DESCRIPTION OF MAP UNITS

PALEOZOIC ROCKS

Pms SANDIA FORMATION (Ps) and Sandia and Madera Formations (Pms) of Baltz (1972) (PENNSYLVANIAN)--Sandia Formation is composed of sandstone and conglomeratic sandstone; interbedded dark-gray shale, sandy shale, shaly limestone, and a few thick beds of limestone; locally contains coaly shale near base. Madera Formation (lower member only) is composed of extensive thick strata of fossiliferous marine limestone, interbedded dark-gray shale, and thin to thick sandstone which is quartzose in lower part and arkosic in upper part. Where carbonate rocks of Terrero and Espiritu Santo Formations are absent, unit may locally include the del Padre Sandstone Member of the Espiritu Santo Formation

Mte TERRERO AND ESPIRITU SANTO FORMATIONS (MISSISSIPPIAN)--Terrero Formation composed of sandy clastic crossbedded limestone, gray massive crystalline limestone, and limestone breccia. Espiritu Santo Formation composed of dark-gray limestone and dolomite, sandy limestone, and thin to thick basal quartz sandstone and other clastic rocks of the Del Padre Member. These formations are no more than about 60 m thick, and at least the carbonate members are absent in the northern part of the area (distribution in part from Miller and others, 1963)

Pzs UNIDENTIFIED SANDSTONE AND CONGLOMERATE (PALEOZOIC)--Largely basal Sandia Formation, but possibly locally the basal Del Padre Sandstone Member of the Espiritu Santo Formation

PRECAMBRIAN ROCKS

Predominantly intrusive rocks. Correlation across Pecos-Picuris fault uncertain

sy Syenite and associated melasyenite--Syenite, pink medium- or fine-grained rock composed of closely packed rounded or "tabby" crystals of perthitic microcline with 10-15 percent of complexly intergrown hornblende and (or) biotite in clots with magnetite. Alkali feldspars enclose sparse small crystals of plagioclase and biotite. Accessory minerals are apatite, allanite, sphene, and zircon. Melasyenite, dark-gray massive rock composed of intergrown blocky clinopyroxene and biotite, or hornblende and biotite, and about 30 percent of integranular alkali feldspar. Accessory minerals are apatite, allanite, sphene, and zircon

p Pegmatite dike

Areas underlain by abundant pegmatite dikes

g Granitic rocks, undivided--Granite, granodiorite, and tonalite

Pink coarse-grained or medium-grained granite is widely exposed along Rio Mora, Pecos River, and along and west of Pecos-Picuris fault. Aplitic in small bodies in southeast. Massive or with faint to conspicuous secondary foliation. Commonly has 2 mm to 1 cm equant grains of quartz in a coarse matrix of microcline, albite, quartz, and a few percent of clotted biotite; sparse sericite and rare garnet. Apparently grades to quartz porphyries south of Macho Canyon in western terrane; and in eastern tributaries to Rio Mora and head of Bear Creek in southern terrane.

Light-gray fine-grained muscovite granite is abundant in and near migmatitic gneisses of western terrane.

Granodiorite and tonalite are widely exposed in western terrane--typically gray, medium grained, and well foliated, having flattened clots of biotite and possibly hornblende

ggn Mixed pink granitic rocks and layered gneisses near Hermit Peak in southern terrane

ggq, ggqf, ggf Granitic rocks of hypabyssal aspect--Quartz porphyry (ggq), quartz-feldspar porphyry (ggqf), and fine-grained granophyre (ggf)

Quartz porphyries are pink and massive or with a faint to conspicuous secondary foliation. In massive rocks, equant quartz phenocrysts about 2 mm across are in a matrix of poikilitic alkali feldspar, sparse opaque minerals, secondary muscovite, and rare garnet. In foliated rocks quartz phenocrysts are flattened to thin lenses 1 cm or so long. This foliation is parallel to intrusive contacts and is not cataclastic; possibly formed by subsolidus recrystallization under stress. The foliated rock is locally a greenish "quartz-eye" clayey phyllite, where weathered below Paleozoic unconformity.

Granophyre is associated with and similar to massive quartz porphyry, but without quartz phenocrysts.

Quartz-feldspar porphyry was found only in the small body 3 km west of Pecos Baldy. Has deformed 2 mm phenocrysts of quartz and perthitic alkali feldspar in a fine-grained schistose granular matrix of quartz, alkali feldspar, foliated secondary muscovite, and scattered crystals of chloritized biotite, and 1 or 2 percent of magnetite; accessory minerals are sparse apatite, allanite, and sphene

qd, qdai Quartz diorite, tonalite, and trondhjemite (qd) in scattered intrusive bodies and in inferred subvolcanic intrusive complex; where mixed with subordinate intrusive amphibolite (qdai).

The trondhjemite is typically well foliated, pale gray and medium to fine grained; composed of predominant sodic oligoclase; about 25 percent of quartz, and less than 10 percent each of microcline and biotite; zircon is a sparse accessory mineral.

The tonalite is similar to trondhjemite, but is darker, having more biotite and perhaps hornblende, whereas the quartz diorite has less quartz, and as much as 20 percent total biotite and hornblende. Accessory minerals are magnetite, sphene, allanite, zircon, apatite, epidote, and rare garnet

ai, aiqd, aif Largely intrusive amphibolite (ai) mixed with subordinate quartz diorite and related rocks (aiqd) of inferred subvolcanic intrusive suite. The amphibolite is dark, typically massive or foliated, and not conspicuously layered, but commonly mesh veined with quartz diorite or lighter rocks; visibly crystalline, grains about 1 mm in size; composed largely of plagioclase and hornblende; locally has abundant relict 1 cm phenocrysts of plagioclase (aif)

Migmatitic gneisses of western Precambrian terrane

gnb, gnba, gnbf Biotite gneiss--Sillimanitic biotite gneiss, two mica gneiss and schist, and biotite-quartz-plagioclase gneiss (gnb); interlayered with amphibolite (gnba), or with felsic gneiss (gnbf)

gnf, gnfa, gnfb Felsic gneiss--Typically light-gray, layered or thinly laminated biotite-quartz-feldspar gneiss, locally with sparse hornblende or muscovite (gnf), interlayered with abundant amphibolite (gnfa), or with biotite gneiss (gnfb). Probably largely felsic metavolcanic in origin

a Amphibolite of basaltic or diabasic or mixed origin

Stratified rocks of the southern Precambrian terrane

sh Pelitic schist (metashale)--Predominantly muscovite schist or two mica schists with garnet, staurolite, or sillimanite in accord with metamorphic grade; commonly interbedded with feldspar-rich metagraywacke of probable volcanoclastic origin

sha, shm Interlayered pelitic schist and layered or massive basaltic amphibolite (sha); poorly bedded chloritic amphibole schist (shm), probably mafic metashale derived from basaltic tuff

q Quartzite--Occurs only as isolated thin beds in southern terrane, in part a facies of siliceous iron-formation

cs Calc-silicate rocks and marble--Thinly bedded or laminated impure metalimestone, calcareous metasiltstone, and marble composed of amphibole, diopside, grossular, calcic plagioclase, clinozoisite, epidote, and calcite

qf, qfa Quartz-feldspar granofels (qf); largely feldspathic metasandstone, commonly interbedded with metabasaltic amphibolite (qfa). The granofels is fine grained gray, or greenish gray to pale orange, and composed of quartz, somewhat smaller amounts of potassic and sodic feldspar, and small amounts of biotite, muscovite, epidote, and garnet; detrital magnetite, zircon, and apatite may be distributed along bedding; locally has porphyroblasts of potassium feldspar. The rocks typically are faintly bedded or laminated; locally conspicuously crosslaminated

cgq, cgf, cg, cgp Metaconglomerate (cg); quartz metaconglomerate (cgq) with clasts of quartzite and quartz-rich metasandstone; probable tuffaceous metaconglomerate (cgf) having feldspar-rich clasts and matrix and few quartzite clasts; polymictic metaconglomerate (cgp) containing small boulders of feldspathic granofels, felsite, amphibolite, and iron-formation in a matrix of chlorite-amphibole schist; metamudflow breccia in Pecos River canyon (cgm) containing angular fragments of metasedimentary rocks in a pelitic schist matrix

vm, Fe, r, ab Mixed metavolcanic rocks (vm)--Metarhyolite or metadacite (r); metabasalt (ab); iron-formation (Fe). Includes domes, pyroclastic deposits and minor interbedded metashale and metagraywacke. Subdivided where mapped in detail along traverse lines

Fe Iron-formation--typically crystalline metachert with sharply defined magnetite-rich laminations; locally hematitic or pyritic

r, rt Metarhyolite or silicic metadacite (r), and tuffaceous metarhyolite or metadacite (rt). The silicic rock along Doctor Creek is dense, almost glassy, and has scattered blocky phenocrysts of sodic plagioclase as much as 1 mm long in a matrix of much finer grained quartz, potassium feldspar, sparse biotite, and magnetite, and clots of polycrystalline quartz and sparse intergrown deep-glue-green hornblende. The plagioclase contains scattered epidote, indicating a more calcic original composition. The tuff along Doctor Creek has blocky to rounded crystals of sodic plagioclase as much as 5 mm across in an unsorted clastic matrix of quartz, feldspar, and magnetite and metamorphic biotite and sparse hornblende; some of the feldspar crystals are broken, as shown by truncated primary zoning. Most of the silicic flows and tuffs probably have high sodium and low potassium contents

ab, abp, abf, abl, abi Metabasaltic amphibolite (ab) locally with pillows (abp) and relict plagioclase phenocrysts (abf); in areas of high-rank metamorphism the basaltic origin is inferred from style of layering as either relict tuffaceous bedding or deformed pillows (abl); locally mixed with intrusive amphibolite (abi). The high-rank amphibolite is composed of green hornblende, calcic plagioclase, and sparse quartz. The lower rank amphibolite may have paler green hornblende and more sodic plagioclase, and the rock is finer grained; pillows are most conspicuous in these areas

Stratified rocks of northern Precambrian terrane

hqs Hematitic sillimanite-quartz schist or muscovite-sillimanite-quartz schist--Red schist composed principally of quartz (about 75 percent percent), abundant fibrolitic sillimanite or a low-birefringent clay(?) after sillimanite and sparse to moderately abundant muscovite; dusty hematite most abundant in clots rich in sillimanite and clay(?). Rock interpreted to be metalaterite at the top of the quartzite-schist assemblage of the northern terrane

qfa Quartz-feldspar granofels interbedded with metabasaltic amphibolite--Exposed in northern terrane 3.5 km north of Gascon Point in a probable east-plunging syncline. Described under southern terrane

sha Interlayered pelitic schist, metasandstone, and metabasaltic amphibolite--In the Truchas Peaks area (Grambling, written commun., 1978), this unit is a complex assemblage of quartz-muscovite schist, micaceous quartzite, two-mica schist, biotite schist, two-mica plagioclase granofels, biotite-quartz-plagioclase gneiss commonly with hornblende, thin hornblende-rich beds, amphibolite, and local green quartz-epidote rock; pink piemontite-thulite-bearing manganiferous calc-silicate rock is found in the layer that crops out 1 km south of Truchas Peak

shm Poorly bedded chloritic amphibole schist--Exposed near the southern edge of the northern terrane in Rio Mora Canyon and on-strike to the east; probably mafic metashale derived largely from basaltic tuff

sh, shq, shp Pelitic schist--Typically aluminous muscovite schist or two-mica schist variably containing chlorite, garnet, staurolite, andalusite, sillimanite, and kyanite, depending on metamorphic grade (sh); in places with abundant strata of quartzite (shq); locally dark and pyrrhotitic (shp)

q Quartzite--Thinly to thickly bedded, white or gray; commonly crossbedded having dark minerals distributed along bedding surfaces. Typically composed of quartz and little else, except heavy minerals along bedding; locally contains sparse muscovite

Plate 1.-- Geologic map of the Pecos Wilderness and adjacent areas, Santa Fe, San Miguel, Mora, Rio Arriba, and Taos Counties, New Mexico

1 0 5 MILES
1 0 4 KILOMETERS

Scale 1:48,000
Contour interval 20 and 40 feet
This map is preliminary and has not been edited or reviewed for conformity with U.S. Geological Survey standards and nomenclature.

CONTACT--Indefinite or conjectural in Precambrian rocks no more than 1/2 km from lines of traverse, except in areas mapped in detail by Grambling (written commun., 1978; Truchas Peaks area) and by Marcus Moench (written commun., 1977, Rio Mora canyon)

FAULT--Dotted where concealed, queried where conjectural; D on downthrown side; p indicates faults that were mapped in part or wholly from aerial photographs

BORREGO LINEAMENT TOPOGRAPHIC LINEAMENT WEST OF THE PECOS-PICURIS FAULT

SYNCLINES--Queried where conjectural

Upright, shorter arrow indicates steeper limb

Overturned

ANTICLINES--queried where conjectural

Upright

Overturned

30 STRIKE AND DIP OF BEDDING--May be overturned locally in Precambrian rocks

70 STRIKE AND DIP OF OVERTURNED BEDDING

70 STRIKE AND DIP OF FOLIATION--Includes compositional layering in gneisses, transverse schistosity in bedded metamorphic rocks, and primary and secondary foliation in igneous rocks

S1 METAMORPHIC INDEX MINERALS IN PELITIC ALUMINOUS SCHISTS--Bi, biotite; Gn, garnet; St, staurolite; Si, sillimanite; Ky, kyanite. Symbols in Truchas Peaks-Pecos Baldy area are mainly from isograd map of Grambling (written commun., 1978)

PROSPECT PIT

ADIT

LINE OF TRAVERSE--Not shown in areas mapped in detail by Jeffery Grambling and Marcus Moench

Base by U.S. Geological Survey. Prepared by photoreduction and combination of the following 7 1/2-minute quadrangle topographic maps: Chimayo (1953), Cundiyo (1953), Tesuque (1953), Santa Fe (1952), Truchas (1953) Sierra Mosca (1953), Aspen Ranch (1953), McClure Reservoir (1953), El Valle (1964), Truchas Peak (1963), Cowles (1961), Rosilla Peak (1961), Jicarita Peak (1964), Pecos Falls (1963), Elk Mtn. (1963), Honey Boy Ranch (1961), Holman (1965), Gascon (1965), Rociada (1965), and El Porvenir (1961).

SCALE 1:48 000
1 ½ 0 1 2 3 MILES
1 .5 0 1 2 3 KILOMETERS
Contour interval 20 and 40 feet

Geology by Robert H. Moench, U.S. Geological Survey, and James M. Robertson, New Mexico Bureau of Mines and Mineral Resources, with contributions by J. A. Grambling, M. H. Moench, and W. D. Riesmeyer. Mapped principally in June and July 1977 by Moench and Robertson assisted by Bruce Gamble, Suzann Hess, and Sally King. In part modified from Miller, Montgomery, and Sutherland (1963), and Baltz (1972).