PEYTON YATES
Case No. 8354
10/17/84 Examiner Hearing
Exhibit No. 5

LA MESA UNIT

PEYTON YATES

JUNE 15, 1984

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BLACK OIL, INC.
AIPG # 2392
AAPG # 1743

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INTRODUCTION

Peyton Yates proposes to drill a 7000' wildcat well in Section 26 of T.15N., R.9E., and a 8200' wildcat well in Section 20 of T.16N., R.9E. to test the Paleozoic section on a large subthrust structure in this area. Accordingly, the purpose of this report is to summarize the geological reasons for forming a 152 section federal unit.

PROPOSED UNIT LOCATION AND DESCRIPTION

The proposed La Mesa Unit (Figure 1) is located in northern Santa Fe County, just west and southwest of Santa Fe, New Mexico. The unit is situated in a region of semi arid, moderate to low relief, pinon and juniper covered range land, with scattered ranches and home sites. The surface is covered by terrace gravels and a thin veneer of eolian sand and soil over Tertiary sandstones and volcanics.

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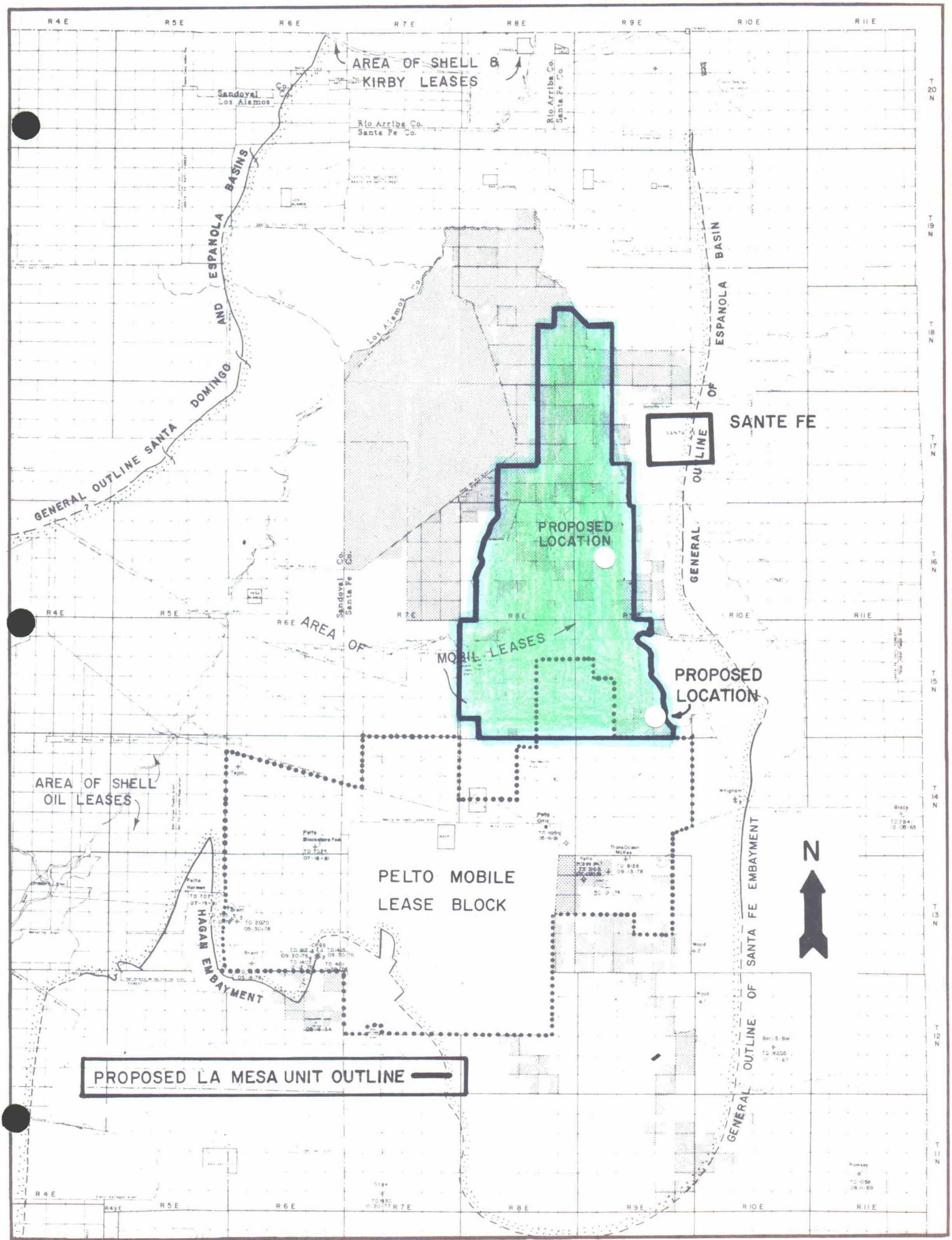

Figure 1. Regional Index Map

Surface drainage is provided by intermittent streams and arroyos which eventually drain into the Santa Fe river and the Rio Grande. Topographically, the area ranges from flat plains in the southwest to rolling foothills in the east and northeast. Elevations range from 6800 feet in the northeast to 6000 feet in the southwest.

Primary access to the unit area is provided by interstate Highway I-25 and numerous paved state and county roads. Numerous secondary dirt and gravel roads serve small ranches and residences in the area, particularly near Santa Fe. New road construction for the proposed tests will be minimal.

The proposed unit area (Figure 2) comprises approximately 152 sections (4-1/4 townships). The unit is bounded on the east by the outskirts of the city of Santa Fe and the foothills of the Sangre de Cristo Mountains. It is bounded on the north by the Jacona Grant, and on the west and north by the proposed Caja del Rio Grande Unit. It is bounded on the south by the boundary line between T.14N., and T.15N.

GEOLOGICAL DISCUSSION

The La Mesa Unit is located on the extreme east flank of the Espanola Basin. Within the unit, approximately 12,000' of sedimentary rocks of Mississippian, Pennsylvanian, Permian, Triassic, Jurassic and Cretaceous rock are overlain by up to 5,000' of Tertiary and Quaternary rocks. In addition to the normal section, low angle imbricate thrust faulting has thrust the Paleozoic and Mesozoic section southeasterly over rooted Paleozoic and Mesozoic sediments in parts of the unit area. This thrusting may have thickened the section to over 20,000' in the extreme northwestern part of the unit.

To date only one well, the CKZ, Inc. Gianardi No. 1 in Sec. 21, T15N, R8E, has been drilled in the unit area. This well was drilled 7000 feet into the Permian section in 1983. The well was drilled tight and no data has been released.

Excellent reflection seismic lines in the area document unusual and dramatic thrust faulting which is present beneath Tertiary cover. Thrusting which is soled in the Precambrian or lower Paleozoic has created a large structural trap potential in the lower rooted plate where an upper overthrust plate of Paleozoics has been thrust southeastward over the truncated lower Paleozoic section. The lower plate section plunges to the west, north and south along a very large anticlinal flexure. This geometry creates a very large truncated and faulted anticlinal prospect in the lower plate. Because of the size of the flexure, there is a potential for several hundred million barrels of oil, and equivalent gas.

The primary objective will be the lower Paleozoics units which are truncated by and are underlying the overthrusted Paleozoic sheets. Shallower folded Paleozoic and Mesozoic rocks are also possible objectives. Figure No. 3 is the expected normal stratigraphic section (generalized) for the unit area.

Era	System	Series	Stratigraphic unit	Lithology	Thickness (Basin)
Cenozoic	Quaternary	Holocene	Unnamed local sedimentary deposits	Alluvium in valleys; stream gravel on low terraces; colluvium on slopes	3-15
		Pleistocene		Stream gravel on high terraces; alluvium on high pediments	0-15
			Bandelier Tuff	Welded and nonwelded rhyolite ash flows	0-150
	Quaternary or Tertiary	Pleistocene or Pliocene	Unnamed local sedimentary deposits	Gravel on high-level piedmont, west and northwest sides of Nacimiento Uplift	0-30
	Tertiary	Pliocene	Puye Formation	Sand, volcanic gravel, tuffaceous beds, and river gravel	15-215
		Pliocene and Miocene	Tschicoma Formation	Dacite, rhyodacite, and quartz latite of Jemez Mountains volcanic pile	0-900
			Lobato Basalt	Olivine-augite basalt	0-180
			Santa Fe Formation of Smith, Bailey, and Ross, 1970. Mainly equivalent to Miocene Tesuque Formation	Partly consolidated cross-bedded sand, arkosic sand, and volcanic-pebble gravel and sand; pinkish brown to buff	0-1200+
		Miocene and Oligocene	Abiquiu Tuff of Smith, 1938	Tuffaceous sandstone, volcanic-pebble conglomerate and, at the base, conglomerate of Precambrian and Paleozoic clasts; light gray	0-360+
		Oligocene(?) and Eocene	El Rito Formation of Smith, 1938	Sandstone, shale, and conglomerate of Precambrian clasts; red to brown; nonmarine	0-120
		Eocene	San Jose Formation	Shale, sandstone, conglomerate; nonmarine	60-550
		Paleocene	Nacimiento Formation	Shale, sandstone, conglomerate; nonmarine	160-530
			Ojo Alamo Sandstone	Sandstone and conglomerate; nonmarine	20-60
Mesozoic	Cretaceous	Upper	Kirtland Shale and Fruitland Formation	Shale and sandstone; nonmarine	30-135
			Pictured Cliffs Sandstone	Sandstone; marine	0-70
			Lewis Shale	Claystone, siltstone, and some thin limestone; marine	150-680
			Mesaverde Group	Sandstone, shale, and some coal; marine and nonmarine	170-560
			Mancos Shale	Claystone, siltstone, and some thin limestone; marine	700-760
			Dakota Sandstone	Sandstone, some shale and conglomerate; marine and nonmarine	45-60
	Jurassic	Upper	Morrison Formation	Sandstone and shale; nonmarine	100-180
		Middle	Todilto Formation	Gypsum and underlying limestone; nonmarine	18-38
			Entrada Sandstone	Sandstone; nonmarine	70
	Triassic	Upper	Chinle Formation	Claystone, siltstone, sandstone, and basal conglomeratic sandstone; red and brown; nonmarine	300-320
Paleozoic	Permian	Lower	Cutler Formation	Sandstone, shale, and conglomerate; arkosic; red and brown; nonmarine	150-290+
	Pennsylvanian	Upper and Middle	Madera Formation	Limestone, shale, and arkosic sandstone; mainly marine	0-300+
		Lower	Sandia Formation	Sandstone, shale, and some limestone; marine and nonmarine	0-60+
	Mississippian	Upper and Lower	Arroyo Penasco Group	Limestone and thin basal sandstone; marine	Present
Precambrian			Granite, tonalite, gneiss, schist, metavolcanic rocks, quartzite, and local mafic and ultramafic rocks		

Figure 3. Generalized Espanola Basin section.

The south, west and north sides of the unit are defined by the -2000' contour on the top of the Pennsylvanian in the lower in-place anticlinal trend as shown on Figure 4. The west side is also generally coincident with our proposed Caja Del Rio Grande Unit Area. The south side is further limited by the potential trapping limits of the overthrusted sheets. The east side of the unit is defined by north-south trending, down to the west, high angle normal faulting associated with the west flank of the Sangre de Cristo uplift. This fault zone structurally defines the eastern side of the Espanola Basin.

Because of the complex nature of the overthrusts, structural contouring in the underlying Paleozoic units is difficult, however it is quite apparent that a major structural uplift is present under the over-thrust sheets. Accordingly, we feel two tests of this structure are necessary. The southern test will drill to basement at a drilling depth of approximately $\pm$ 7000'. The second, northern test, will drill to 8200' through the overthrusts and into the underlying lower Paleozoic.

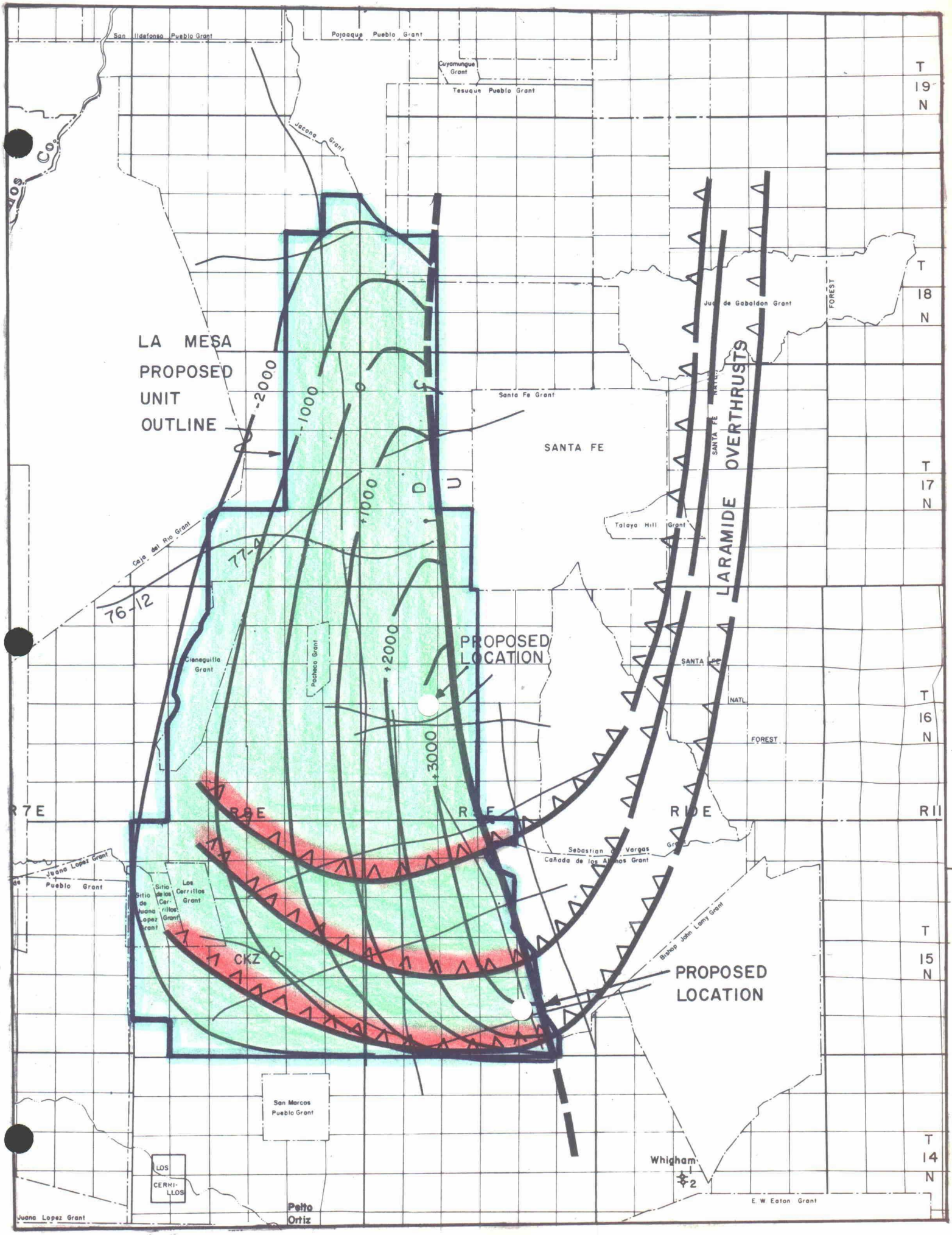

Figure 4. Generalized Contours Top Pennsylvanian in Lower Plate, showing upper plate over thrusts.

SUMMARY AND CONCLUSIONS

The structural map on the top of the Pennsylvanian (Figure 4) shows the most compelling evidence for the unit as proposed. A very large northerly trending anticlinal flexure, which is faulted on its eastern flank, has been truncated and overthrust by Paleozoic sediments from the west and northwest. This geometry forms a potentially large structural trap where the overthrusted plates seal the truncated lower Paleozoic units. Additionally, the northerly trending, down-to-the west fault zone, which forms the eastern edge of the Espanola Basin, down faults this large anticlinal feature and may form an updip seal on the east side of the unit.

This part of the Espanola Basin is virtually unexplored and no wells in the basin have yet penetrated to basement rocks. The southern proposed wildcat will drill through the overlying thrust sheets and test the entire Paleozoic section. The second and northern test will drill through the overthrusts and test the lower plate Paleozoics - it may or may not go to basement. These two tests will be the first tests of the entire Paleozoic in the the Espanola Basin.

In conclusion, the outline of the 4-1/4 township proposed La Mesa Unit includes all drillable locations which we can presently see. All geologic parameters appear to justify the formation of the unit as proposed since this large structure and the overlying thrust sheets are quite complex and drilling will be expensive.

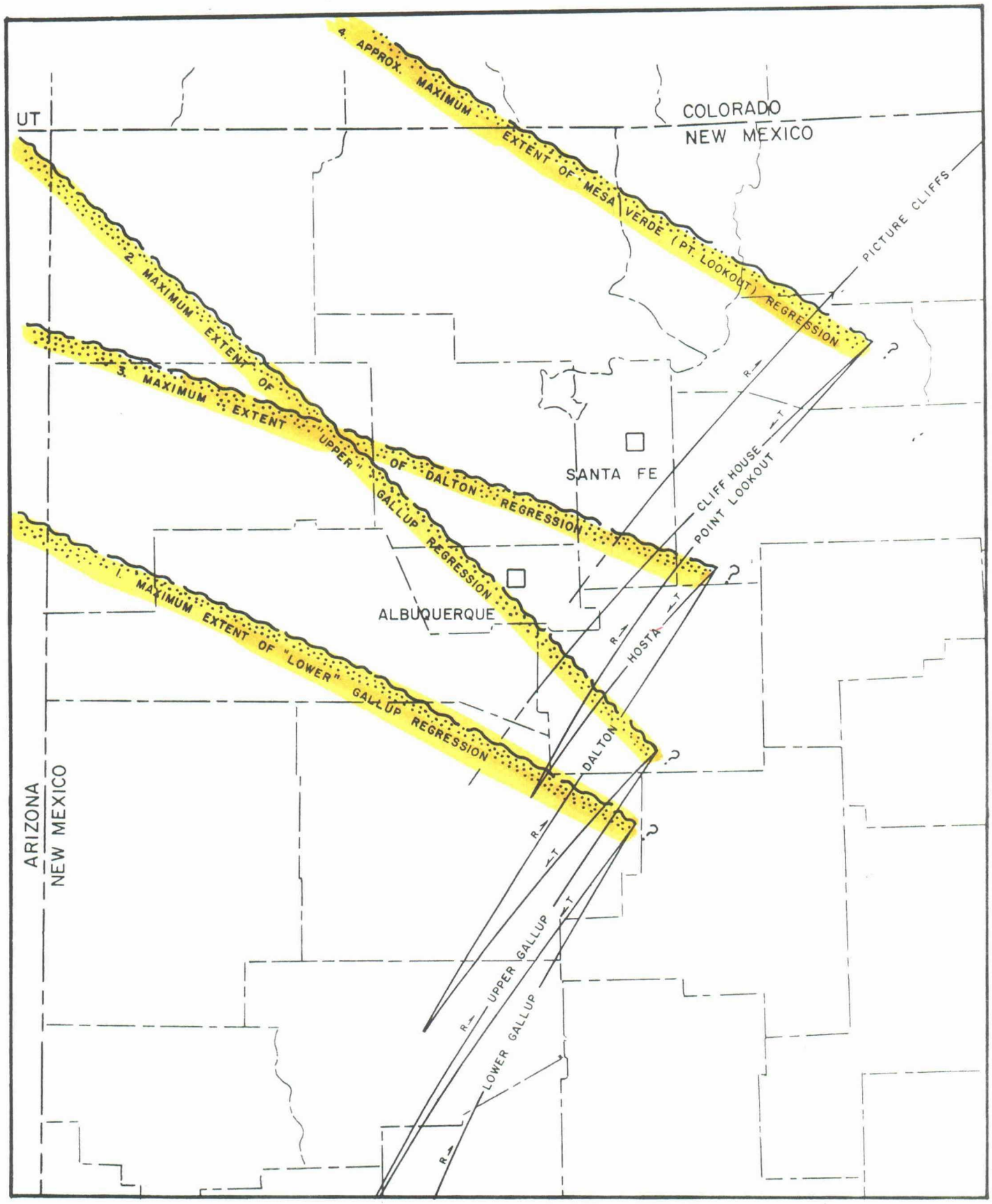

Fig.3 Location of maximum extent of major Cretaceous regressions in the northwestern part of New Mexico.

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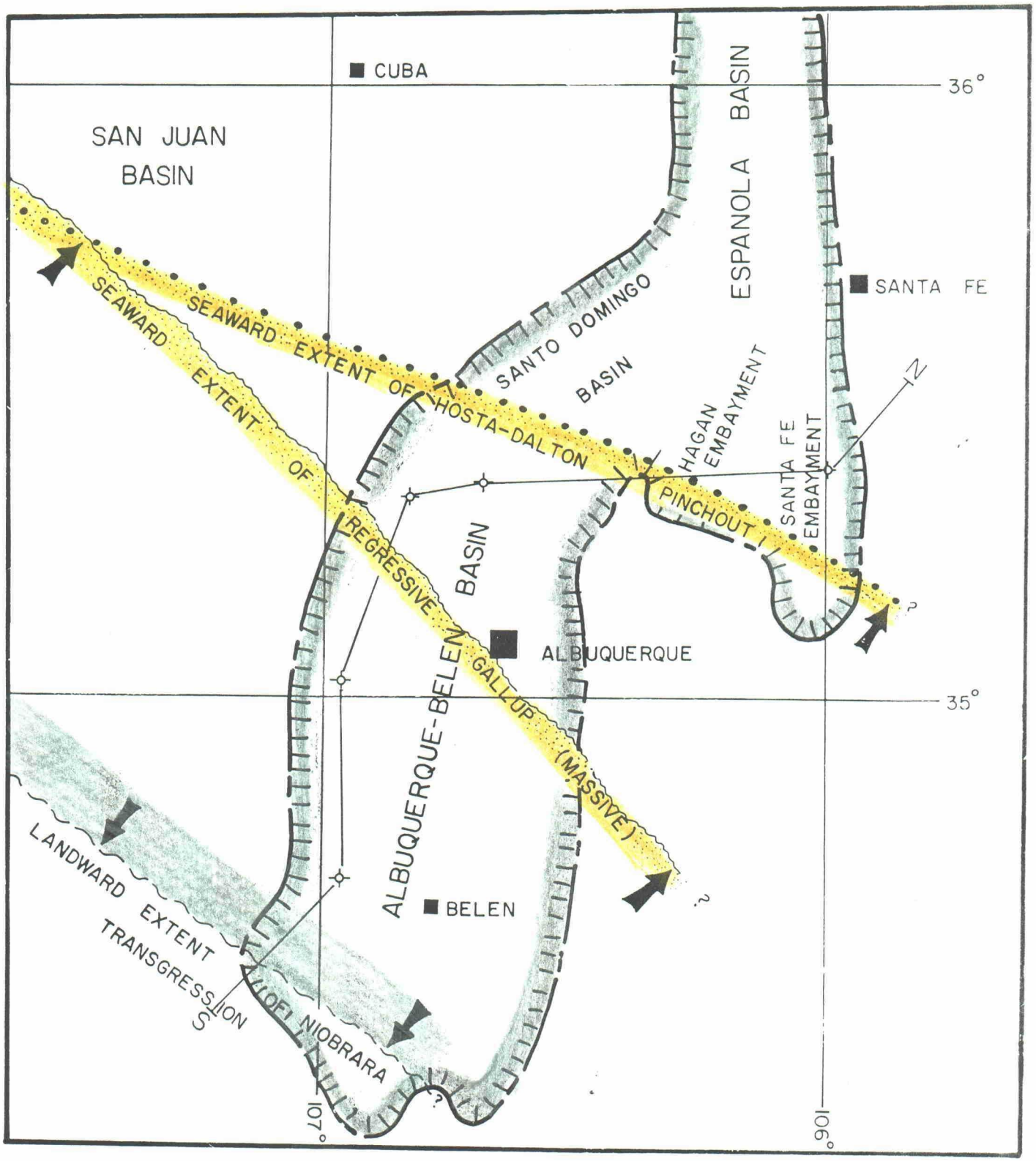
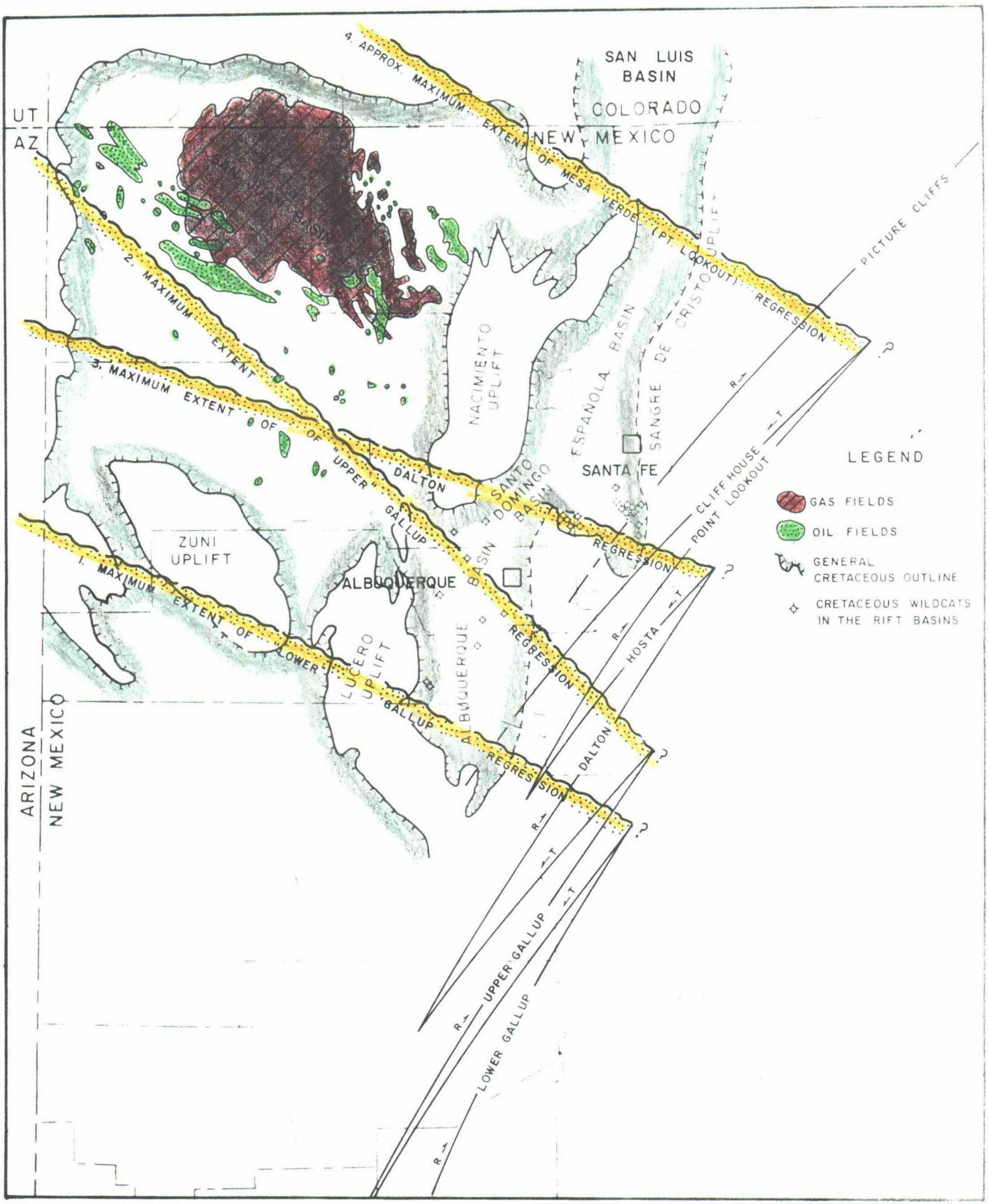

CUBA
36°
SAN JUAN BASIN
ESPANOLA BASIN
SANTA FE
SEAWARD EXTENT OF HOSTA-DALTON
SANTO DOMINGO BASIN
HAGAN EMBAYMENT
SANTA FE EMBAYMENT
N
PINCHOUT
SEAWARD EXTENT OF REGRESSIVE GALLUP (MASSIVE)
ALBUQUERQUE
35°
ALBUQUERQUE-BELEN BASIN
BELEN
LANDWARD EXTENT OF TRANSGRESSIVE NIOBRARA
107°
106°


4. APPROX. MAXIMUM EXTENT OF MESA VERDE (PT. LOOKOUT) REGRESSION
SAN LUIS BASIN
COLORADO
NEW MEXICO
UT
AZ
2. MAXIMUM EXTENT
3. MAXIMUM EXTENT OF UPPER
DALTON
GALLUP
REGRESSION
NACIMIENTO UPLIFT
ESPANOLA BASIN
SANGRE DE CRISTO UPLIFT
PICTURE CLIFFS
SANTA FE
SANTO DOMINGO BASIN
CLIFF HOUSE
POINT LOOKOUT
ZUNI UPLIFT
ALBUQUERQUE
1. MAXIMUM EXTENT OF LOWER
LUCERO UPLIFT
ALBUQUERQUE BASIN
HOSTA
DALTON
UPPER GALLUP
LOWER GALLUP
ARIZONA
NEW MEXICO
LEGEND
GAS FIELDS
OIL FIELDS
GENERAL CRETACEOUS OUTLINE
CRETACEOUS WILDCATS IN THE RIFT BASINS