permian and Cretaceous sedimentary rocks.	Barker and others, 1977
H-6	Tfs	31°55' 105°32'	Tertiary	Sill, nepheline syenite, intruded Permian Hueco Limestone.	Barker and others, 1977
H-7	Tfs	31°54' 105°31'	Tertiary	Sill-discordant sheet, nepheline syenite, intruded Permian Hueco Limestone and Cretaceous Washita Group.	Barker and others, 1977
H-8	Tfs	31°52' 105°27'	Tertiary	Discordant sheet, nepheline syenite, intruded Permian Hueco Limestone and Cretaceous Washita Group.	Barker and others, 1977
H-9	Ts	31°52' 105°26'	Oligocene 34.9±0.6, 35.1±0.6, 36.1±0.6 m.y.	Dome, syenite, intruded Permian Hueco Limestone, and Cretaceous Washita Group.	Barker and others, 1977
H-10	Tfs	31°51' 105°26'	Tertiary	Discordant sheet, nepheline syenite, intruded Permian Hueco Limestone.	Barker and others, 1977
H-11	Tfs	31°53' 105°24'	Tertiary	Discordant sheet, nepheline syenite, intruded Permian Hueco Limestone.	Barker and others, 1977

H-12	Tfs	31° 45' 105° 28'	Tertiary	Cone sheet, nepheline syenite, intruded Permian Hueco Limestone.	Barker and others, 1977
H-13	pEg	31° 40' 105° 56'	Precambrian	Granite, overlain by Bliss Sandstone; host rock unknown.	Barnes, 1968
H-14	Tt	31° 39' 105° 18'	Tertiary	Discordant sheet, trachyte, intruded Permian Hueco Limestone and Cretaceous Washita Group.	Barker and others, 1977
H-15	Tfs	31° 35' 105° 10'	Tertiary	Discordant sheet, nepheline syenite, intruded Permian Hueco Limestone and Cretaceous Washita Group.	Barker and other, 1977
H-16	Ts	31° 31' 105° 36'	Tertiary	Sill, syenite, intruded Cretaceous Cox Sandstone.	Albritton and Smith, 1965
H-17	Ts	31° 20' 105° 34'	Tertiary	Dikes-sills, syenite, intruded Cretaceous Cox Sandstone and Finlay Limestone.	Albritton and Smith, 1965
H-18	Tr	31° 17' 105° 27'	Tertiary	Laccoliths, rhyolite, intruded shale and limestone of Cretaceous Washita Group.	Albritton and Smith, 1965
H-19	Tr	31° 17' 105° 23'	Tertiary	Laccolith, rhyolite, intruded Cretaceous Campagrande Formation.	Albritton and Smith, 1965
H-20	Tr	31° 15' 105° 26'	Oligocene 36.1±0.6 m.y. (C.D. Henry, unpublished data)	Laccolith, rhyolite, intruded shale and limestone of Cretaceous Washita Group.	Albritton and Smith, 1965
H-21	Tt	31° 11' 105° 22'	Tertiary	Dikes and sills, trachyte, intruded shale and limestone of Cretaceous Cox Sandstone and Finlay Limestone.	Albritton and Smith, 1965
H-22	Tqm	31° 12' 105° 29'	Oligocene 35.4±0.6 (F.W. McDowell, unpublished data)	Stock, quartz monzonite, intruded Cretaceous sedimentary rocks and Tertiary lava flows and ash-flow tuff.	Albritton and Smith, 1965
H-23	Tqm	31° 07' 105° 30'	Tertiary	Ring dike, quartz monzonite, intruded Cretaceous sedimentary rocks and Tertiary volcanic rocks.	Albritton and Smith, 1965

MAP SHEET 2
(Part of Fort Stockton and Marfa Sheets)

BREWSTER COUNTY (B)

B-1	Tpt	30° 19' 103° 45'	Tertiary	Dike, peralkaline trachyte, intruded Tertiary volcanic rocks.	Parker, 1976
B-2	Tu	30° 20' 103° 44'	Tertiary	Stock?, intruded Decie Formation (Tertiary), lava flows, and minor ash-flow tuff.	Parker, 1976, 1983
B-3	Tpr	30° 19' 103° 43'	Tertiary	Stock, peralkaline rhyolite, intruded lava flows and ash-flow tuff of Decie Formation (Tertiary).	Parker, 1976, 1983

B-4	Tpt	30°20' 103°42'	Tertiary	Stock, peralkaline trachyte, intruded lava flows, minor ash-flow tuff of Decie Formation (Tertiary).	Parker, 1976, 1983
B-5	Tu	30°21' 103°39'	Tertiary	Uncertain intrusive type, intruded Tertiary Crossen Trachyte lava flow.	Parker, 1976
B-6	Tfs	30°18' 103°46'	Tertiary	Stock, feldspathoidal syenite, intruded Tertiary volcanic rocks.	Parker, 1976
B-7	Tfs	30°17' 103°43'	Tertiary	Laccolith (trap-door) feldspathoidal syenite, intruded Tertiary volcanic rocks.	Parker, 1976
B-8	Tpt	30°18' 103°40'	Tertiary	Stock, peralkaline trachyte, intruded Tertiary volcanic rocks.	Parker, 1976
B-9	Ts	30°13' 103°44'	Tertiary	Sill, syenite, intruded tuffaceous sediments of Duff Formation (Tertiary).	McAnulty, 1955
B-10	Tfs	30°14' 103°39'	Tertiary	Laccolith (trap-door), feldspathoidal syenite, intruded Tertiary volcanic rocks, mostly lava flows.	Barnes, 1982; McAnulty, 1955
B-11	Tfs	30°13' 103°38'	Tertiary	Sill, feldspathoidal syenite, intruded Tertiary volcanic rocks, mostly lava flows.	McAnulty, 1955
B-12	Ts	30°08' 103°40'	Tertiary	Stock-laccolith, syenite, intruded Maxon Sandstone of Trinity Group, and Fredericksburg, and Washita Groups all of Cretaceous age and Tertiary volcanic rocks.	McAnulty, 1955
B-13	Tfs	30°31' 103°31'	Tertiary	Sill, feldspathoidal syenite, intruded tuffaceous sediments of Tertiary Pruett Formation.	McAnulty, 1955
B-14	Tu	30°17' 103°38'	Tertiary	Lithology unknown, intruded Tertiary volcanic rocks, mostly lava flows.	Parker, 1976
B-15	Tt	30°18' 103°37'	Tertiary	Trachyte?, intruded Tertiary volcanic rocks, mostly lava flows.	Parker, 1976
B-16	Tu	30°19' 103°36'	Tertiary	Lithology unknown, intruded Tertiary volcanic rocks, mostly lava flows.	Parker, 1976
B-17	Ts	30°21' 103°30'	Tertiary	Stock-breccia pipe in western outcrops, syenite, intruded Permian Capitan Limestone.	Parker, 1976
B-18	Tu	30°18' 103°32'	Tertiary	Lithology unknown, intruded Cretaceous Washita Group.	Barnes, 1982
B-19	Tt	30°19' 103°30'	Tertiary	Sill?, trachyte, intruded Permian Word Formation.	King, 1937
B-20	Ts	30°18' 103°31'	Tertiary	Stock, syenite, intruded Permian Cathedral Mountain Formation.	King, 1937

B-21	Tu	30°16' 103°34'	Tertiary	Lithology unknown.	Barnes, 1982
B-22	Tb	30°08' 103°28'	Tertiary	Laccolith, basalt, intruded Permian Capitan Limestone.	King, 1937
B-23	Ts	30°22' 103°12'	Tertiary	Syenite?, intruded between Neal Ranch and Skinner Ranch Formations of Permian age.	King, 1937
B-24	Ts	30°18' 103°16'	Tertiary	Stock, syenite, surrounded by alluvium.	King, 1937
B-25	Tpt	30°03' 103°04'	Tertiary	Dike, peralkaline trachyte, intruded Pennsylvanian and Mississippian Tesnus Formation.	King, 1937
B-26	Tpr	30°02' 103°05'	Tertiary	Dike, peralkaline rhyolite, intruded Pennsylvanian and Mississippian Tesnus Formation.	King, 1937

CULBERSON COUNTY (C)

C-1	Tr	30°50' 104°53'	Tertiary	Stock, rhyolite, intruded Tertiary tuffaceous sediments and lava flows.	Twiss, 1959
C-2	Tt	30°50' 104°50'	Tertiary	Stock, trachyte, intruded Cretaceous Cox Sandstone and Finlay Limestone.	Twiss, 1959
C-3	Tr	30°48' 104°52'	Tertiary	Stock, rhyolite, intruded Cretaceous Cox Sandstone and Finlay Limestone.	Twiss, 1959
C-4	Tqm, Tt	30°55' 104°43'	Tertiary	Stocks, quartz-monzonite, and trachyte intruded Tertiary tuffaceous sediments and lava flows.	Hay-Roe, 1957
C-5	Tr	30°49' 104°41'	Tertiary	Stock, rhyolite, intruded Tertiary tuffaceous sediments and lava flows.	Hay-Roe, 1957

HUDSPETH COUNTY (H)

H-1	Ts	30°55' 105°05'	Tertiary	Stock (resurgent dome), syenite, intruded Tertiary lava flows and ash-flow tuff.	Underwood, 1963
H-2	Tr	30°57' 105°04'	Tertiary	Stock, rhyolite, intruded Cretaceous limestone and shale.	Underwood, 1963
H-3	Tr	30°51' 105°00'	Tertiary	Stock, rhyolite, intruded Cretaceous limestone and shale.	Underwood, 1963

JEFF DAVIS COUNTY (JD)

JD-1	Tu	31°00' 103°57'	Tertiary	Lithology, unknown, intruded Tertiary volcanic rocks.	Barnes, 1982
------	----	-------------------	----------	---	--------------

JD-2	Tpt	30°55' 103°54'	Tertiary	Laccoliths, peralkaline trachyte, intruded Tertiary tuffaceous sediments and lava flows.	Barnes, 1982
JD-3	Tpt	30°52' 103°48'	Tertiary	Dikes, peralkaline trachyte, intruded Upper Cretaceous sedimentary rocks.	Eifler, 1951
JD-4	Tpt	30°51' 103°52'	Tertiary	Laccolith, peralkaline trachyte, surrounded by alluvium.	Barnes, 1982
JD-5	Tu	30°51' 103°53'	Tertiary	Lithology, unknown, intruded Upper Cretaceous sedimentary rocks.	Barnes, 1982
JD-6	Tpt	30°48' 103°53'	Tertiary	Laccoliths, peralkaline trachyte, intruded Upper Cretaceous sedimentary rocks.	Barnes, 1982
JD-7	Ts	30°33' 103°45'	Tertiary	Laccolith, syenite, intruded Tertiary volcanic rocks, mostly lava flows.	Smith, 1975
JD-8	Tpr	30°33' 103°46'	Tertiary	Sill, peralkaline rhyolite, intruded into Tertiary volcanic rocks, mostly lava flows.	Smith, 1975
JD-9	Tpr	30°32' 103°51'	Tertiary	Stock, peralkaline rhyolite, intruded Tertiary volcanic rocks, mostly lava flows.	Smith, 1975
JD-10	Tpt	30°31' 103°50'	Tertiary	Laccolith and dikes, peralkaline trachyte, intruded Tertiary volcanic rocks mostly lava flows.	Smith, 1975
JD-11	Tpr, Ts	30°30' 103°46'	Tertiary	Sill, peralkaline rhyolite; cut by laccolith of syenite, intruded Tertiary volcanic rocks, mostly lava flows.	Smith, 1975
JD-12	Tt	30°30' 103°45'	Tertiary	Trachyte, intruded Tertiary volcanic rocks, mostly lava flows.	Smith, 1975
JD-13	Ts	30°30' 103°56'	Tertiary	Stock, syenite, intruded Tertiary volcanic rocks, mostly lava flows.	Gorski, 1970
JD-14	Ts	30°29' 103°56'	Tertiary	Syenite?, intruded Tertiary volcanic rocks, mostly lava flows.	Gorski, 1970
JD-15	Tu	30°27' 103°55'	Tertiary	Lithology, unknown, intruded Tertiary volcanic rocks, mostly lava flows.	Gorski, 1970
JD-16	Tpr	30°26' 103°50'	Tertiary	Stocks, peralkaline rhyolite, intruded Tertiary volcanic rocks, mostly lava flows.	Gorski, 1970
JD-17	Tu	30°28' 103°42'	Tertiary	Lithology unknown, intruded Tertiary volcanic rocks, mostly lava flows.	Gorski, 1970

JD-18	Tt	30°51' 104°33'	Tertiary	Stock, trachyte, intruded Tertiary volcanic rocks.	Hay-Roe, 1957
JD-19	Ts	30°46' 104°32'	Tertiary	Stock, syenite, surrounded mostly by alluvium and Cretaceous Finlay Limestone.	Hay-Roe, 1957
JD-20	Tr	30°43' 104°34'	Tertiary	Laccoliths (trap-door), rhyolite, intruded Tertiary lava flows.	Wightman, 1953
JD-21	Tr	30°43' 104°31'	Tertiary	Laccolith, rhyolite, intruded Tertiary volcanic rocks.	Wightman, 1953
JD-22	Tb	30°42' 104°47'	Tertiary	Dike, basalt, intruded Cretaceous Ojinaga Formation.	Dasch and others, 1969
JD-23	Tb	30°36' 104°48'	Tertiary ~ 23 m.y.	Stock, basalt, intruded Tertiary tuffaceous sediments.	Dasch and others, 1969
JD-24	Tb	30°35' 104°43'	Tertiary	Dike, basalt, intruded Cretaceous Ojinaga Formation.	Dasch and others, 1969
JD-25	Tu	30°51' 104°13'	Tertiary	Stock?, lithology unknown, intruded Tertiary volcanic rocks, mostly lava flows.	Anderson, 1968
JD-26	Tfs	30°40' 104°20'	Tertiary	Laccolith?, feldspathoidal syenite, intruded Tertiary volcanic rocks.	Anderson, 1968
JD-27	Tg	30°40' 104°14'	Tertiary	Stock-laccolith?, granite, intruded Tertiary volcanic rocks.	Anderson, 1968
JD-28	Tg	30°32' 104°05'	Tertiary	Stock-laccolith?, granite, intruded Tertiary volcanic rocks.	Anderson, 1968

PRESIDIO COUNTY (P)

P-1	Tb	30°33' 104°52'	Tertiary	Sill, basalt, intruded tuffaceous sediments of Vieja Group (Tertiary).	Dasch and others, 1969
P-2	Tb	30°33' 104°44'	Miocene ~ 19 m.y.	Sill, basalt, intruded Cretaceous San Carlos Sandstone.	Dasch and others, 1969
P-3	Tt	30°07' 104°34'	Tertiary	Laccolith, trachyte, intruded Tertiary tuffaceous sediments.	Amsbury, 1958
P-4	Tr	30°03' 104°34'	Tertiary	Stocks or laccoliths, rhyolite, intruded limestone of Cretaceous Bluff Mesa Formation.	Amsbury, 1958
P-5	Tr	30°01' 104°30'	Oligocene 35.7±0.8, 34.7±0.8 m.y. (C.D. Henry, unpublished data)	Stocks, rhyolite, intruded Bluff Mesa Formation and Cox Sandstone of Cretaceous age and Tertiary volcanic rocks.	Amsbury, 1958
P-6	Tt	30°01' 104°24'	Tertiary	Stock, trachyte, intruded Tertiary volcaniclastic rocks.	Duex and Henry, 1981

P-7	Tqm	30°02' 104°21'	Oligocene 36.7±0.6 m.y. (C.D.Henry, unpublished data)	Stock, quartz monzonite, intruded Tertiary ash- flow tuff.	Duex and Henry, 1981
P-8	Tr	30°01' 104°18'	Tertiary	Stock, rhyolite, intruded Cretaceous limestone.	Duex and Henry, 1981
P-9	Tt	30°03' 104°18'	Tertiary	Stock, trachyte, intruded Tertiary lava flows.	Duex and Henry, 1981
P-10	Tpr	30°13' 104°19'	Tertiary	Stock, peralkaline rhyolite intruded Cretaceous Finlay Limestone.	Ramsey, 1961
P-11	Ts	30°18' 103°50'	Tertiary	Stock, syenite, intruded Tertiary volcanic rocks.	Parker, 1976

MAP SHEET 3
(Part of Emory Peak-Presidio Sheet)

BREWSTER COUNTY (B)

B-1	Tb	29°50' 103°35.5'	Tertiary	Sill?, basalt, intruded volcaniclastic rocks, of Pruett Formation (Tertiary).	Goldich and Elms, 1949
B-2	Ts	29°46' 103°36'	Tertiary	Sill, syenite, intruded Cretaceous Boquillas Formation.	Goldich and Elms, 1949
B-3	Tfs	29°53' 103°27'	Tertiary	Sill, feldspathoidal syenite, intruded Cretace- ous Boquillas Formation.	Eifler, 1943
B-4	Tfs	29°50' 103°25'	Tertiary	Stock, feldspathoidal syenite, intruded volcanic rocks of Tertiary Pruett Formation.	Eifler, 1943
B-5	Tfs	29°47' 103°21'	Tertiary	Sill, feldspathoidal syenite, intruded Cre- taceous Pen and Boquillas Formations.	Eifler, 1943
B-6	Tfs	29°45' 103°20'	Tertiary	Sill, feldspathoidal syenite, intruded Cre- taceous Pen, Boquillas, and Aguja Formations.	Eifler, 1943
B-7	Tfs	29°43' 103°18'	Tertiary	Sill?, feldspathoidal syenite. Intruded Cre- taceous Aguja Formation.	Barnes, 1979a
B-8	Tb	29°43' 103°23'	Tertiary	Basalt?, intruded Cretace- ous Boquillas Formation.	Barnes, 1979a
B-9	Tb	29°39' 103°23'	Tertiary	Sill, basalt, intruded Cretaceous Boquillas Formation.	Barnes, 1979a
B-10	Ts	29°38' 103°27'	Tertiary	Sill, syenite, intruded Cretaceous Boquillas Formation.	Barnes, 1979a
B-11	Tu	29°38' 103°31'	Tertiary	Stock, intruded Cretaceous Boquillas Formation.	Barnes, 1979a
B-12	Tb	29°35' 103°28'	Tertiary	Sill-laccolith?, basalt?, intruded Cretaceous Boquillas Formation.	Barnes, 1979a

B-13	Tt	29°35' 103°30'	Tertiary	Laccolith, trachyte, intruded Cretaceous Boquillas Formation.	Moon, 1953
B-14	Tpr	29°31' 103°47'	Tertiary	Stock?, peralkaline rhyo- lite, intruded Cretaceous Boquillas Formation.	Erickson, 1953
B-15	Tu	29°30' 103°45'	Tertiary	Lithology unknown, intruded Cretaceous Santa Elena Limestone.	Barnes, 1979a
B-16	Tgb	29°29' 103°41'	Oligocene 33.5±0.7, 34.3±2.2 m.y. (F.W. McDowell, unpublished data)	Sill, gabbro, intruded Cretaceous Boquillas Formation.	Lonsdale, 1940
B-17	Tpr, Tb, Tr	29°31' 103°39'	Tertiary	Stock, peralkaline rhyo- lite in north one-half of area; sills, basalt rhyolite in south one-half; intruded Cretaceous Aguja and Pen Formations.	Lonsdale, 1940; Moon, 1953
B-18	Tb	29°30' 103°38'	Tertiary	Sill?, basalt, intruded Cretaceous Boquillas Formation.	Lonsdale, 1940
B-19	Tr	29°31' 103°36'	Tertiary	Stock-laccolith?, rhyo- lite intruded Cretaceous Santa Elena Limestone and Boquillas Formations.	Moon, 1953
B-20	Tb	29°32' 103°35'	Tertiary	Dome, basalt, intruded Cretaceous Aguja Formation.	Moon, 1953
B-21	Tr	29°31' 103°34'	Tertiary	Dome, rhyolite, intruded Cretaceous Santa Elena Limestone.	Moon, 1953
B-22	Ts	29°30' 103°33'	Tertiary	Sill?, syenite, intruded Cretaceous Boquillas Formation.	Moon, 1953
B-23	Tpr	29°30' 103°33'	Tertiary	Stocks?, laccoliths?, peralkaline rhyolite, intruded Cretaceous Boquillas and Pen Formations.	Lonsdale, 1940
B-24	Tr	29°28' 103°33'	Tertiary	Stock?, rhyolite, intruded Cretaceous Santa Elena Limestone.	Lonsdale, 1940
B-25	Ts	29°27' 103°33'	Tertiary	Sill, syenite, intruded Cretaceous Aguja Formation.	Lonsdale, 1940
B-26	Tb	29°25' 103°44'	Tertiary	Sill, basalt, intruded Cretaceous Santa Elena Limestone.	Lonsdale, 1940
B-27	Tb	29°25' 103°38'	Tertiary	Sill and laccolith, basalt, intruded Cretace- ous Boquillas Formation.	Lonsdale, 1940
B-28	Tt	29°26' 103°34'	Tertiary	Sill, trachyte, intruded Cretaceous Aguja Formation.	Lonsdale, 1940
B-29	Tpt	29°27' 103°31'	Tertiary	Sill, peralkaline intruded Cretaceous Aguja Formation.	Lonsdale, 1940

B-30	Ts	29°26' 103°32'	Tertiary	Sill, syenite, intruded Cretaceous Aguja Formation.	Lonsdale, 1940
B-31	Ts Tgb	29°25' 103°35'	Tertiary	Sill?, syenite and gabbro, intruded Cretaceous Pen and Aguja Formations.	Lonsdale, 1940
B-32	Ts	29°23' 103°38'	Oligocene or Eocene 37.5±2.4 m.y. (Daily, 1979) 41.0±0.8 m.y. (F.W. McDowell, unpublished data)	Domes?, sill and dike, syenite, intruded Cretaceous Boquillas and Aguja Formations.	Daily, 1979; Lonsdale, 1940
B-33	Tpt, Tgb	29°24' 103°33'	Tertiary	Stock?, peralkaline trachyte; sill?, gabbro, intruded Cretaceous Aguja Formation.	Lonsdale, 1940
B-34	Tpt	29°25' 103°31'	Tertiary	Sill?, peralkaline trachyte, intruded Cretaceous Aguja Formation.	Lonsdale, 1940
B-35	Ts	29°24' 103°32'	Tertiary	Sill, syenite, intruded Cretaceous Aguja Formation.	Lonsdale, 1940
B-36	Tgb	29°21' 103°35'	Tertiary	Laccoliths, gabbro, intruded Cretaceous Pen and Aguja Formations.	Lonsdale, 1940
B-37	Tpt	29°21' 103°32'	Oligocene or Eocene 39.1±2.2 m.y. (Daily, 1979)	Laccolith; peralkaline trachyte, intruded Cretaceous Pen and Aguja Formations.	Daily, 1979; Lonsdale, 1940
B-38	Tu	29°22' 103°45'	Tertiary	Lithology unknown, intruded Cretaceous Santa Elena Limestone.	Lonsdale, 1940
B-39	Tr	29°21' 103°44'	Tertiary	Sill?, rhyolite, intruded Cretaceous Santa Elena Limestone.	Lonsdale, 1940
B-40	Ts	29°19' 103°46'	Tertiary	Sill?, syenite, intruded Cretaceous Santa Elena Limestone.	Yates and Thompson, 1959
B-41	Ts	29°19' 103°41'	Tertiary	Sill?, syenite, intruded Cretaceous Buda Limestone and Del Rio Clay.	Yates and Thompson, 1959
B-42	Ts	29°34' 103°24'	Tertiary	Sill-laccolith?, syenite?, intruded Cretaceous Aguja Formation.	Barnes, 1979a
B-43	Tb	29°35' 103°18'	Tertiary	Sill?, basalt, intruded Cretaceous Boquillas Formation.	Barnes, 1979a
B-44	Tm	29°30' 103°15'	Tertiary	Laccoliths, monzonite, intruded Cretaceous Aguja Formation.	Barnes, 1979a
B-45	Tpr	29°31' 103°29'	Tertiary	Stock?, peralkaline rhyolite, intruded Cretaceous Santa Elena Limestone and Boquillas and Aguja Formations.	Barnes, 1979a
B-46	Tu	29°32' 103°27'	Tertiary	Sill?, lithology unknown, intruded Cretaceous Brewster Formation.	Barnes, 1979a

B-47	Tt, Tpr	29°30' 103°25'	Tertiary	Sill?, trachyte, and stock-laccolith?, and sill?, peralkaline rhyolite, intruded Cretaceous Boquillas Formation and Santa Elena Limestone.	Barnes, 1979a
B-48	Tpr, Tpt, Tt	29°29' 103°29'	Eocene 41.3±2.5 m.y. (Daily, 1979)	Laccolith, peralkaline rhyolite and trachyte; stock, peralkaline trachyte; intruded Cretaceous Boquillas and Aguja Formations.	Barnes, 1979a; Daily, 1979
B-49	Tpr, Tr	29°27' 103°29'	Tertiary	Stock and sill, peralkaline rhyolite; laccolith and stock-laccolith?, rhyolite; intruded Cretaceous Buda Limestone, Del Rio Clay, and Boquillas and Aguja Formations.	Barnes, 1979a
B-50	Tb, Tpr	29°25' 103°25'	Tertiary	Sill?, basalt; laccolith and sill-laccolith, peralkaline rhyolite; intruded Cretaceous Boquillas Formation.	Barnes, 1979a
B-51	Tr	29°27' 103°23'	Tertiary	Laccolith, rhyolite, intruded Cretaceous Boquillas Formation.	Barnes, 1979a
B-52	Tt	29°29' 103°24'	Tertiary	Laccolith, trachyte, intruded Cretaceous Boquillas Formation.	Barnes, 1979a
B-53	Tm, Tb	29°29' 103°21'	Tertiary	Laccolith, monzonite?; and stock?, basalt; intruded Cretaceous Aguja Formation.	Barnes, 1979a
B-54	Tgb	29°26' 103°27'	Eocene 42.4±0.7 m.y. (F. W. McDowell, unpublished data)	Dome, gabbro, intruded Santa Elena Limestone.	Barnes, 1979a
B-55	Tr, Tpr, Tt	29°24' 103°30'	Oligocene and Eocene 26.7±1.9 m.y. (rhyolite), 39.6±2.1 m.y. (peralkaline rhyolite) (Daily, 1979)	Laccolith, rhyolite and peralkaline rhyolite; laccolith?, trachyte; intruded Cretaceous Aguja and Pen Formations.	Barnes, 1979a; Daily, 1979
B-56	Tpt, Tpr	29°20' 103°30'	Oligocene and Eocene 35.2±2.7 m.y. (south body) 37.5±2.6 m.y. 41.0±2.9 m.y. (north body, peralkaline rhyolite)	Laccoliths, peralkaline trachyte and peralkaline rhyolite, intruded Cretaceous Aguja and Pen Formations.	Barnes, 1979a; Daily, 1979
B-57	Tr, Tpt	29°24' 103°27'	Tertiary	Sill?, rhyolite and peralkaline trachyte, intruded Cretaceous Aguja Formation.	Barnes, 1979a
B-58	Ts	29°24' 103°25'	Tertiary	Sill, questionable in north one-half, syenite, intruded Cretaceous Boquillas and Pen Formations.	Barnes, 1979a; Maxwell and others, 1967

B-59	Tgb, Tb, Tt, Ts	29°25' 103°23'	Tertiary	Sills, gabbro, basalt, and trachyte; laccolith, syenite; intruded Cre- taceous Aguja and Javelina Formations.	Barnes, 1979a; Maxwell and others, 1967
B-60	Tpt	29°59' 103°02'	Tertiary	Dikes, peralkaline trachyte, intruded Pennsylvanian and Mississippian Tesnus Formation.	King, 1937
B-61	Tpt	29°51' 103°13'	Tertiary	Stocks, peralkaline trachyte, intruded Cre- taceous Glen Rose and Del Carmen Formations.	King, 1937
B-62	Tpt	29°53' 103°02'	Tertiary	Stock, peralkaline trachyte, intruded Cre- taceous Del Carmen Formation.	King, 1937
B-63	Tpt	29°49' 103°02'	Tertiary	Stock, peralkaline trachyte, surrounded by alluvium.	King, 1937
B-64	Tfs	29°49' 102°59'	Tertiary	Stock?, feldspathoidal syenite, intruded Cre- taceous Santa Elena Limestone.	Barnes, 1979a; King, 1937
B-65	Tfs	29°45' 102°51'	Tertiary	Sill?, feldspathoidal syenite, intruded Cre- taceous Santa Elena Limestone.	St. John, 1965
B-66	Tb	29°43' 103°00'	Tertiary	Sill?, stock at east end, basalt, intruded Cretaceous Boquillas Formation and Santa Elena Limestone.	St. John, 1965
B-67	Tb	29°39' 103°01'	Tertiary	Sill, basalt, intruded Cretaceous Boquillas Formation.	St. John, 1965

BREWSTER COUNTY (B) -- Continued
Big Bend National Park

B-68	Tgb	29°38' 103°11'	Tertiary	Sill, gabbro, intruded Cretaceous Aquija Formation.	Maxwell and others, 1967
B-69	Tgb	29°30' 103°05'	Tertiary	Sill, gabbro, intruded Cretaceous Boquillas Formation.	Maxwell and others, 1967
B-70	Tg	29°22' 103°04'	Tertiary	Laccolith, granite, intruded Cretaceous Boquillas and Pen Formations.	Maxwell and others, 1967
B-71	Tgb	29°26' 103°13'	Tertiary	Sill, gabbro, intruded Cretaceous Aguja Formation.	Maxwell and others, 1967
B-72	Ts	29°24' 103°14'	Tertiary	Sill, syenite, intruded Eocene Canoe Formation.	Maxwell and others, 1967
B-73	Tg	29°24' 103°12'	Tertiary	Laccolith, granite, intruded Cretaceous Aguja Formation and Eocene Hannold Hill Formation.	Maxwell and others, 1967
B-74	Tpt	29°23' 103°11'	Tertiary	Sill, peralkaline trachyte, intruded Eocene Hannold Hill Formation.	Maxwell and others, 1967

B-75	Tpt	29°23' 103°26'	Tertiary	Stock?, peralkaline trachyte, intruded Cretaceous Javelina Formation and tuffaceous sedimentary rocks of Tertiary Chisos Formation.	Maxwell and others, 1967
B-76	Ts, Tgb	29°23' 103°23'	Tertiary	Laccolith, syenite, and sill, gabbro, intruded Cretaceous Aguja Formation.	Maxwell and others, 1967
B-77	Tg	29°23' 103°19'	Tertiary	Laccolith and sill?, and sill at Painted Gap Hills; granite, intruded Cretaceous Aguja Formation.	Maxwell and others, 1967
B-78	Tt	29°21' 103°24'	Tertiary	Sill and three small stocks in southwest part, trachyte, intruded Cretaceous Aguja and Javelina Formations and, Tertiary Chisos Formation.	Maxwell and others, 1967
B-79	Tr	29°21' 103°21'	Tertiary	Laccolith, rhyolite, intruded Cretaceous Aguja Formation.	Maxwell and others, 1967
B-80	Tb, Tt, Ts	29°20' 103°22'	Tertiary	Sills, basalt, trachyte, and syenite; intruded Cretaceous Aguja Formation.	Maxwell and others, 1967
B-81	Ts	29°20' 103°16'	Oligocene 26.1±1.9 m.y. (Daily, 1979)	Laccolith, syenite, intruded Tertiary Chisos Formation.	Daily, 1979; Maxwell and others, 1967
B-82	Tr, Tpr	29°19' 103°12'	Oligocene 28.9±2.4 m.y. (rhyolite) (Daily, 1979)	Sills, rhyolite and peralkaline rhyolite, intruded Cretaceous Aguja Formation and Tertiary Chisos Formation.	Daily, 1979; Maxwell and others, 1967; Ogley, 1979
B-83	Tfs	29°19' 103°28'	Tertiary	Sill, feldspathoidal syenite, intruded Cretaceous Javelina Formation.	Maxwell and others, 1967
B-84	Ts, Tt	29°16' 103°25'	Tertiary	Dike, syenite, and stocks, trachyte, intruded Cretaceous Aguja Formation and Tertiary Chisos Formation.	Maxwell and others, 1967
B-85	Tpr	29°16' 103°19'	Oligocene 31.3±2.3, 36.8±2.5 m.y. (Daily, 1979)	Stock, peralkaline rhyolite, intruded Tertiary Chisos Formation.	Daily, 1979; Maxwell and others, 1967; Ogley, 1979
B-86	Tt	29°19' 103°14'	Tertiary	Laccolith, trachyte, intruded Tertiary Chisos Formation.	Maxwell and others, 1967; Ogley, 1979
B-87	Tpr, Tt, Tpt	29°17' 103°13'	Tertiary	Stocks, peralkaline rhyolite, trachyte, and peralkaline trachyte, intruded Tertiary Chisos and South Rim Formations.	Maxwell and others, 1967; Ogley, 1979
B-88	Tpr, Tr	29°18' 103°11'	Miocene 17.0±1.2 m.y. (rhyolite) (Daily, 1979)	Dikes, peralkaline rhyolite, and sill, rhyolite, mostly surrounded by alluvium; intruded Tertiary Canoe and Chisos Formations.	Daily, 1979; Maxwell and others, 1967

B-89	Tr	29°16' 103°10'	Tertiary	Stock and sill (east body), rhyolite, intruded Tertiary Chisos and Canoe Formations.	Maxwell and others, 1967
B-90	Tpr, Tt	29°15' 103°15'	Tertiary	Dike, peralkaline rhyolite, and stock, trachyte, intruded Tertiary Chisos Formation.	Maxwell and others, 1967; Ogley, 1979
B-91	Tm	29°15' 103°33'	Tertiary	Sill or laccolith, monzonite, intruded Cretaceous Aguja Formation.	Maxwell and others, 1967
B-92	Tpr	29°14' 103°25'	Oligocene 27.2±1.9 m.y. (Daily, 1979)	Stock, peralkaline rhyolite, intruded Tertiary Chisos Formation.	Daily, 1979; Maxwell and others, 1967
B-93	Tpr, Tr	29°11' 103°19'	Tertiary	Stock?, peralkaline rhyolite and rhyolite, intruded Tertiary Chisos Formation.	Maxwell and others, 1967
B-94	Tpr, Tr	29°13' 103°16'	Tertiary	Sill, peralkaline rhyolite and rhyolite, intruded Tertiary Chisos Formation.	Maxwell and others, 1967
B-95	Tpr	29°13' 103°14'	Tertiary	Dike-sill and sill, peralkaline rhyolite, intruded Tertiary Chisos Formation.	Maxwell and others, 1967
B-96	Tpr, Tgb	29°11' 103°16'	Tertiary	Stock, peralkaline rhyolite and sills, gabbro, intruded Cretaceous Aguja Formation and Tertiary Chisos Formations.	Maxwell and others, 1967
B-97	Tgb, Tpr, Tpt	29°10' 103°12'	Tertiary	Laccolith, gabbro; sill, peralkaline rhyolite; stock, peralkaline trachyte; intruded Tertiary Chisos Formation.	Maxwell and others, 1967
B-98	Ts, Tr	29°09' 103°17'	Tertiary	Stock?, syenite and stock, rhyolite, intruded Cretaceous Aguja Formation and Tertiary Chisos Formation.	Maxwell and others, 1967
B-99	Tgb, Tt	29°07' 103°15'	Tertiary	Sill, gabbro; dike, trachyte; intruded Cretaceous Aguja Formation.	Maxwell and others, 1967
B-100	Ts	29°11' 103°09'	Tertiary	Sill, syenite, intruded Cretaceous Aguja and Javelina Formations. Western outcrops surrounded by alluvium.	Maxwell and others, 1967
B-101	Tr	29°11' 103°10'	Tertiary	Laccolith, rhyolite, intruded Cretaceous Aguja Formation.	Maxwell and others, 1967
B-102	Tgb, Tr	29°07' 103°11'	Tertiary	Sill, gabbro, and sill?, rhyolite, intruded Cretaceous Aguja Formation.	Maxwell and others, 1967
B-103	Tr	29°13' 103°06'	Tertiary	Stock?, rhyolite, intruded Cretaceous Aguja Formation.	Maxwell and others, 1967
B-104	Tgb	29°11' 103°07'	Tertiary	Sill, gabbro, intruded Cretaceous Javelina Formation.	Maxwell and others, 1967

B-105	Tgb, Tr	29°05' 103°10'	Oligocene or Eocene 34.4±3.0 m.y. (gabbro) (F.W. McDowell, unpublished data)	Sill, gabbro and rhyo- lite, intruded Cretaceous Boquillas, Pen, and Aguja Formations.	Maxwell and others, 1967
B-106	Ts, Tgb, Tr	29°05' 103°07'	Tertiary	Sills, syenite, gabbro, and rhyolite, intruded Cretaceous Boquillas, Pen, and Aguja Formations.	Maxwell and others, 1967
B-107	Tb, Tgb	29°14' 103°44'	Oligocene 32.6±0.6 m.y. (basalt) (F.W. McDowell, unpublished data)	Sill, basalt and gabbro, intruded Cretaceous Boquillas Formation.	Maxwell and others, 1967
B-108	Tb, Ts, Tgb	29°11' 103°35'	Tertiary	Sills and dikes, basalt and syenite; sills, gabbro; syenite, intruded Cretaceous Aguja and Pen Formations.	Maxwell and others, 1967

PRESIDIO COUNTY (P)

P-1	Tqm	29°58' 104°22'	Oligocene 36.7±0.6, 36.5±0.6 m.y. (C.D. Henry, unpublished data)	Stock (resurgent dome), quartz monzonite, propy- litic alteration, intruded Pennsylvanian and Permian sandstone, shale, and limestone, and Tertiary lava flows.	Duex and Henry, 1981
P-2	Tpr, Tt	29°59' 104°30'	Tertiary	Stocks, peralkaline rhyolite and trachyte (southwest outcrop); dike (southeast outcrop), trachyte, intruded mostly lava flows of Tertiary Chinati Mountains Group.	Amsbury, 1958; Cepeda and Henry, 1983
P-3	Tqm	29°55' 104°30'	Oligocene 32.0±0.7 m.y. (Cepeda and Henry, 1983)	Stock (resurgent dome), quartz monzonite, intruded mostly lava flows of Tertiary Chinati Mountains Group.	Amsbury, 1958; Cepeda and Henry, 1983
P-4	Tpr	29°58' 105°25'	Oligocene 32.3±0.7 m.y.	Stocks-dikes, peralkaline rhyolite, intruded mostly lava flows of Tertiary Chinati Mountains Group.	Cepeda and Henry, 1983
P-5	Tr	29°54' 104°22'	Tertiary	Domes-flows and dome (smaller outcrop), rhyolite, intruded mostly lava flows of Tertiary Chinati Mountains Group.	Cepeda and Henry, 1983
P-6	Tqm	29°48' 104°24'	Tertiary	Stock and stock-sills, quartz monzonite, intruded Permian sand- stone and limestone.	Cepeda and Henry, 1983; Price and Henry, 1982
P-7	Tt	29°48' 104°22'	Tertiary	Sills, trachyte, intruded Permian sandstone and limestone, and Cretaceous Shafter and Del Carmen Formations.	Cepeda and Henry, 1983; Rix, 1953

P-8	Tr	29°45' 104°16'	Tertiary	Laccolith, rhyolite, intruded sandstone and shale of Permian Ross Mine Formation, sandstone of Cretaceous Presidio Formation, and Tertiary volcanic rocks.	Rix, 1953
P-9	Tpr	29°46' 104°09'	Oligocene 34.3±0.7 m.y. (C.D. Henry, unpublished data)	Stock-laccolith?, peralkaline rhyolite, surrounded by alluvium.	Hardisty, 1982
P-10	Tt	29°43' 104°12'	Tertiary	Stock?, trachyte, intruded Tertiary volcanic rocks.	Dietrich, 1965
P-11	Tb	29°37' 104°09'	Miocene 18.0±0.4 m.y. (McDowell, 1979)	Stock, basalt, intruded lava flows of Tertiary Rawls Formation.	Dietrich, 1965; McDowell, 1979
P-12	Tt	30°02' 104°03'	Tertiary	Dome or laccolith, trachyte, intruded Tertiary volcanic rocks.	Dietrich, 1965
P-13	Tt	30°28' 104°06'	Tertiary	Sill-dike, trachyte, intruded Tertiary volcanic rocks.	McKnight, 1969
P-14	Tb	29°25' 104°06'	Tertiary	Sill?, basalt, intruded Tertiary volcanic rocks.	McKnight, 1969
P-15	Ts	29°27' 104°00'	Oligocene 26.8±0.4 m.y. (F.W. McDowell, unpublished data)	Stock, syenite, intruded Tertiary volcanic rocks.	McKnight, 1969
P-16	Tb	29°50' 103°56'	Tertiary	Sill?, basalt, intruded Tertiary volcanic rocks.	Barnes, 1979a
P-17	Tb	29°48' 103°57'	Tertiary	Stock, basalt, intruded Tertiary volcanic rocks and tuffaceous sediments of Oligocene Tascotal Formation.	Barnes, 1979a
P-18	Tb	29°45' 103°57'	Tertiary	Cone sheet, basalt, intruded Tertiary volcanic rocks and tuffaceous sediments of Oligocene Tascotal Formation.	Erickson, 1953
P-19	Tb	29°43' 103°59'	Tertiary	Stock, basalt, intruded Tertiary volcanic rocks and tuffaceous sediments of Oligocene Tascotal Formation.	Erickson, 1953
P-20	Tb, Ts	29°45' 103°50'	Tertiary	Dikes, basalt and syenite, intruded Tertiary volcanic rocks and tuffaceous sediments of Tertiary Pruett Formation.	Erickson, 1953
P-21	Ts	29°37' 103°48'	Tertiary	Dome, syenite, intruded volcanic rocks of Oligocene Mitchell Mesa Welded Tuff.	Erickson, 1953
P-22	Ts	29°31' 103°59'	Tertiary	Dike and domes, syenite, intruded lava flows of Tertiary Rawls Formation.	Erickson, 1953

P-23	Tpr	29°30' 103°48'	Oligocene 35.2±0.8 m.y. (southeast outcrop) (F.W. McDowell, unpublished data)	Stock, peralkaline rhyolite, intruded Tertiary volcanic rocks and lava flows of Tertiary Rawls Formation.	Erickson, 1953
P-24	Tr	29°27' 103°48'	Oligocene 37.5±0.8 m.y. (sill) (F.W. McDowell unpublished data)	Sill and central stock (laccolithic dome), rhyolite, intruded Cretaceous Glen Rose Formation and lower Paleozoic sandstone, shale, and limestone.	Lonsdale, 1940
P-25	Tt, Tb, Tpr	29°28' 103°53'	Tertiary	Dome, trachyte and basalt; stock, peralkaline rhyolite into Tertiary volcanic rocks and lava flows of Tertiary Rawls Formation.	McKnight, 1969
P-26	Tt, Tpr	29°29' 103°57'	Tertiary	Dome, trachyte; laccolith?, peralkaline rhyolite, intruded Tertiary volcanic rocks.	McKnight, 1969
P-27	Tgb, Tb	29°24' 104°00'	Tertiary	Dome, gabbro and basalt, intruded Tertiary volcanic rocks.	McKnight, 1969
P-28	Tb	29°25' 103°56'	Tertiary	Dome, basalt, intruded Tertiary volcanic rocks.	McKnight, 1969
P-29	Ts	29°19' 103°52'	Tertiary	Laccoliths, syenite, intruded Tertiary volcanic rocks and Cretaceous Boquillas Formation.	McKnight, 1969
P-30	Tr	29°19' 103°48'	Tertiary	Sill, rhyolite, intruded Cretaceous Boquillas Formation.	McKnight, 1969

REFERENCES CITED

- Albritton, C. C., Jr., and Smith, J. F., Jr., 1965, Geology of the Sierra Blanca area, Hudspeth County, Texas: U.S. Geological Survey Professional Paper 479, 131 p.
- Amsbury, D. L., 1958, Geologic map of Pinto Canyon area, Presidio County, Texas: Austin, University of Texas, Bureau of Economic Geology Geologic Quadrangle Map 22, scale 1:63,360.
- Anderson, J. E., Jr., 1968, Igneous geology of the central Davis Mountains, Jeff Davis County, Texas: Austin, University of Texas, Bureau of Economic Geology Geologic Quadrangle Map 36, scale 1:62,500.
- Barker, D. S., 1977, Northern Trans-Pecos magmatic province--Introduction and comparison with the Kenya Rift: Geological Society of America Bulletin, v. 88, no. 10, p. 1421-1427.
- 1979, Magmatic evolution in the Trans-Pecos province, in Walton, A. W., and Henry, C. D., eds., Cenozoic geology of the Trans-Pecos volcanic field of Texas: Austin, University of Texas, Bureau of Economic Geology, Guidebook 19, p. 4-9.
- Barker, D. S., Long, L. E., Hoops, G. K., and Hodges, F. N., 1977, Petrology and Rb-Sr isotope geochemistry of intrusions in the Diablo Plateau, northern Trans-Pecos magmatic province, Texas and New Mexico: Geological Society of America Bulletin, v. 88, no. 10, p. 1437-1446.
- Barnes, V. E., 1968, Geologic atlas of Texas, Van Horn-El Paso sheet: Austin, University of Texas, Bureau of Economic Geology map, scale 1:250,000.
- 1979a, Geologic atlas of Texas, Emory Peak-Presidio sheet: Austin, University of Texas, Bureau of Economic Geology map, scale 1:250,000.
- 1979b, Geologic atlas of Texas, Marfa sheet: Austin, University of Texas, Bureau of Economic Geology map, scale 1:250,000.
- 1982, Geologic atlas of Texas--Fort Stockton sheet: Austin, University of Texas, Bureau of Economic Geology map, scale 1:250,000.
- Bedinger, M. S., Sargent, K. A., and Reed, J. E., 1984, Geologic and hydrologic characterization and evaluation of the Basin and Range province relative to the disposal of high-level radioactive waste--Part I, Introduction and guidelines: U.S. Geological Survey Circular 904-A, 16 p.
- Cepeda, J. C., and Henry, C. D., 1983, Oligocene volcanism and multiple caldera formation in the Chinati Mountains, Presidio County, Texas: Austin, University of Texas, Bureau of Economic Geology Report of Investigations 135, 32 p.
- Daily, M., 1979, Age relations in alkaline rocks from the Big Bend region, Texas, in Walton, A. W., and Henry, C. D., eds., Cenozoic geology of the Trans-Pecos volcanic field of Texas: Austin, University of Texas, Bureau of Economic Geology Guidebook 19, p. 92-96.
- Dasch, E. J., Armstrong, R. L., and Clabaugh, S. E., 1969, Age of Rim Rock dike swarm, Trans-Pecos Texas: Geological Society of America Bulletin, v. 80, no. 9, p. 1819-1824.

- Denison, R. E., and Hetherington, E. A., 1969, Basement rocks in far west Texas and south-central New Mexico, in Kottlowski, F. E., and LeMone, D. V., eds., Border stratigraphy symposium: New Mexico Bureau of Mines and Mineral Resources Circular 104, p. 1-16.
- Dietrich, J. W., 1965, Geologic map of Presidio area, Presidio County, Texas: Austin, University of Texas, Bureau of Economic Geology Geologic Quadrangle Map 28, scale 1:48,000.
- Duex, T. W., and Henry, C. D., 1981, Calderas and mineralization, volcanic geology and mineralization in the Chinati caldera complex, Trans-Pecos Texas: Austin, University of Texas, Bureau of Economic Geology Geological Circular 81-2, 14 p.
- Eifler, G. K., Jr., 1943, Geology of the Santiago Peak Quadrangle, Texas: Geological Society of America Bulletin, v. 54, no. 10, p. 1613-1643.
- _____, 1951, Geology of the Barrilla Mountains, Texas: Geological Society of America Bulletin, v. 62, no. 4, p. 339-353.
- Erickson, R. L., 1953, Stratigraphy and petrology of the Tascotal Mesa Quadrangle, Texas: Geological Society of America Bulletin, v. 64, no. 12, p. 1353-1386.
- Goldich, S. S., and Elms, M. A., 1949, Stratigraphy and petrology of the Buck Hill Quadrangle, Texas: Geological Society of America Bulletin, v. 60, no. 7, p. 1133-1182.
- Gorski, D. E., 1970, Geology and trace transition element variation of the Mitre Peak area, Trans-Pecos Texas: Austin, University of Texas, unpublished M.S. thesis, 201 p.
- Hardisty, R. D., 1982, Geology of the igneous rocks of the Cienega southwest Quadrangle, Presidio County, Texas: Canyon, West Texas State University, unpublished M.A. thesis, 121 p.
- Hay-Roe, Hugh, 1957, Geologic map of the Wylie Mountains and vicinity, Culberson and Jeff Davis Counties, Texas: Austin, University of Texas, Bureau of Economic Geology Geologic Quadrangle Map 21, scale 1:48,000.
- Henry, C. D., and McDowell, F. W., 1982, Timing, distribution, and estimates of volumes of silicic volcanism in Trans-Pecos Texas (abs.): Geological Society of America Abstracts with Programs, v. 14, no. 3, p. 113.
- Hoffer, J. M., 1970, Petrology and mineralogy of the Campus Andesite pluton, El Paso, Texas: Geological Society of America Bulletin v. 81. no. 7, p. 2129-2135.
- King, P. B., 1937, Geology of the Marathon region, Texas: U.S. Geological Survey Professional Paper 187, 148 p.
- _____, 1965, Geology of the Sierra Diablo region, Texas: U.S. Geological Survey Professional Paper 480, 179 p.
- Lonsdale, J. T., 1940, Igneous rocks of the Terlingua-Solitario region, Texas: Geological Society of America Bulletin. v. 51. no. 10, p. 1539-1636.
- Maxwell, R. A., Lonsdale, J. T., Hazzard, R. T., and Wilson, J. A., 1967, Geology of Big Bend National Park, Brewster County, Texas: Austin, University of Texas Publication 6711, 320 p.
- McAnulty, W. N., 1955, Geology of Cathedral Mountain Quadrangle, Brewster County, Texas: Geological Society of America Bulletin, v. 66, no. 5, 531-578.

- McDowell, F. W., 1979, Potassium-argon dating in the Trans-Pecos Texas volcanic field, in Walton, A. W., and Henry, C. D., eds., Cenozoic geology of the Trans-Pecos volcanic field of Texas: Austin, University of Texas, Bureau of Economic Geology Guidebook 19, p. 10-18.
- McKnight, J. R., 1969 [1970], Geologic map of Bofecillos Mountains area, Trans-Pecos Texas: Austin, University of Texas, Bureau of Economic Geology Geologic Quadrangle Map 37, scale 1:48,000.
- Moon, C. G., 1953, Geology of Agua Fria Quadrangle, Brewster County, Texas: Austin, University of Texas, Bureau of Economic Geology Report of Investigations 15, 45 p.
- Ogley, D. S., 1979, Eruptive history of the Pine Canyon caldera, Big Bend Park, in Walton, A. W., and Henry, C. D., eds., Cenozoic geology of the Trans-Pecos volcanic field of Texas: Austin, University of Texas, Bureau of Economic Geology Guidebook 19, p. 67-71.
- Parker, D. F., 1976, Petrology and eruptive history of an Oligocene trachytic shield volcano, near Alpine, Texas: Austin, University of Texas, unpublished Ph.D. dissertation, 183 p.
- , 1983, Origin of the trachyte-quartz trachyte-peralkalic rhyolite suite of the Oligocene Paisano volcano, Trans-Pecos Texas: Geological Society of America Bulletin, v. 94, no. 5, p. 614-629.
- Price, J. G., and Henry, C. D., 1982, Porphyry copper-molybdenum deposit associated with the Chinati Mountains caldera, Trans-Pecos Texas (abs.): Geological Society of America Abstracts with Programs, v. 41, no. 7, p. 593.
- Ramsey, J. W., 1961, Perdiz Conglomerate, Presidio County, Texas: Austin, University of Texas, unpublished M.S. thesis, 88 p.
- Rix, C. C., 1953, Geology of Chinati Peak Quadrangle, Presidio County, Trans-Pecos Texas: Austin, University of Texas, unpublished Ph.D. dissertation, 188 p.
- Sargent, K. A., and Bedinger, M. S., 1985, Geologic and hydrologic characterization and evaluation of the Basin and Range province relative to the disposal of high-level radioactive waste--Part II, Geologic and hydrologic characterization: U.S. Geological Survey Circular 904-B, [in press].
- St. John, B. E., 1965, Geologic map of Black Gap area, Brewster County, Texas: Austin, University of Texas, Bureau of Economic Geology Geologic Quadrangle Map 30, scale 1:62,500.
- Sharp, J. E., 1979, Cave Peak, a molybdenum-mineralized breccia pipe complex in Culberson County, Texas: Economic Geology, v. 74, no. 3, p. 517-534.
- Smith, M. A., 1975, Geology and trace element geochemistry of the Fort Davis area, Trans-Pecos Texas: Austin, University of Texas, unpublished Ph.D. dissertation, 231 p.
- Thomann, W. F., 1981, Ignimbrites, trachytes, and sedimentary rocks of the Precambrian Thunderbird Group, Franklin Mountains, El Paso, Texas: Geological Society of America Bulletin, v. 92, no. 2, p. 94-100.

- Twiss, P. C., 1959, Geology of Van Horn Mountains, Texas: Austin, University of Texas, Bureau of Economic Geology Geologic Quadrangle Map 23, scale 1:48,000.
- Underwood, J. R., Jr., 1963, Geology of Eagle Mountains and vicinity, Hudspeth County, Texas: Austin, University of Texas, Bureau of Economic Geology Geologic Quadrangle Map 26, scale 1:48,000.
- Wightman, R. B., 1953, Geology of Valentine area, Jeff Davis County, Texas: Austin, University of Texas, unpublished M.S. thesis, 89 p.
- Wise, H. M., 1977, Geology and petrology of igneous intrusions of northern Hueco Mountains, El Paso and Hudspeth Counties, Texas: El Paso, University of Texas, unpublished M.S. thesis, 47 p.
- Yates, R. G., and Thompson, G. A., 1959, Geology and quicksilver deposits of the Terlingua district, Texas: U.S. Geological Survey Professional Paper 312, 114 p.