DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

TO ACCOMPANY
WRIR 83-4121-E

MAP SHOWING OUTCROPS OF ASH-FLOW TUFFS, BASIN AND RANGE PROVINCE AND VICINITY, TRANS-PECOS TEXAS

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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).

The map report on the ash-flow tuffs of Trans-Pecos Texas was prepared from published maps and reports and from recent work in progress by geologists of the Texas Bureau of Economic Geology, and was compiled utilizing the project guidelines of Sargent and Bedinger (1984). The map shows the outcrops and localities of measured thicknesses of the ash-flow tuffs that resulted from silicic volcanism 38 to 28 million years ago (Henry and McDowell, 1982). Locally, however, some thin, inadequately studied tuffs of limited distribution have been excluded from the map. Such tuffs are reported in the "lower rhyolite" in the Eagle Mountains (Underwood, 1963), in the southern Davis Mountains (Parker, 1977), within parts of the Shely Group and Morita Ranch Formation in the Chinati Mountains (Cepeda and Henry, 1983), and in the Rawls Formation in the Bofecillos Mountains (McKnight, 1969). The distribution of most ash-flow tuffs in the northern Davis and Wylie Mountains is not well known. The Chambers Tuff, largely tuffaceous sedimentary rocks, is reported to contain several ash-flow tuffs (Walton, 1972), but their distribution is poorly documented. Metamorphosed ash-flow tuffs of Precambrian age in the Thunderbird Group in the Franklin Mountains (Thomann, 1981) and in the Carrizo Mountain Group near Van Horn (Rudnick , 1983) were not included on the map. In some areas studied in reconnaissance, the definitive lithology of some volcanic units described as lava flows or tuffs has not been determined.

In the Description of Map Units, the general location, caldera source and volume of tuff, isotopic age, if available, lithologic data, and the reference sources for each geologic unit are described. The nomenclature of the geologic units is from published reports and does not necessarily conform to U.S. Geological Survey usage.

DESCRIPTION OF MAP UNITS

[To convert meters (m), to feet, multiply meters by 3.281; to convert cubic kilometers (km^2) to cubic miles, multiply by 0.2399]

Map symbol	Location: Map sheet and county	Geologic unit	Source of tuff	Volume of tuff (km^2)	K-Ar age in millions of years (m.y.) and number of dated samples	Comments	References
Ts	Map sheet 3, Presidio County	Santana Tuff	Caldera in Mexico	60 to 150 km	28.2, 28.3, and 29.8 m.y. (Gregory, 1981)	Outcrop centers around Santana Mesa, but the tuff is more widespread in Mexico.	Chuchla, 1981; Gregory, 1981; McKnight, 1969
Tsc	Map sheet 3, Presidio County	San Carlos Tuff of Chuchla (1981)	Caldera in Mexico	50 to 150 km	30.2 and 30.6 m.y. (Gregory, (1981)	Outcrops on south flank of Santana Mesa. Tuff is possibly all caldera fill.	Chuchla, 1981; Gregory, 1981; McKnight, 1969
Tcm6	Map sheet 3, Presidio County	Chinati Mountains Group, upper rhyolite	Chinati Mountains caldera	5 to 20 km	32.5 m.y. (McDowell, 1979)	Forms part of caldera fill.	Cepeda, 1979; Cepeda and Henry, 1983; McDowell, 1979
Tmm	Map sheets 2 and 3, Presidio and Brewster Counties	Mitchell Mesa Rhyolite	Chinati Mountains caldera	As much as 1,000 km outside of caldera; 100 to 400 km inside caldera	32.3 m.y. average age (18) (McDowell, 1979)	Most extensive and volumetrically the largest ash-flow in Trans-Pecos Texas. Extends into Mexico. Named Mitchell Mesa Rhyolite by Goldrich and Elms (1949) but later called Welded Tuff by Barnes (1979a, 1979b, 1982).	Barnes, 1979a, 1979b, 1982; Burt, 1970; Cepeda and Henry, 1983; Goldrich and Elms, 1949; McDowell, 1979
Tsr	Map sheet 3, Brewster County	South Rim Formation	Pine Canyon caldera	10 to 20 km	32.7 to 33.3 m.y., (4) (F.W. McDowell, University of Texas, Austin, unpublished data)	Crops out in Big Bend National Park. Formation comprised of several ash-flow tuffs and one lava flow.	Maxwell and others, 1967; Ogley, 1979

Tmes	Map sheet 3, Brewster and Presidio Counties	Mule Ear Spring Tuff Member, Chisos Formation	Sierra Quemada caldera(?)	10 to 30 km	33.7 and 34.1 m.y. (F.W. McDowell; unpublished data; Gregory, 1981)	Crops out in Big Bend National Park, near Santana Mesa, and to the south in Mexico.	Chuchla, 1981; Gregory, 1981; Maxwell and others, 1967; McKnight, 1969
Tsp	Map sheet 1, Hudspeth County	Square Peak Volcanics	Quitman Mountains caldera	<20 km	~35 m.y. (McDowell, 1979)	Forms caldera fill that probably is only partly ash-flow tuff. Age is that of the Quitman Mountains pluton, which probably is resurgent dome in the caldera.	Albritton and Smith, 1965; Hobbs and Hoffer, 1980; McDowell, 1979
Tur	Map sheet 2, Hudspeth County	Upper rhyolite	Eagle Mountains caldera	10 to 30 km	36.6 m.y. (C.D. Henry, Texas Bureau of Economic Geology, unpublished data)	Caldera fill of rhyolite tuff, densely welded in lower part, grades into a poorly welded and more lithic upper part. Probably in part correlative with unit Tem.	Hoffer and others, 1980; Underwood, 1963
Ts6-Tm4	Map sheets 2 and 3, Presidio County	Shely Group, unit 6, and Morita Ranch Formation, unit 4, lower part	Chinati Mountains area	10 to 20 km	34.4 and 34.9 m.y. (F.W. McDowell, and C.D. Henry, unpublished data).	Unit 6 of Shely Group and the lower part of unit 4 of the Morita Ranch Formation are correlative ash-flow tuffs, probably derived from small caldera now obscured by the Chinati Mountains caldera.	Amsbury, 1958; Cepeda and Henry, 1983; Rix, 1953
Tem	Map sheet 2, Hudspeth and Jeff Davis Counties	Unnamed ash-flow tuffs	Eagle Mountains caldera	30 to 100 km	35.2 to 37.7 m.y., (3) (McDowell, 1979)	Correlative ash-flows tuffs, including the lower, middle, and upper ignimbrites in southern Quitman Mountains (Jones and Reaser, 1970); tuffs in lower part of Garren Group in Indio Mountains (not shown on map) in southeast corner of Hudspeth County (Underwood, 1963); and an ignimbrite (Tg6) in upper part of Garren Group in Van Horn Mountains (Twiss, 1959). Unit in part correlative with upper rhyolite (Tur).	Jones and Reaser, 1970; Twiss, 1959; Underwood, 1963

Tm3	Map sheet 3, Presidio County	Morita Ranch Formation, unit 3	Chinati Mountains area(?)	2 to 15 km	33.1 m.y. (C.D. Henry, unpublished data)	Age of this unit relative to age of unit Ts6-Tm4 is uncertain.	Cepeda and Henry 1983; Dietrich, 1965; Rix, 1953
Thl	Map sheet 2, Culberson, Jeff Davis, and Hudspeth Counties	High Lonesome Tuff	Caldera in Van Horn Mountains	4 to 15 km	38.0 m.y. (C.D. Henry, unpublished data)	In the Van Horn Mountains and vicinity, beds formerly assigned to the Pantera Trachyte, which is a series of lava flows in its type area in the Wylie Mountains (Hay-Roe, 1957), are ash-flow tuff and are called the High Lonsome Tuff by Henry and Price (1985). C.D. Henry and J.G. Price (unpublished field data) also recognize High Lonesome Tuff at several localities mapped as Pantera Tuff in the Wylie Mountains area, but the distribution of the tuff relative to the total extent of the Pantera is unknown. Consequently, no outcrops of the High Lonsome Tuff are shown in the Wylie Mountains area on this map.	Hay-Roe, 1957; Henry and Price, 1985; Twiss, 1959; Underwood, 1963
Twc	Map sheet 2, Jeff Davis and Presidio Counties	Wild Cherry Formation	Central Davis Mountains			Crops out in the Davis Mountains, where it is composed of at least two separate ash-flow tuffs.	Anderson, 1968 Parker and McDowell, 1979
Tbs	Map sheet 2, Jeff Davis, Presidio, Reeves, and Pecos Counties	Barrel Springs Formation	Central Davis Mountains		36.0 to 36.7 m.y., (4) (Parker and McDowell, 1979)	In Davis Mountains is composite unit of several ash-flow tuffs and minor tuffaceous sedimentary rocks and lava flows.	Anderson, 1968 Parker and McDowell, 1979

Twb	Map sheet 2, Jeff Davis County	Wild Cherry and Barrel Springs Formations, undivided	Central Davis Mountains	675 km		The Wild Cherry and Barrel Springs are lithologically similar, and are mapped together where no intervening formation is present.	Anderson, 1968 Parker and McDowell, 1979
Tg	Map sheets 1 and 2, Jeff Davis, Reeves, and Pecos Counties	Gomez Tuff	Buckhorn caldera	220 km	36.4 to 38.7 m.y., (6) (Parker and McDowell, 1979)	Widespread in Davis Mountains and vicinity. Together with the Buckshot Ignimbrite, is oldest ash-flow tuff in Trans-Pecos Texas.	Parker, 1982; Parker and McDowell, 1979
Tbu	Map sheet 2, Presidio, Jeff Davis, Culberson, and Hudspeth Counties	Buckshot Ignimbrite	Infiernito caldera	30 to 40 km	37.0 to 37.9 m.y., (3) (McDowell, 1979; C.D. Henry, unpublished data)	Mainly in the Sierra Vieja and Van Horn Mountains, but some outcrops in Mexico. Together with the Gomez Tuff is oldest tuff in Trans-Pecos Texas.	Anderson, 1975 McDowell, 1979
Tin	Map sheet 2, Presidio County	Unnamed ash-flow tuff	Infiernito caldera	40 to 60 km	~37 m.y.	Fill in part of the Infiernito caldera. Probably correlative with the Buckshot Ignimbrite.	Duex and Henry, 1981

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