# *Evidence of igneous activity in the northwestern part of the Delaware Basin*

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## EVIDENCES OF IGNEOUS ACTIVITY IN THE NORTHWESTERN PART OF THE DELAWARE BASIN

by
Wallace E. Pratt*

The southern part of the Deleware Basin abounds in igneous rocks. Similarly, igneous rocks are in evidence along its western margin. But few outcrops of igneous are known in the northern part of the basin. This paper describes briefly two localities in which evidences of intrusive igneous rocks have been observed in the northwestern part of the basin.

The 1928 edition of the geologic map of New Mexico, compiled by N.H. Darton, shows a north-northeast trending igneous dike in the northeastern part of Township 26 South, Range 24 East, near the point where the Carlsbad-El Paso highway, U.S. 62 crosses the southern border of the state into Texas. This dike is emplaced in beds of Castile gypsum and the possible contact effects of such an occurrence might be expected to command unusual interest. Yet surprisingly few of the considerable number of geologists who have carried out field work in this locality appear to be familiar with it. Phillip King, for example, in his study of the adjacent Guadalupe Mountains (1948), merely notes its presence:

> "Northeast of the area studied a dike of igneous rocks cuts the anhydrites of the Castile formation. I have not visited this locality and know nothing of the character of the rock."

Under the circumstances it appears worthwhile to record even casual observations on this occurrence.

Darton's only published reference to this dike (1928) states:

> "In 1925 I found a dike cutting the Castile gypsum in Section 10, Township 26 South, Range 24 East, 30 miles south-southwest of Carlsbad. An examination by C.S. Ross shows that althouth considerably decomposed, it is a lamprophyre of basaltic habit."

The vicinity of this dike is shown on the accompanying sketch map, figure 1. There are, in fact three separate dikes. Their presence is manifested at the surface by rectilinear patches of rust-colored, earthy material, studded with occasional sharp, small fragments of a dark colored, fine-grained igneous rock. The dikes vary in width up to about 20 feet and in length up to about one-half mile. They are parallel, *en echelon*, and trend east-northeast. They lie close together within, but at the extreme northern margin of the area of Castile outcrop marked by conspicuous "linears", as shown by Phillip King on U.S. Geological Survey, Oil and Gas Investigations Preliminary Map 90. These linears are also parallel and also trend north of east, but in a direction more easterly than the trend of the dikes.

Three miles to the northeast of the highway, is Lang's (1947) Cretaceous fossil locality. At this point there is also evidence of igneous rocks, to be discussed later. About one half mile northwest of the middle of the northernmost dike is a so-called "bottomless lake", a typical sink-hole in the Castile. CP Hill, a large outlier of Rustler formation, lying unconformably on the Castile, 20 miles west of the normal outcrop of the Rustler, is situated a little more than one mile southeast of Lang's Cretaceous fossil locality. This hill is roughly on the strike of the dikes, projected eastward.

One half mile east of the eastern end of the southernmost dike, across the highway, is a quarry in a vein-like body of crystalline selenite. This body of selenite appears to trend east-northeast, parallel to the dikes, between walls of Castile gypsum. It lies athwart a prominent linear, transgressing the strike of the linear slightly. One mile to the south is another parallel linear, and between these two linears, which mark low scarps, facing each other, lies a shallow flat-bottomed valley. In this valley 3/4 of a mile southeast of the selenite quarry stands a conspicuous brown hill, formed of another Rustler outlier. The rocks of this hill are copiously stained with iron oxide and several tunnels and shafts have been driven into it by prospectors.

The dike rocks are severely altered and the walls of the dikes are not clearly defined. To recover a hand-size specimen of fresh rock from the outcrop requires considerable search. In 1950 I collected and submitted to Peter H. Masson* two specimens which he has been good enough to identify and describe.

He classed as an alkali trachyte a specimen which I took from the south wall of the northernmost dike, midway along its outcrop. In thin section he identified the following minerals:

Oligoclase, abundant narrow twinned laths with

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*Humble Oil & Refining Co., Houston, Texas. Personal Communication.

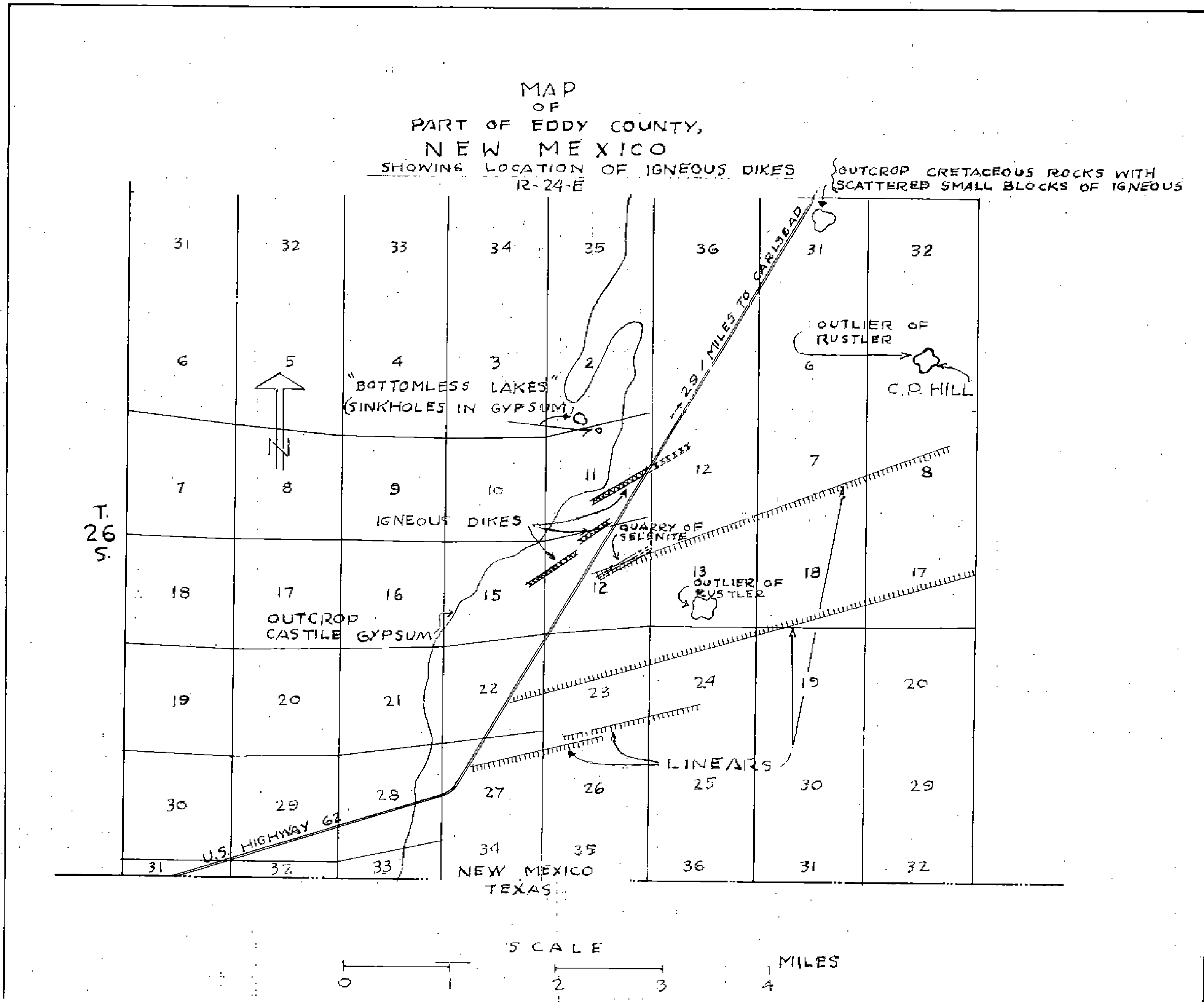
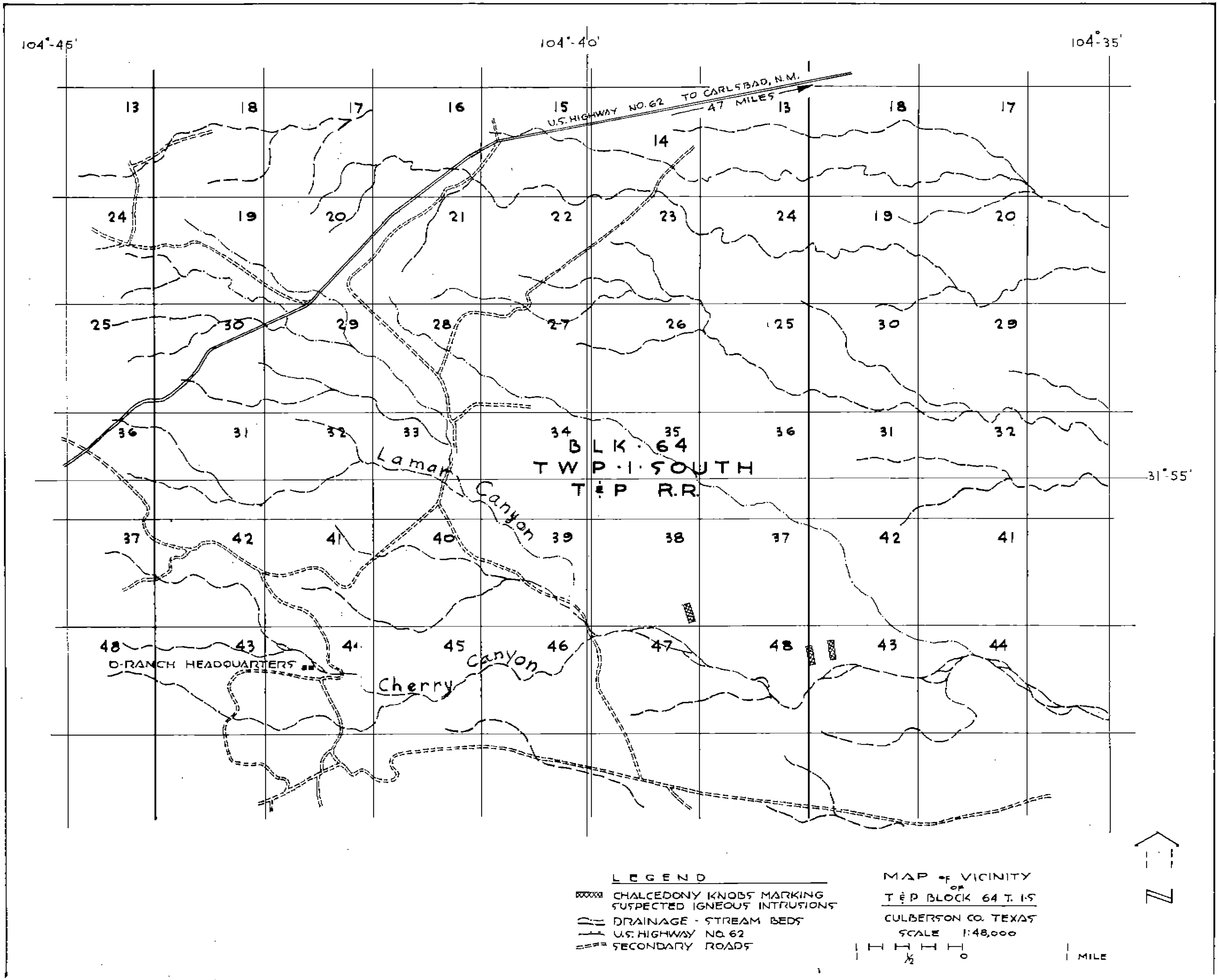

MAP OF PART OF EDDY COUNTY, NEW MEXICO
SHOWING LOCATION OF IGNEOUS DIKES
R-24-E
T. 26 S.
OUTCROP CRETACEOUS ROCKS WITH SCATTERED SMALL BLOCKS OF IGNEOUS
29 MILES TO CARLSBAD
OUTLIER OF RUSTLER
C.P. HILL
"BOTTOMLESS LAKES" (SINKHOLES IN GYPSUM)
N
IGNEOUS DIKES
QUARRY OF SELENITE
OUTLIER OF RUSTLER
OUTCROP CASTILE GYPSUM
LINEARS
U.S. HIGHWAY 62
NEW MEXICO
TEXAS
SCALE
0 1 2 3 4 MILES

FIGURE 1.



104°-45'
104°-40'
104°-35'
31°-55'
U.S. HIGHWAY NO. 62 TO CARLSBAD, N.M. 47 MILES
BLK · 64
TWP · 1 · SOUTH
T & P R.R.
Lamar Canyon
Cherry Canyon
D-RANCH HEADQUARTERS
LEGEND
CHALCEDONY KNOBS MARKING SUSPECTED IGNEOUS INTRUSIONS
DRAINAGE - STREAM BEDS
U.S. HIGHWAY NO. 62
SECONDARY ROADS
MAP of VICINITY of T & P BLOCK 64 T. 1-S
CULBERSON CO. TEXAS
SCALE 1:48,000
½
0
1 MILE
N


FIG. 2

altered dusty appearance and frayed irregular outlines.

Orthoclase, Minor.
Ilmenite, fairly abundant.
Titaniferous Magnetite, minor
Apatite, Abundant
Epidote, Minor.
Gypsum, abundant in vesicles.
Pyrite, lining vesicles.

Masson identified the other specimen of dike rock, which came from the highway cut across the east end of the northern most dike, as a soda trachyte of porphyritic texture, with principal minerals in the following approximate order of abundance. Anorthoclase, Albite, Chloritic material, Ilmenite, Magnetite, Calcite and gypsum, the last two as secondary minerals lining vesicles.

Both specimens are vesicular, indicating a surface environment of cooling and crystallization. W. Harold Tomlinson reports traces of bismuth, copper and lead in specimens of this same dike which I collected and asked him to examine.

At Lang's Cretaceous fossil locality, patches of dark colored igneous rocks in sharp fragments and blocks up to about 8 inches in maximum dimension are encountered at intervals over an area one-half mile in diameter. I have not found this material definitely in place, but it appears to be confined to this one locality.

Masson has also examined specimens of this rock. He identified one specimen as an altered olivine trachyandesite, dark gray in color, porphyritic in texture and vesicular, with the following minerals: Oligoclase, Andesine, Sanidine, Hornblende, Ilmenite, Apatite, Chlorite, Chrysotile, Biotite, Gypsum, Zeolite (type not determined, and Pyrite. Another specimen, he classed as a biotite trachyandesite, dark brown in color and prophyritic. In this specimen the following minerals were identified: Oligoclase, Andesine, Biotite, Chlorite, Magnetite, Bowlingite (?), Apatite and Calcite. Both specimens are clearly rocks that cooled close to the surface.

Phillip King (1948) has described another occurence of igneous rocks which is situated in Culberson County, Texas, about 15 miles southwest of the cluster of dikes described above, near the southeast corner of Block 64, Township 1 South, T. & P. Railroad Survey. This locality is shown on the accompanying sketch map, Fig. 2. The outcrops are difficult of access, forming part of the rugged walls of Lamar Canyon, about 5 miles south of U.S. Highway 62, some 50 miles southwest of Carlsbad.

In his discussion of Tertiary igneous rocks, King notes that very little igneous activity took place in the region of the Guadalupe Mountains. With reference to the outcrops near the southeast corner of Blk. 64, shown on Fig. 2, he states (page 102):

> "One small intrusive plug was found within the area studied, and only a few have been found elsewhere in the mountains.
>
> This plug, discovered by H.C. Fountain, is situated in the Delaware Mountains, in a small ravine half a mile north of Lamar Canyon and 1½ miles east of the junction of Lamar and Cherry Canyons. It forms a low ridge several hundred feet long, and cuts sandstones not far above the Rader limestone member of the Bell Canyon formation. The sandstones have been tilted, baked, and silicified for about 10 feet from the edge of the plug. The rock itself is light gray and aphanitic and is probably a trachyte."

I have examined this "Plug" several times and, with the assistance of Mr. Jack Kinney of the D Ranch staff, found two other similar outcrops about one mile to the east-southeast, as shown on Fig. 2. But at none of these outcrops have I been able to find any igneous rock, or any tilted or baked sandstones. There is clear evidence of intense silicification of the enclosing sandstones, however, at each of these outcrops.

The "low ridge several hundred feet long" noted by King as marking his intrusive plug consists of great blocks of chalcedonic sandstone, deeply stained with iron at the surface. On fresh fracture, the rock is dazzling white and has the appearance of a quartzitic sandstone. Peter Masson examined samples I collected and identified the rock as a "quartz sandstone" composed of closely packed, rounded to subrounded grains, "with secondary outgrowth rims."

The two other outcrops shown on Fir. 2 are similar to King's plug in character, although somewhat smaller – low ridges, more than 100 feet in length, composed of large, jagged blocks of chalcedonic sandstone. These ridges are all parallel, trending north-northwest, and they are distributed along a line running east-southeast. A little higher in the stratigraphic section that the western outcrop, the two eastern outcrops occur in Bell Canyon sandstones at about the horizon of the Flaggy (McCombs) limestone member. Associated with the eastern outcrop is a prominent aragonite vein, a foot or more in width, striking north-northwest, parallel to the ridge of chalcedony blocks, at a distance of about 30 feet to the west of it.

I would interpret each of these ridges of silicified sandstone, as evidences of underlying intrusive dikes or plugs, as King did. Each of them, in my opinion, is a part of the siliceous mantle of an underlying igneous intrusion.

In this connection it should be noted that Magnolia Petroleum Company's Homer Cowden No. 1, located seven miles east-southeast of these chalcedony ridges, on line with their trend, drilled into a body of igneoug rock at a depth of 8730 feet and continued in it to a depth of 9140 feet. This body of igneous has been interpreted as a sill. Perhaps the source of this intrusion may also be the source of the solutious which so intensely silicified the conspicuous outcrops under discussion.

Megascopic inspection of cores cut from this sill show it to be a light gray, holocrystalline rock, with prominent black needles of some ferromagnesian mineral. Remarkable enough, it is extremely porous and made a copious flow of salt water on test. Joseph Neely of the Magnolia Petroleum Company, has kindly placed at my disposal the following petrographic analysis, made by Peter T. Flawn at the University of Texas, of the igneous material encountered in this well:

"1. Estimated mineral composition:
   73% Plagioclase; zoned-oligoclase to andesine.
   15% microcline microperite.
   5% biotite; pale to reddish brown, partly altered to chlorite.
   4% calcite, replacing the primary minerals and filling interstices between feldspar subhedra.
   3% chlorite; from alteration of biotite.
   Trace sericite; from alteration of feldspar
   Trace quartz; a secondary mineral, associated with calcite in interstitial fillings.
   Trace zircon
   Trace apatite; needles and grains.

2. Grain size: average 2 m m

3. Fabric: hypidiomorphic granular

4. Rock name: lenco syendiorite (under other classifications, viz. Wahlstrom, this rock might be called a monozite)."

According to Flawn (1952) the tertiary intrusives of West Texas and eastern New Mexico generally consist of alkalic igneous rocks. The specimens collected from the two localities described above appear to fit into this classification and may reasonably be presumed to be of Tertiary age.

### References

1949 – King, Phillip. Geology of the Southern Guadalupe Mountains, Texas U.S. Geological Survey Professional Paper 215 (1949) P. 103.

1928 – Darton, N.H. Red Beds and Associated Formations in New Mexico. U.S. Geological Survey Bulletin 794 (1928) P. 61.

1947 – Lang, W.B., Occurrence of Comanche rocks in Black River Valley, New Mexico. Amer Assoc. Petroleum Geologists Bull. Vol. 31 (1947) p.p. 1472-1478.

## ABSTRACT

**Proposed Type Sections for the Queen and Grayburg Formations of Guadalupian Age in the Guadalupe Mountains, Eddy County, New Mexico**

by
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The "Queen sand" was named "from extensive outcrops in the vicinity of Queen Post Office" in Eddy County, New Mexico (Crandall, 1929) but no type section was designated, and no thickness was given. The Grayburg formation" was named by Dickey (1940) from an interval in a well drilled one mile north of the Grayburg pool in Eddy County. He stated, "The . . . . Grayburg undoubtedly crop (s) out in the Guadalupe Mountain area west of Carlsbad, and at some future time (it) should be measured and defined in this area." Recent mapping has shown that both units deserve formational status. Since a great deal of confusion has arisen because these two commonly used names have never been adequately defined in their surface outcrops, type sections are herewith proposed.