Geology by Page C. Twiss

Summers 1956 and 1957

Strike and dip of beds

Anticline and syncline

Fault

u, upthrown side; o, downthrown side

dashed where inferred, dolled where

concealed

T on overthrust side

Measured section

Earth-dammed pand for water storage

-1-1-

Erosion control dams

Stock tank

Concrete or metal

Bullet

Triangulation station

With number

Arrow shows plunge of axis

GEOLOGIC MAP OF VAN HORN MOUNTAINS,

TEXAS

EXPLANATION

Volcanic rock

Consists of Tg., andesite, Tg6, rhyolite,

Ttr. trachyte with Ttu, tuff at base:

and Fairbury trachytes

approximately correlative with Moor

Pantera trachyte

Hogeve tuff

equivalent to Tch, Chambers tuff

Buckshot ignimbrite

Colmena formation

Conglomerate at base grading up

UNCONFORMITY

Chispa Summit formation

UNCONFORMITY

Buda limestone

Eagle Mountains sandstone

Loma Plata limestone

Benevides formation

Finlay limestone

Bluff and Yearwood formations

Bluff on southwest, sandstone cap-

Yucca formation

Sandstone and conglomerate

ped by aphanitic limestone

Yearwood on north, limestone-quart, ite-chert-pebble conglomerate

Clayey limestone capped by resist-

ant sandstone

Klu, upper massive member; KII,

lower thin-bedded member

Flaggy limestone and shale

ward to tuff; Tcb, basalt

Thb. basall, Thf flow rock (basall)

in Sierra Vieja, Tchb, basalt

basalt, Tg, luff

Tg5, tuff, Tg4, basalt, Tg3, tuff, Tg2,

000 0 2000 4000 6000 8000 10000 12000 14000 FEE

UNCONFORMITY

Victorio Peak formation

Hueco limestone

Powwow conglomerate

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Perthite-quartz-plagioclase-

muscovite pegmatite

Feldspathic mus- Biotite schist

muscovitic meta-

quartzite

covite schist and amphibolit

Metaquartzite and metarkosite

Control by U.S. Coast & Geodetic Survey

927 North American Datum

and U.S. Geological Survey

Polyconic Projection

Base from aerial photographs

Pvl, limestone member; Pvb, basal

sandstone member

HHHHHH

Cartographer in charge, J.W. Macon

Photogrammetry by D.F. Scranton

Terrace grave

Qg₁, highest pediment gravel; Qg, un-

differentiated pediment gravel, at least as old as Qg₂ and probably

older than Qg; QI, landslip mate-

UNCONFORMITY

Bolson fill

Tr, rhyolite; Td, dike; Ti, plug

Gravel facies near highlands; sand,

sill, and clay in lowlands

rial ranging in age from Qg₁ to Qg₃

Drafted by J.M. Tabor

INTRODUCTION About 10 miles south of Van Horn, Texas, the Van Horn Mountains rise abruptly above an intermontane plain and extend southward to the Sierra Vieja. The area lies primarily in the southwestern part of Culberson County but extends into Hudspeth and Jeff Davis counties. The mountains owe their present topographic form to late Tertiary block-faulting. Structurally they are a northward - trending horst which is flanked on the east and west by intermontane basins. The basin east of the mountains is herein named "Lobo bolson"; although structurally separate, it is topographically a southern extension of Salt Basin. An outcrop (30° 46.5' N., 105° 55.5' W.) of Tertiary volcanic rock separates two structural basins west of the mountains; the southern basin is herein named "Green River bolson."

northern basin is a southeastern exten-Wylie Mountains (Hay-Roe, 1957). The sion of Eagle Flat. In addition to the major, generally north-south high-angle normal faults that define the horst, many normal faults of lesser magnitude cut the highland mass of the Van Horns; they are either nearly hua trough are the tectonic elements that parallel to or at large angles to the strike controlled the type and distribution of of the horst. In the southern part of the sediment during the Cretaceous period. area are three thrust faults of Laramide In the Van Horn Mountains along part age. Older Comanchean strata on the of the western edge of the platform, Cre west are thrust over younger Cretaceous taceous rocks lie unconformably on those strata on the east. These faults occurred of Wolfcamp and Leonard age. before the outflow of lava in the Davis

Mountains. The northern segment of the mountains, where Precambrian metasedimentary rocks are exposed, is within the lift. Rocks of Permian, Cretaceous, and along the western flank of the Colquitt Tertiary age dip generally to the south syncline in the southwestern Van Horns. at about 4 degrees. The area lies along Grayish-red, siliceous, and friable sand the junction of the Chihuahua tectonic stone and lenses of medium graw and belt on the west and Diablo Platform on moderate red, quartz- and chert-pebble the east. The Tertiary volcanic rocks are conglomerate comprise the oldest Crepart of the Davis Mountains lava field, taceous rocks. Bedding is obscure exwhich is the greatest exposure of vol. cept for multidirectional cross stratificacanic rock in Texas

Eagle Flat and from the northern and these beds is Early Albian. eastern parts of the Van Horn Mountains, is a prominent basin of interior drainage flows through the gap between the north western flank of the Colquitt syncline.

eastern intermontane basins are being Exogyra and Ostrea. is at least 1,100 feet thick. Previous workers have contributed The middle unit is predominantly light much to the knowledge of the area. olive-gray, thin- to medium-bedded, un-

Baker (1927) included the Van Horn fossiliferous sandstone. The rock is fine-Mountains in his regional study of to medium-grained, siliceous and calcitic Trans-Pecos Texas. Flawn (in King and and chert-bearing texturally supermature Flawn, 1953) mapped the Precambrian orthoquartzite and subgraywacke. The rocks exposed in the Carrizo Mountains thickness is about 390 feet. and in the northwestern and northeastern A distinctive yellowish-gray to medium sectors of the Van Horns; summaries of dark gray, finely crystalline limestone his petrographic descriptions are includ-separates the underlying clastic section ed in this report. The southern third of from the overlying Cox sandstone. The the area was mapped by The University limestone is medium to thick bedded and of Texas graduate students C. G. Havard, contains small pelecypod fragments, Lun-R. I. Ellsworth, E. R. Kennedy, and atia sp., and Orbitolina texana; it is 126 R, N, Throop in 1948 and P. Braithwaite feet thick. On aerial photos this unit apand D. R. Frantzen in 1957. This study pears as a light band at the base of an is part of a Bureau of Economic Geology east-dipping hogback of the Cox sandproject of geologic mapping in Trans-stone on the western flank of the Col-Pecos Texas. The writer gratefully acquitt syncline. knowledges the valuable suggestions of The Bluff formation is 600 feet thick; Professor R. K. DeFord and Dr. John T. its age, based on Orbitoling texang, is Lonsdale on stratigraphic and petro- Early Albian, and it is correlative with graphic problems, respectively. Dr. K. P. the Glen Rose limestone of central Texas. Young identified the Cretaceous fossils. The Yucca and Bluff formations are a John W. Trammell ably assisted in the nearly continuous depositional sequence, field in 1957 and Charles E. Clark in having formed in neritic and beach en-1956. This report is part of a doctoral vironments along the eastern edge of the

GEOLOGIC FORMATIONS PRECAMBRIAN ROCKS

vision of Professor DeFord.

CARRIZO MOUNTAIN GROUP included in the Carrizo Mountain group: out in four isolated localities in the they crop out in the southern Carrizo northern third of the area; its average Mountains, the northwestern Van Horn thickness is about 225 feet. At all ex-Mountains (Mica Mine area), and the posures the Yearwood overlies Permian northeastern Van Horn Mountains. De- limestone unconformably and slightly scriptions of these rocks are abridged discordantly. from Flawn (King and Flawn, 1953). In the northeastern Van Horns the The outcrops of the Mica Mine area be- lower member is composed of 57 feet of long to the amphibolite facies of Eskola conglomerate alternating with sandstone, and show the highest grade of meta-shale, and limestone; the over-all color morphism in the Van Horn uplift. is moderate reddish brown. A few thin Cq).—The oldest rocks exposed in the slope. The conglomerate consists of dark area are fine- to medium-grained feld- gray limestone, chert pebbles, and coarse spathic metaquartzite and metarkosite sandstone in a fine sandy limestone with varying content of muscovite and groundmass. The limestone and chert biotite. The color is pink or buff, weather- pebbles are derived from the underlying ing dark brown; the well-indurated rock Hueco limestone. The bulk of the basal forms blocky ledges and steep, rugged member is moderate reddish-brown hogbacks. Schistosity, which parallels sandstone, siltstone, and shale. original bedding, is developed where the The thickness of the lower member mica content exceeds 10 percent. The ranges from 175 feet north of the Mica rock is a granoblastic mosaic of quartz. Mine to about 60 feet in the northeastern microcline, and plagioclase with oriented Van Horns; in the north-central Van grains of muscovite and/or biotite, and Horns the lower member is absent. The traces of zircon and ore minerals. Esti- thickness depends on the position of mated thicknesses of the unit are 3,400 valleys in the pre-Cretaceous surface. feet in the Carrizo Mountains and 900 The upper member is 146 feet of feet in the Van Horn Mountains. pale reddish-brown to pinkish-gray, mas-(p€Cms).-A sequence of feldspathic posed predominantly of microcrystalline muscovite schist and muscovitic meta- limestone fragments cemented with quartzite lies on the metaquartzite-metar- sparry calcite. Ostrea cf. franklini and kosite in gradational contact. The unit is Ostrea sp. have been collected from the

Mountains and 1,500 feet thick in the age of the Yearwood is Early Albian. Mica Mine area. The rock is very light gray, foliated, friable (forming micaceous sand); its outcrop forms a gentle slope. It is a granoblastic mosaic of quartz, microcline, and sodic plagioclase with more than 15 percent of well-oriented muscovite flakes. The grain size of thickest and most widespread Cretaceous the mosaic averages from 0.2 to 0.5 mm, formation in the area. It lies disconand the dimensions of the mica grains formably above the limestone of the

Biotite schist and amphibolite (p. distinctive because of its uniform grain Cbsa).—In the Mica Mine area thin size and the brownish-black desert varlenses of biotite schist, at places assonish on its outcrops. ciated with amphibolite, are intercalated with the quartzite and muscovite schist. bedding planes are seen only on steep The thickness of these lenses ranges from slopes. Lenses of chert pebbles and less than 1 foot to 25 feet. The biotite green-brown biotite and muscovite in a mosaic of quartz, sodic plagioclase, and in some places microcline. Four types of amphibolite occur in

Mine area: (1) hornblende-plagioclase the beds are composed of fine- to medirock, (2) almandine-hornblende-plagioclase rock, (3) anthophyllite-hornblendeplagioclase rock, and (4) epidote-hornblende-plagioclase rock. King and Flawn (1953, pp. 141-146) concluded that the amphibolite is of sedimentary origin. A small body of amphibolite in the northeast Van Horns is probably related to the amphibolite suite of the Mica Mine area. Pegmatite (p€p).—Intrusive bodies of pegmatite in the metasedimentary rocks faulting, the thickness of the Cox in the of the Mica Mine area and the northeastern Van Horn Mountains were described by Flawn (1951). They have irregular shapes and are zoned and un-200 feet may have been eroded. In the zoned; the mineral assemblage consists muscovite. Only 11 of more than 80 ured. Hay-Roe (1957) reported thickbodies are included on the map; they are resistant and form prominent topo-

PERMIAN SYSTEM Powwow Conglomerate (Pp)

and southern Carrizo Mountains the Albian; the upper part is paleontologion the Precambrian rocks. Mountains, the Mica Mine area, and the area of the Plata Verde mine. The ceous feldspathic sandstone. The per- in steep cliffs; its light gray color dif- decreases; bedding thickness increases series. The age is Cenomanian. The Buda 310 feet. It rests on the Chispa Summit sandstone and olive-gray limestone. The Benevides formation.

controlled by the locally derived material detrital quartz grains, all enclosed in a from the underlying Precambrian ter- finely crystalline calcite matrix. rane. In the Van Horn Mountains where Fossils from the Finlay include Holec-Precambrian pegmatite is common, the typus planatus, Holectypus sp., Enallas-Powwow contains abundant pegmatite ter sp. cf texana, Toucasia texana, Toudebris; in the Carrizo Mountains the casia patagiata, Caprinuloidea sp., Ex-Powwow contains schist fragments and ogyra texana, Gryphaea mucronata, G. wow in the area. Hay-Roe (1957) re- sp. aff. regina, Lunatia pedernales, Neported four ostracods and one foramini- rinea sp., Ceritella sp., and Protocardia fer from near the top of the formation in texana. The formation is paleontologi-

placed the age as Wolfcamp. stricted to the southern Carrizo and orange and yellowish-gray color and an matoceras texanum, Pervinquieria sp., the underlying Buda limestone is sharp. mon. stone lies conformably above the Pow. Its outcrops form the flat highlands of pedina sp. cf. taffi, Pecten (Neithea) sp., content decreases and the rocks are thin covered interval, which is probably thick. feet from the Wylie Mountains, and Gil- thick. The base is placed at the first lostoma sp. were collected crystalline, and fossiliferous; it becomes stone and interbeds of marl; it is capped its age probably ranges from Late Albian 437) established eight ammonite zones feet thick is at the base; it is slightly which are cemented with coarse sand-enclosed in a cryptocrystalline matrix. About 40 feet of Pantera is intercalated thick, feet thick are near the base but, gen- and calcitic, texturally mature ortho-

dolomitic toward the top. Beds up to 6 by 25 feet of medium-grained siliceous into early Cenomanian. erally, the thickness ranges from 6 inches quartzite, which probably was laterally to 3 feet. Calcite-filled joints perpendicu- continuous with the calcarenite of the lar to the bedding are common; the rock type section at Pinto Canyon. has a petroliferous odor on fresh surface. Fossils are plentiful; the nodular Nodular, irregular pipes and patches of marly limestone beds contain Oxytrogray chert are common throughout. pidoceras bravoense, O. belknapi, O. Silicified fossils are plentiful. Euom- supani, Gryphaea navia, G. mucronata. phalus sp., Composita sp., Marginilera Exogyra texana, Pecten (Neithea) texsp., and echinoid spines and plates were anus, Protocardia texana, Trigonia sp., identified by the writer. R. V. Hollings- Cyprimeria texana, Homomya sp., Telworth identified Schwagering and Para- line sp., Tapes sp., Hinnites sp., Paleschwagerina from the upper beds in the opinna sp., Holectypus sp., Hemiaster cf. area. Only the lower part of the Hueco whitei, Enallaster texanus, and Microlimestone is exposed in the Van Horn pedina sp. The upper massive sandstone Mountains, and it is of Wolfcamp age. contains Alectryonia carinata, Trigonia

Overlying the Hueco limestone in a relative with the Kiamichi (Middle Alsmall, north-facing cuesta at the north- bian) of north Texas; it probably was east boundary of the area is a medium laterally continuous with the lower 30 gray dolomite. This unfossiliferous unit feet of the Boracho limestone at Kent is tentatively assigned to the Leonard Station (Brand and DeFord, 1958). series by lithostratigraphic comparison with the Victorio Peak formation in the Wylie Mountains to the northeast, In rocks; the outcrop of Victorio Peak was of the Van Horn Mountains; the light probably preserved in a topographic low gray outcrop contrasts with the vellowish and not completely removed by the pre- gray and brown of the underlying forma-Busul member (Pyh).—At the base of and has been divided into two members. the north face of the Victorio Peak Lower member (Kll).-The lower cuesta is a gravish-orange to vellowish- member consists of nodular, thin- to gray, medium-bedded rock composed of thick-bedded, medium gray, finely crysmedium - grained, subround dolomite talline limestone with interbeds of

the porosity is about 10 percent. Al- (usually covered) and contains Eopachy-

though the base of this unit is covered, the writer believes that it overlies the Hueco limestone; the dip of these beds is similar to that of the Hueco beds to the north. This unit is about 60 feet thick. Limestone member (Pvl).-The basal member of the Victorio Peak grades upward into a medium- to thick-bedded unfossiliferous, dolomitic limestone. On fresh surfaces the color grades upward from brownish black to medium gray; it weathers to pale orange. Bedding is well developed; the beds are from 6 to 15 inches thick. Differential weathering produces a horizontal fluting parallel to bed ding. The rock is finely crystalline and composed of clear crystalline calcite patches scattered throughout a finely rystalline dolomite matrix.

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JOHN T. LONSDALE, DIRECTOR

About 180 feet was measured in the Van Hern Mountains; no upper contact was observed. This unit is similar to the Topographically, the northern part of the Peak formation that crops out in the limestone member (Pvl) of the Victorio age is probably Leonard. CRETACEOUS SYSTEM

The Diablo Platform and the Chihua

COMANCHE SERIES Yueea Formation (Kyu)

About 250 feet of the upper part of the southern boundary of the Van Horn up- Yucca formation crops out in the area tion near the top. Stream flow of the region is intermit- No fossils have been collected from the tent. Salt Basin, collecting water from Yucca in the area; possibly the age of

Bluff Formation (Kbl) Water flows northward from Lobo Flat to The Bluff formation lies conformable Salt Basin through Wildhorse Draw. above the Yucca; the outcrop lies to the After cloudbursts, water from Eagle Flat east of the Yucca and is restricted to the

end of the Van Horns and the south end The lower contact is placed at the lowest of the Carrizo Mountains and joins Wild- thick-bedded sandy limestone. This limehorse Draw. Green River, which empties stone is dark gray, weathers to olive into the Rio Grande, receives water from gray, is medium crystalline, quartzose, the western part of the area. Hence, the and contains a few large fragments of filled with sediment, while outcrops of In the area three subdivisions of the the Green River bolson are being eroded Bluff can be distinguished. The lower and the sediment transported to the Gulf 86 feet consists of thick-bedded, light of Mexico. In Lobo Flat as much as 1,200 brownish-gray, quartzose sandstone alterfeet of alluvium covers the bed rock, and nating with medium gray calcarenite and at the head of Green River the alluvium limestone. Many beds contain Exogyra and Ostrea fragments.

dissertation prepared under the super- Chihuahua trough.

Yearwood Formation (Ky)

Although no guide fossils were found, a study of regional stratigraphy indicates that the Yearwood formation is correlative with the Bluff formation. The Year All Precambrian rocks of the area are wood (Brand and DeFord, 1958) crops

Metaquartzite and metarkosite (p.E. ledges of conglomerate break the gentle Muscovite schist and metaquartzite sive, unfossiliferous limestone. It is com-

about 400 feet thick in the Carrizo lower member in the area; possibly the

Forming the prominent scarp of the northeastern Van Horns and widely ex posed in the central Van Horns and Col quitt syncline, the Cox sandstone is the

Beds are from 2 to 8 feet thick, but granules are scattered randoml throughout the section; along the north western scarp of the mountains a few ledges of dark gray finely crystalline limestone are exposed. A few beds of calcarenite were observed on the eastern layers from 5 to 60 feet thick in the Mica flank of the Colquitt syncline. Most of um-grained, well-rounded quartz and a few rounded chert fragments. About 75 percent of the grains are cemented by quartz overgrowths; however, calcite is also a cementing agent; all samples show more than 5 percent porosity. Small patches (2 mm in diameter) of red and

yellow iron oxide give the rock a speckled Because of poor exposures and much northern Van Horns has not been determined; along the eastern scarp 870 feet was measured but an additional Colquitt syncline 1.215 feet was measthe northeastern Wylies to 530 feet in the south-central. The variation in thickness, the textural maturity, the high degree of rounding, and uniform size of grains in-

dicate that the rock was deposited along a fluctuating beach. As a result of the late Pennsylvanian Near the base of the section are many orogeny of west Texas (King, 1942, p. small fragments of fossil wood; northeast 716), the pre-Permian Paleozoic rocks of the Plata Verde mine large speciwere removed from the Van Horn uplift, mens of Ostrea sp. were collected near exposing Precambrian rocks. The un- the base; Exogyra texana, Trigonia sp., sorted debris derived from the irregular and Ostrea sp., collected from the east pre-Permian surface now composes the flank of the Colquitt syncline, were Powwow conglomerate. In the Van Horn found near the top. The age of the Cox is Powwow rests with marked discordance cally correlative with the lower part of the Fredericksburg group of central

particles. At places the basal beds conthe Finlay is placed at the first massive, Pholadomya sp., Turritella sp., and Ty- (Neithea) sp., Protocardia texanum, tain large angular boulders (up to 3 feet medium gray, sandy, finely crystalline lostoma sp. centage of gravel and the over-all grain ferentiates it from the underlying, domiupward. This section contains Idiohamis a distinctive body of rock that can be formation in the northern Sierra Vieja: thickness ranges from 250 feet in filled Near the base, the limestone is convalleys to about 20 feet over buried hills. sistently sandy and marly, thin bedded, iei, Drakeoceras sp. aff. kummeli, D. sp. In some places it is absent, and Hueco and nodular; it becomes thick bedded aff. lasswitzi, Mortoniceras sp., M. stenlimestone rests directly on Precambrian and massive at the top. The rock con-

The composition of the Powwow is ments of gastropods and pelecypods, and sp. cf. navia, Pecten (Neithea) duplici-No fossils have been found in the Pow- costa, Pecten (Neithea) sp., Tylostoma the nearby Wylie Mountains. From these cally correlative with the Fredericksburg

and DeFord, 1958).

specimens and regional stratigraphy he group of central Texas.

Gillerman (1953, p. 31) named and described the Eagle Mountains sandsp., Pecten (Neithea) texanus, Idonearca sp., and Inoceramus sp. cf. concentricus. The formation is paleontologically cor-

(Cenomanian), is of Cenomanian age most places in the Van Horns the Hueco The Loma Plata limestone (Amsbury, and probably is correlative with the Del limestone is overlain by Cretaceous 1958) is restricted to the southern half Rio of south Texas. tions. The formation is 685 feet thick rhombs, probably originally a dolomite laminated calcareous shale; it is 285 sand, cemented by crystalline calcite; feet thick. The lower 30 feet is marl

Pholadomya sp., Lima sp., Ostrea sp.,

sp., aff. pachys, Ophryoceras sp., Prohys- p. 385). teroceras sp. aff. austinense. P. cf. word-GULF SERIES Chispa Summit Formation (Kes)

Tetragramma sp. cf. taffi, Phymosoma calcareous shale that crops out in a cline.

upper massive reddish-brown sandstone. Holectypus sp., Enallaster sp., Micro- Above the lower 150 feet the limestone careous, illitic shale.

stone, as "about 70 feet of interbedded brown sandstones, brown shales, siltstones and sandy limestones" exposed on the north side of the Eagle Mountains. The formation is 29 feet thick in the area; it crops out south of Willoughby Windgap along the western margin and south-central part of the mountains. It Cretaceous formation in the area. The basalt is incurred unit of the mountains. It Cretaceous formation in the area. The basalt is incurred unit of the area. The basalt is incurred unit of the where it lies on the moderate red volcanic color is dark yellowish brown to very bedded limestone and shale that becomes sandy toward the top. The rock CENOZOIC ROCKS contains fragments of microcrystalline limestone, subangular to subrounded quartz, collophane, and glauconite grains, and fragments of rudistids and oysters. No fossils from this formation were positively identified, although one questionable fragment of Exogyra arietina was found. The Eagle Mountains, overlying Yearwood, Cox, and Finlay formations; in the southwestern part, Cox and Fin-Cenomanian) and underlying the Buda

The Powwow crops out in the Carrizo Texas, but the lower part of the Cox discus laevicaniculatum, E. brazoense, of echinoid spines and plates, gastropods, Chambers tuff of the Vieja group (Decrysts (2V=25°), about 20 percent Hogeye at these exposures is equivalent into the northern Sierra Vieja; it crops groundmass with alkalic feldspar micro-Mountains, northeastern Van Horn may be equivalent to upper Trinity.

Mountains, northeastern Van Horn may be equivalent to upper Trinity.

Mountains, northeastern Van Horn may be equivalent to upper Trinity.

Beudanticeras sp. aff. parandieri, B. sp., pelecypods, and foraminifers, which are

Ford, 1958) are extended northward. Mortoniceras sp., Goodhallites sp., Crag- scattered throughout a microcrystalline No fossils have been recovered from and 5 percent tuff fragments, all en- ern Sierra Vieja). inites sp., Idiohamites fremonti, Holec- calcite matrix; pore space and fractures Tertiary strata in the Van Horns, but closed in a colorless shard matrix (n= At other localities where the Buck- The thick, massive Pantera that caps formation has obscure to well-developed The Cox sandstone grades upward to typus sp., Hemiaster sp., bave been filled with sparry calcite.

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The Cox sandstone grades upward to typus sp., Hemiaster sp., bave been filled with sparry calcite. undulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding, its color is grayish the Finlay limestone showing an inundulating bedding its color is grayish the Finlay limestone showing an inundulating bedding its color is grayish the finlay limestone showing an inundulating bedding its color is grayish the finlay limestone showing an inundulating bedding its color is grayish the fin orange and grayish red, and its grains crease in calcite content and a correnopsis sp., Kingena sp., Pecten (Neithea) icanum, B. sp., Nerinea sp., Turritella been determined as Oligocene (Bridges, twisted, showing well-developed microeastern Van Horns and near High Loneexposed. At the base a dark gray to laths with interstitial glass. A few octaan easterly or northeasterly trend, and range in size from large boulders to clay sponding decrease in sand. The base of texanus, Alectryonia sp. aff. carinata, sp., Tylostoma sp., Exogyra sp., Pecten 1958, pp. 35-36).

tologically correlative with the Eagle the Colmena. Ford group of central Texas and the Basalt member (Tcb).—From the posure, this member thins rapidly south-interstitial alkalic feldspar.

pale orange tuff. The base of the member yellowish brown.

the mappable units of the Tertiary se- the Colquitt syncline and in the Sierra lo top. quence in the Van Horn Mountains, Vieia. The Buckshot is grayish red, mas-The Buda limestone is medium light names from units in the Wylie Mountains sive, and very hard; no flow banding is The Hogeye tuff crops out in the northtains sandstone and is about 135 feet From the Sierra Vieja the Colmena The rock contains about 4 percent Hogeve overlies the Buckshot ignimbrite traced from the type section in the Wylie phenocrysts and many trachyte and tuff and intergranular clinopyroxene and thick. The rock is composed of fragments formation, Buckshot ignimbrite, and euhedral to anhedral sanidine pheno- and underlies the Pantera trachyte; the Mountains through the Van Horns and fragments set in a hypocrystalline magnetite.

or orange, texturally immature, mica- about 175 feet. The limestone is exposed content increases and the shale content Buda is also the top of the Comanche tion, ranging in thickness from 190 to space. The rock is a trachytic ignimbrite. Eagle Mountains, Buda, and Chispa crysts of oligoclase, anorthoclase, magnet- vesicles of the upper part of the trachyte. and apatite. size decrease upward; the upper 20 feet nantly brown Cox sandstone and the ites fremonti, Pervinquieria equidistans, traced from southern Trans-Pecos to on the Cox limestone, Finlay limestone, The youngest volcanic rocks of the and are compositionally like the specis a zone of thin, interbedded, brown grayish-yellow marl of the overlying P. kilani, P., n. sp., P. shumardi, P., n. central Texas (Brand and DeFord, 1958, Benevides formation, Eagle Mountains area are in small tacular, soda-rich dike swarm of the sandstone, Buda limestone, and Chispa nimbrite and underlies the Bracks rhyowere continuous with part of the Col-Summit formation in isolated outcrops lite (DeFord, 1958, pp. 20-21); the mena formation of the northern Sierra light brownish-gray sanidine trachyte syncline (Tg1 to Tg6) and in a small 1959). The dikes contain phenocrysts of along the eastern margin of the Van Bracks is absent in the Van Horn Moun- Vieja. porphyry, which at places shows colum- inlier (Tg7) near the east-central bound- sodic labradorite laths with intergranular Horns northward to Hammer Handle tains. The Pantera trachyte (Hay-Roe, The Hogeye ranges from 435 feet thick nar structure. The rock contains large ary. Probably these rocks belong in the magnetite and clinopyroxene and more

(Neithea) texanus, Enallaster sp., Ma- area by the Chispa Summit formation formation directly west of Willoughby it is interbedded with the Chambers tuff unmapped members. The lower member feldspar (Or 15), oligoclase, magnetite, by raeans of map symbols in parentheses. common. craster sp., Holoaster sp., H. simplex, which lies disconformably on the Buda Windgap along the western margin; and about 170 feet below the top of the consists of grayish orange-pink to pale and severely altered pyribole; these are Tuff (Tg1).—The basal tuff (Tg1) of Salenia sp., Hemiaster elegans, Holecty- limestone. The Chispa Summit is a ma- on Cox sandstone at the southeastern and Chambers. The thickness of the Cham- reddish-brown crystal and vitric tuff with enclosed in a partly devitrified, glassy this sequence is underlain by trachyte pus sp., Pedinopsis sp., Micropedina sp., rine sequence of flaggy limestone and southwestern flanks of the Colquitt syn- bers in the area, from Buckshot to Pan- lenses of conglomerate containing peh- (n=1.505) matrix. Some sections show (Ttr) and capped by basalt (Tg2). The tera, is about 650 feet. sp., and Tylostoma sp. The lower mem- narrow band along the western margin In all exposures the base of the Col- The Chambers consists of two un- lenses of fine to medium sandstone. The twisted glass threads outlining the is mostly covered. It contains lithic fragber, Late Albian in age, is approximately of the mountains and in a northwest- mena is composed of pale reddish-brown mapped members: the lower is composed thickness of the lower member ranges phenocrysts. Chalcedony and quartz ments and shards, is friable, pale greencorrelative with the Levinson member of trending belt in the central Van Horns to dusky brown conglomerate contain- of tuff, tuffaceous sandstone, and con- from 355 feet in the Colquitt syncline to crystals are common as pore fillings. ish yellow, and weathers to very pale the Boracho limestone at Kent (Brand south of Willoughby Windgap; in the ing pebbles, cobbles, and boulders of glomerate; the upper is moderate red 180 feet near High Lonesome.

In outcrops south of Willoughby Windgap; in the ing pebbles, cobbles, and boulders of glomerate; the upper is moderate red 180 feet near High Lonesome. south-central part of the area the forma- limestone and sandstone. The conglom- tuffaceous sandstone. The rock of the The upper member of the Hogeye con- gap, the thickness ranges from 0 to 40 Basalt (Tg2).—A black, aphanitic Upper member (Klu).—The base of tion dips about 5 degrees southward erate ranges in thickness from 16 feet lower member is predominantly lithic, sists of pale grayish-red to reddish- feet. At the base is a dark gray vitro- basalt (Tg2), 42 feet thick, is intercalthe upper member is placed at the base forming a broad exposure. At Chispa in Hammer Handle Canyon to 310 feet crystal, and vitric tuff, which is poorly orange sandstone, which is fine grained phyre with texture and composition like ated between tuffs (Tg1 and Tg3); it of the lowest thick-bedded, cliff-forming Summit 840 feet of the formation was in the Colquitt syncline. The boulders indurated, varicolored (grayish pink, and well indurated. The rock contains the vitrophyres of High Lonesome. weathers to grayish brown, rounded and limestone. The upper member is 400 measured; however, a complete section and cobbles are well rounded, somewhat grayish purple, pale red, light gray, and nearly equal amounts of sanidine and Above is a resistant, massive, moderate irregular plates. About 3 percent of the sorted, and loosely cemented by calcite. yellowish gray), medium grained, medi light gray, thick- to very thick-bedded, The lower 150 feet of Chispa Summit Most of the gravel has been derived from um bedded; it contains thin interbeds of contains up to 15 percent ignimbrite. The rock contains a few and olivine phenocrysts set in a subsparsely fossiliferous, finely crystalline is composed predominantly of pale yel- the Cox sandstone, and the limestone pale brown conglomerate and sandstone. In the contract of the Pantera trachyte. The Benevides formation (Amsbury, limestone, It forms steep slopes along the lowish-brown, flaggy, fossiliferous, micro-cobbles and boulders have been eroded. The conglomerate interbeds include member of the Hogeye ranges from 7 cleus of oligoclase and boulders have been eroded. The conglomerate interbeds include member of the Hogeye ranges from 7 cleus of oligoclase and boulders have been eroded. Only about 400 feet of the Hueco lime- limestone with interbeds of from the Finlay and Bluff formations. pebbles, cobbles, and boulders of lime- feet in the north to 80 feet stone crops out in the area; it is re. limestone; it is characterized by pale are three distinct massive units. Paracy- calcareous, illitic shale. The contact with Thin tuffaceous sandstone beds are com- stone, sandstone, and ignimbrite in a before erosion it was laterally continu- clastic, and vesicular matrix of partly Cavities are filled with opal and chal- West and south of High Lonesome are cene to Recent.

Globigerina sp., and fish scales and jaws; percent) enclosed in a hypocrystalline tuff near the base of the Pantera tra- ish-black slightly porphyritic basalt. from 43 feet to about 150 feet, Coilopo- and cryptocrystalline matrix (n=1.510). chyte.

Buckshot Ignimbrite (Tbu)

the basalt is underlain by friable, very the top; it weathers to pale red and pale Van Horns. The surface of contact has considerable netite and clinopyroxene rods, and internetite and clinopyroxene rods, and internetite and clinopyroxene, and Colmena by 92 feet of light gray, friable Spring. This unit may have been laterally (Tg6). Phenocrysts of embayed quartz south of the Colquitt house and the area and Tertiary formations. relief. In the northeastern Van Horns, stitial alkalic feldspar. The average grain interstitial alkalic feldspar. At the top tuff and from the Pantera by about 40 continuous with the upper part of the and sanidine crystals are set in an aphan- of this study. The Tarantula was formed 1.524 and small 2V) and traces of mag-slightly porphyritic. Phenocrysts of se-

bles of sandstone and limestone and a microeutaxitic texture formed by long, tuff forms a gentle slope, and its outcrop tuffaceous sandstone; the thickness va- moderate red and grades from a con- ish-red trachyte is exposed. This rock is microeutaxitic texture.

feet the writer has collected Metoicocceras to pale red and well indurated; it conthough the upper several feet are covered, south of High Lonesome are several thin, about 1½ miles south of the area of this thick, is restricted to the central part of circle the area. sp., Calycoceras sp., Inoceramus labiatus, tains quartz and sanidine phenocrysts (3 the member probably grades into friable isolated exposures of dark gray to gray-Phenocrysts of olivine, labradorite laths, ceras sp., Vascoceras sp., PseudaspidoObscure relict thread-like shards are

Basalt member (Tchb).—Interbedded and augite are enclosed in an orthophyric company of the bedrock near the margins of the subtrachytic matrix of sodic labradorite

Embayed quartz phenocrysts are comsubtrachytic matrix of sodic labradorite

The bedrock near the margins of the subtrachytic matrix of sodic labradorite

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The bedrock near the margins of the subtrachytic matrix of sodic labradorite

The bedr ceras sp., Inoceramus labiatus, and Exorgan sp. The Chiene Superities poles.

The Chiene Super 100 feet thick at the northernmost ex- netite, and clinopyroxene rods, and of yellowish-gray to pinkish-gray, friable, spar. Boquillas formation of the Big Bend northern Sierra Vieja northward to ward and terminates about a mile south The rock is similar in composition to overlies the Pantera trachyte except in (Tg4) is about 200 feet of tuff, tuffaceous out. area. The Chispa Summit is the youngest Hammer Handle Canyon are several out- of the area. The basalt is medium dark the basalt member of the Colquitt syncline, sandstone, and conglomerate (Tg5). The Basalt-flow member (Thf).—On the coarse grained and contains anhedral (Tg5) is not exposed. is marked by basaltic scoria or breccia. At the base the rock contains about 1 north face of Hammer Handle Canyon crystals of sanidine, oligoclase, and ar-Tertiary rocks composed of tuff, ignim. The basalt contains a few phenocrysts percent each of small altered olivine is a small outcrop of basalt flow rock. It cuate and branching glass (n=1.504) trusive rock, exposed along the axis of Van Horn Mountains is a poorly sorted posed chiefly of subangular to subbrite, flow rock, sandstone, and conglom- (1 mm) of slightly altered olivine en- and calcic labradorite phenocrysts en- is dark gray with brownish-gray splotches shards. erate lie with marked discordance on closed in a subtrachytic sodic labrado- closed in a subtrachytic matrix of sodic and yellowish-gray weathered pheno- The thickness ranges from 80 feet at ish-brown, slightly porphyritic, rhyolite (MS) are proposing the name Tarantula pitted, frosted, and faceted. The sand Because of the aridity of the Van Horn Cretaceous and Permian formations, rite groundmass with intergranular mag- crysts. The unit is separated from the High Lonesome to 140 feet at Wilson ignimbrite with conchoidal fracture gravel. The type section is about 5 miles was derived from the Cox. Benevides, area, ranches and irrigated farms are de-

Pantera Trachyte (Tp)

Summit formations: at Hammer Handle ite, and clinopyroxene, which are en-Canyon poorly indurated tuff overlies the closed in a slightly devitrified brown Garren Group (Undifferentiated)

flank of the Indio Mountains.

1959

Along the eastern flank of the Garden secondary calcite, chalcedony, and quitt syncline.

unbedded, vitric-crystal tuff (Ttu). It Tuff (Tg5).—Lying above the basalt of magnetite and pyribole occur through.

Tertiary rocks truncate the Hueco, Yearwood, Cox, and Finlay formations;

Yearwood, Cox, and Finlay formations;

Tender for the northeestern van Horns, Size of the rock is hypocrystalline containing 5 percent euhedral sanidine laths (n, = | In the northeestern van Horns, Size of the rock is hypocrystalline containing 5 percent euhedral sanidine laths (n, = | In the northeestern van Horns, Size of the rock is hypocrystalline containing 5 percent euhedral sanidine laths (n, = | In the northeestern van Horns, Size of the rock is hypocrystalline containing 5 percent euhedral sanidine laths (n, = | In the northeestern van Horns, Size of the rock is hypocrystalline containing 5 percent euhedral sanidine laths (n, = | In the northeestern van Horns, Size of the rock is hypocrystalline containing 5 percent euhedral sanidine laths (n, = | In the northeestern van Horns, Size of the rock is hypocrystalline containing 5 percent euhedral sanidine laths (n, = | In the northeestern van Horns, Size of the rock is hypocrystalline containing 5 percent euhedral sanidine laths (n, = | In the northeestern van Horns, Size of the rock is hypocrystalline containing 5 percent euhedral sanidine laths (n, = | In the northeestern van Horns, Size of the rock is hypocrystalline containing 5 percent euhedral sanidine laths (n, = | In the northeestern van Horns, Size of the rock is hypocrystalline containing 5 percent euhedral sanidine laths (n, = | In the northeestern van Horns, Size of the rock is hypocrystalline containing 5 percent euhedral sanidine laths (n, = | In the northeestern van Horns, Size of the rock is hypocrystalline containing 5 percent euhedral sanidine laths (n, = | In the northeestern van Horns, Size of the rock is hypocrystalline containing 5 percent euhedral sanidine laths (n, = | In the northeestern van Horns, Size of the rock is hypocrystalline containing 5 percent euhedral sanidine laths (n, = | In the northeestern van Horns, Size of the rock is hypocrystalline containing 5 percent euhedral sanidine laths (n, = | In th lay; and in the south-central Van Horns The Buckshot conformably overlies the netite and altered mafic minerals en- verely altered olivine and pyribole are Forming a hard, resistant can above miarolitic cavities which are partly filled trolled by the type of rock that was exand northern Sierra Vieja, the Chispa

Colmena formation and forms a resistant

Colmena formation and formation and forms a resistant

Colmena formation and f cap rock from 3 to 20 feet thick. The unit vesicles are filled with analcime. The trachytic sodic labradorite (An 55) laths, (Ttr) crops out along Green River and This ignimbrite (Tg6) is about 30 feet rounded orthoquartzite and limestone Summit and 4 miles west of U. S. High-Instead of formulating new names for crops out only on the southern flanks of outcrop shows no discontinuity from base intergranular magnetite and clinopy in the Colquitt syncline and caps High thick. roxene, and interstitial alkalic feldspar. Lonesome. The trachyte is light brown- Andesite (Tg7).—Near the east-cen- rived from the basal conglomerate of the Van Horn Mountains is the Walter May- springs or flowing wells. The member is about 390 feet thick. ish gray, aphanitic at the base and vesic- tral boundary of the area a small hill Colmena tuff. Subrounded tuff, trachyte, field prospect (Baker, 1935, pp. 507- Farm use.—Irrigated farms in Lobo ular at the top; it weathers to moderate of vesicular olivine andesite (Tg7) pro- basalt, and ignimbrite fragments are con-gray, medium- to thick-bedded, finely crystalline limestone; it crops out south crystalline limestone; of Willoughby Windgap along the likely. From the Wylies the Hogeye tuff, the base. In many places the rock is charHorns south of Willoughby Windgap, widespread and distinctive Tertiary forexceeds 300 feet; equivalent units in Bell Valley andesite of Hay-Roe (1957). western margin and south-central part of Pantera trachyte, and undifferentiated acterized by abundant spheroidal pellets along Green River, at Bullet Mounmations in the early 1930's Mayfield shipped a have described the ground-water remore than 400 feet; the over-all color is In the early 1930's Mayfield shipped a have described the ground-water rethe Van Horn Mountains. The Buda units (Tg1-Tg7) of the Garren group which are grayish red with darker rims tain, and in the Colquitt syncline. Along gray to grayish-red, massive sanidine adjacent areas have not been recognized.

Original divine parametrysis are wathread of psilomelane hand picked sources of the area in detail. Rugged to gray to grayish-red, massive sanidine and picked sources of the area in detail. Rugged to gray to grayish-red, massive sanidine and picked sources of the area in detail. Rugged to gray to grayish-red, massive sanidine and picked sources of the area in detail. Rugged to gray to grayish-red, massive sanidine and picked sources of the area in detail. Rugged to gray to grayish-red, massive sanidine and picked sources of the area in detail. Rugged to gray to lies concordantly above the Eagle Moun- (Hay-Roe, 1957) are extended westward. and average about 7 mm in diameter. the southern flanks of the syncline the trachyte porphyry. The Pantera has been which contains a few anhedral sanidine matrix is composed of calcic andesine

destroyed by chalcedony and quartz. concentrated at two localities: near High Above the flow breccia the rock is Lonesome and in the northern Sierra eutaxitic texture; the shards seem to some, tuff lies on Permian and Creta- brownish-gray vitrophyre (3 to 6 feet hedral magnetite grains are scattered the rock is a microgabbro. Phenocrysts wrap around the sanidine phenocrysts. ceous rocks (Hueco, Yearwood, Cox, Fin- thick) is overlain by a light brown vitro- throughout. Along Green River the rock (1 to 2 mm long) of zoned sodic labra-Traces of magnetite, hornblende, and lay, Benevides, and Loma Plata forma- phyre (5 feet thick). Both vitrophyres contains a few phenocrysts of sanidine dorite (An.,), altered olivine, and clinoin diameter) of metaquartzite, metarko- limestone. Practically all outcrops are in Above the lower 30 feet there are beds Pedinopsis sp., and Hemiaster sp. were The oldest Tertiary unit in the Van biotite are present. Secondary calcite, tions); along the western margin of the contain large phenocrysts (1 to 3 mm) (0.3 mm) and altered pyribole. Opal and pyroxene are set in a seriate matrix of site, and pegmatite in a matrix of red the central Van Horns; the thickness is of limestone. In general, the limestone collected in the area. The top of the Horn Mountains is the Colmena forma- chalcedony, and quartz fill small pore Van Horns, tuff is in contact with the of alkalic feldspar (Or 55) and glomero- chalcedony have filled the elongated labradorite, magnetite, olivine, augite,

In contrast, dikes of the northern Sierra Vieja attain thicknesses up to 20 feet

Canyon; on Eagle Mountains sandstone, 1957) which originated to the north in the Colquitt syncline to 187 feet thick (1 to 3 mm), subhedral to anhedral Garren group (Hay-Roe, 1957) In this than 10 percent interstitial analcime and sists of miliolids, echinoid spines, fragsists of miliolids, echinoid spines, fragsists of miliolids, echinoid spines, fragsists of miliolids, echinoid spines, fragtoceras texanum, Kingena sp., Pecten
The Gulf series is represented in the
lower base levels of the Rio Grande some is a nearly circular volcanic plug, whose maximum exposed diameter is algravish red to very dark red, scoriaceous, and contains angular fragments of aphanitic trachyte up to 8 inches in diameber (Thf) of the Hogeye. It may mark the site of a vent through which issued the material that formed the volcanic rocks of the High Lonesome area includ-

matrix of medium- to coarse-grained ous with the upper member of the devitrified glass (n=1,524) shards. cedony. The outcrop of basalt (Tg2) is several small isolated exposures of rhyo-Gods, where the Cox sandstone and Hogwow. Hav-Roe (1957) reported 1.240 the central Van Horns; it is 160 feet Eoradiolites? sp., Trigonia sp., and Ty-mostly grayish-orange, gypsiferous, cal-composed of poorly indurated tuff and The upper member (140 feet thick) is of the Gods (central Van Horns) a gray-quartz. The rock has a well-developed from the east face of the have slipped from the east face of the white tuff (Tg3) separates two layers Because all outcrops of the rhyolite (Tr) than 1,000 feet in the Eagle Mountains. the very light gray limestone of the Fin- is approximately correlative with the upper 20 the writer believes that these exposures The limestone is olive grav to medium lay. The Benevides is composed of modu- San Martine member of the Boracho pa Summit and farther south along the glomerate is overlain by 125 feet of ig- conglomerate contains pebbles of lime- thoclase phenocrysts and a few glomera- this area was a topographic high prior feet is exposed and near the upper con- are only small projections on top of a that of the three terrace gravels (Qg1, trated along bedding planes and shear 62 pp. dark gray (weathers to light gray), finely dark gray (weathers to light gray), finely lar, thin-bedded, sandy and shally lime- limestone is olive gray to medium and larger intrusive body which under- or the bolaction of the composed of mode and limestone is olive gray to medium and larger intrusive body which under- or the bolaction of the composed of mode and limestone is olive gray to medium and larger intrusive body which under- or the bolaction of the composed of mode and larger intrusive body which under- or the bolaction of the composed of mode and larger intrusive body which under- or the bolaction of the composed of mode and larger intrusive body which under- or the bolaction of the composed of mode and larger intrusive body which under- or the bolaction of the composed of mode and larger intrusive body which under- or the bolaction of the composed of mode and larger intrusive body which under- or the bolaction of the composed of mode and larger intrusive body which under- or the bolaction of the composed of mode and larger intrusive body which under- or the bolaction of the composed of mode and larger intrusive body which under- or the bolaction of the composed of mode and larger intrusive body which under- or the bolaction of the composed of mode and larger intrusive body which under- or the bolaction of the composed of mode and larger intrusive body which under- or the bolaction of the composed of mode and larger intrusive body which under- or the bolaction of the composed of mode and larger intrusive body which under- or the bolaction of the composed of mode and larger intrusive body which under- or the bolaction of the composed of the co ranging in age from Late Cenomanian vesicular and has a conchoidal fracture. stone; the sandstone is fine grained, frithrough Turonian. From the lower 43 the ignimbrite is moderate orange pink able, and the bedding is obscure. Al
Basalt (Tg4).—Grayish black, hard, This conclusion is strengthened by the concentric trend of many faults that enwith the Chambers tuff in the northern Basalt (Tg4).-Grayish black, hard, This conclusion is strengthened by the the Colquitt syncline. The rock contains The rock is pale orange, weathers to fine-grained quartz sand covers much of CONSTRUCTION MATERIALS about 3 percent of altered olivine and grayish orange, and is porphyritic except the area north and east of the mountains: labradorite phenocrysts, enclosed in a near its contacts with Cretaceous rocks. it lies on the bajada gravel (Qg3) and Road material. — The fine-grained,

quence of the Colquitt syncline and Cre- of the area. The grayish orange-nink

arkose of the Hogeye tuff. The tuff is pale orange; in most places this tuff Discordantly overlying the volcanic se-vium lie near the east-central boundary the Colquitt syncline, is a dark yellow- gravel for which DeFord and Bridges round quartz grains which are in part 1.533): the rock contains some elongate The composition of the unit is conpebbles and cobbles were probably de- way 90 along the eastern scarp of the from wells in basin areas. There are no

Late Tertiary block-faulting formed eastern face of the Van Horns; the down- Mine area unsuitable for farming.

age; the bolson deposits are materials feet of alluvium. gravel facies is concentrated adjacent to barite and manganese. the highlands: the sand and silt facies is predominant near the center of the bolson. The composition of the bolson de-rock types of the highlands. From the ern Van Horns contains more than 80 few available data the thickness of the bodies of mica-bearing potash-feldspar

(Strain, 1959). Horn Creek contain four levels of terrace crushing the rock of the larger pegma-

drainage system. These gravels from oldest to youngest are shown on the map by means of the symbols Qg1, Qg2, and The Plata Verde mine, a mile ter. The plug intrudes the basalt memfew feet in the center of the bolson to the American Smelting and Refining

Og3. An undifferentiated pediment northwest of the Mica Mine area along middle gravel (Qg2) and is probably tains small quantities of cerargyrite older than the older (Qg1). The gravels (horn silver). The mine was worked consist of subangular to subrounded, sporadically during the 1930's and 1940's. pebble- to boulder-size material derived Most of the production occurred between from the Cretaceous and Tertiary strata 1936 and 1939 when 10,800 tons of ore of the area, Thicknesses range from a were shipped to the El Paso smelter of perhaps 100 feet near the highlands. A Company. The siliceous silver chloride poorly sorted, caliche-cemented gravel ore contained 9 to 26 ounces of silver and hajada (Qg3) flanks the eastern margin 0.23 to 0.46% copper, 68% silica, 13% of the mountains and is correlative with alumina, 2% ferric iron oxide, 1% lime, the youngest gravel (Qg3) of the Green 0.1% zinc, and 0.3% sulfur. The most River bolson. The age of the terrace recent exploratory work was done during gravels probably ranges from Pleisto- 1954-55 when a vertical shaft was sunk

Large blocks of Loma Plata limestone According to Flawn the mineralization

Light vellowish-brown, unconsolidated,

Several small dunes resting on allu-

intermontane basins with interior drain- thrown block is covered by at least 500 that were derived from the surrounding The prospect is readily accessible to Because of the shallowness of Precamhighlands and deposited in the basins. highway and railway. Additional pros- brian rocks, the denudation of marine The deposits consist of interhedded very pecting of the fault zone below the surpale orange silt, sand, and gravel. The face might yield larger quantities of al periods, the intrusion of sedimentary strata by igneous rock, and the intense MICA AND FELDSPAR

fracturing during tectonic episodes, the Van Horn Mountains and flanking areas are not considered favorable for petroleum production, If petroleum were found, it would probably be in the Green deposits of the Green River bolson and pegmatite that are more than a foot formations may be present beneath the Lobo bolson exceeds 1,000 feet: the thick. Flawn (1951, pp. 190-191, and basal-Cretaceous and basal-Permian unage is late Tertiary and Quaternary in King and Flawn, 1953, pp. 169-170) conformities. has discussed the history of operations and the mineral prospects of the area. Recently, roofing and facing material

The valleys of Green River and Van has been produced in small quantity by ADKINS, W. S. (1933) The Mesozoic sys-Geol. Quad. Map No. 22. gravel (Qg) is at least as old as the the western base of the mountains, con- BAKER, C. L. (1927) Exploratory geol-

1934, pp. 215-884. at the south end of the old workings (P. T. Flawn, 1959, personal communi- BRIDGES, L. W. (1958) Revised Cenozoic

Dieciocho fault and rest on the Chispa trending gravity faults which border the DASCH, E. J. (1959) Dike swarm of lerman (1953, p. 14), from 400 to more yellowish-brown sandy limestone above The upper member of the Loma Plata Many fossils have been collected from ries from about 3 to 70 feet.

Summit formation; the range in age of shafts and inclines on the east and west. The upper member of the Loma Plata Many fossils have been collected from ries from about 3 to 70 feet.

Summit formation; the range in age of shafts and inclines on the east and west. The upper member of the Loma Plata Many fossils have been collected from ries from about 3 to 70 feet. the landslip material is the same as Small blebs of cerargyrite are concen- Pecos Texas; M.A. thesis, Univ. Texas, zones (parallel to the bedding) in the DeFord, R. K. (1958) Tertiary formasteeply dipping muscovitic sandstone beds of the Powwow conglomerate. Inv. No. 36.

suitable for base course material. Sand.—The dunes along the eastern border of the area contain poorly sorted. impure, loose, medium- to fine-grained quartz sand which possibly could be used in local construction.

GROUND WATER

pendent on a good supply of ground Ranch use.-More than 40 pumping wells produce water from the Hueco limestone and Cox sandstone, from Cretaceous limestones and volcanic strata, is exposed for about a mile along the the Green River valley south of the Mica

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Sierra Vieja is a local basalt flow. About

the east bank of Green Kiver, and along with intergranular magnetite and clinotop of this unit is chosen as the top of
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Sierra Vieja is a local basalt flow. About

that this alluvium may be correlative eastern scarp of the Van Horns. These

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