INTRODUCTION

The southwestern region of the United States embraces much of Texas, Oklahoma, and southern Colorado, as well as all of New Mexico, Arizona, and southern California. But **the southwest** to many people is the arid country of New Mexico and Arizona.

Through this vast country of desert valleys, broad plateaus, and lofty mountains flow two great rivers, while between them rises the Continental Divide. To the west of this continental backbone is the Colorado, with its rugged canyons which are fabulous geologic spectacles.

To the east and coursing southward to the Gulf of Mexico, is the Rio Grande. Its pleasant valleys, its peoples, and the problems of its waters have been, for years, matters of interest and concern to the American public.

Almost from its headwaters in the San Juan Mountains of southern Colorado the Rio Grande flows through broad valleys that have been the sites of early civilizations. Pueblo Indians were forming fertile areas in this country when Coronado came in search of Cibola and treasure. And here the Spanish colonists settled and thrived. Santa Fe, the oldest seat of government in the United States, was established in the valley of the Rio Grande in 1609, and since then the country has always been a "land of enchantment" and great adventure.

In 1821 Mexico won its independence from Spain, and Santa Fe became a provincial capitol of the new country. The Rio Grande country remained under the flag of Mexico only briefly, however. In 1846 General Kearney of the United States arrived in Santa Fe, and proclaimed the end of Mexican control of the land and its people.

Under the United States New Mexico has been both a territory and a state. Added to its original Indian population were the Spanish colonists and their descendants. Finally, there came the English-speaking settlers from the east. Thus, for over a hundred years, the Rio Grande country has been a land of three peoples and of several languages.

The natural resources of the state of New Mexico are large, and in consequence, the Rio Grande country has developed into a nerve center for exploration and exploitation of this wealth. Its prosperous cities and towns along the Rio Grande Valley are Taos, Espanola, Santa Fe, Bernalillo, Albuquerque, Belen, Socorro, Truth or Consequences, and Las Cruces. Modern transportation systems — railroads, highways, and airways — link these, and also furnish very comprehensive ties with other parts of the continent.

Even with its arid climate the agricultural capabilities of the country are such that a considerable diversity of effort has been encouraged. Thus, there is irrigated and some dry farming. In addition, there are large cattle as well as sheep ranches. Finally, there is valuable timber.

Since the days of the early Spanish expeditions, the Rio Grande Valley and its bordering mountains have been searched for deposits of metallic and nonmetallic minerals, and production, both in the past and at present, has been large. Among the more valuable have been bodies of copper, molybdenum, zinc, lead, manganese, silver, gold, and iron. Fluorspar has been produced in a number of operations, and pumice and perlite deposits are now being exploited. Coal, both for industrial and domestic uses, has been extensively mined at several points.

Turning now to the geologic aspects of the area, the Rio Grande Valley and flanking uplifts constitute an area of nearly 40,000 square miles across the central portion of the state of New Mexico, from the Colorado line on the north to the Texas line on the south. In a way it is a natural province, and consists of a series of northerly trending linked basins flanked by uplifts of various types. The principal basins lie along the Rio Grande depression, and they are bordered on either side by narrow or broad uplifts. The generally uplifted borders of the province contain within them other narrow but less deeply depressed basins.

Many of the uplifts have cores of pre-Cambrian rocks that are locally exposed at the surface. Overlying the pre-Cambrian rocks are sedimentary formations which range in age from Cambrian through Tertiary. In the southern part of the province, the sedimentary rocks range from Cambrian to Tertiary, and the thickness of the sedimentary section may locally exceed 12,000 feet. In the central part of the province, the formations range from Mississippian to Tertiary in age, and thicknesses are as much as 15,000 feet. In the northern part of the province the sediments range in age from Mississippian to Tertiary and there, too, the thicknesses may locally be as much as

12,000 feet.

The principal structural features of the province are systems of northerly trending faults and fault zones. Many of these appear to be of the types that have been referred to as rifts. The most prominent rifts are on the boundaries between the marginal uplifts and the central depressions. However, within some of the basins the rifts may be more numerous than in the bordering uplifts. Some of the deep linked depressions along the Rio Grande with their areas and thicknesses of late Cenozoic sedimentary fill are as follows:

Linked Basins and Cenozoic Fill Along the Rio Grande

Basin	Area (Square miles)	Cenozoic Fill (Feet)
San Luis	1300	2000+
Santa Fe	1060	4000+
Albuquerque	2360	5000+
San Marcial	580	1000+
Caballo	610	1000+

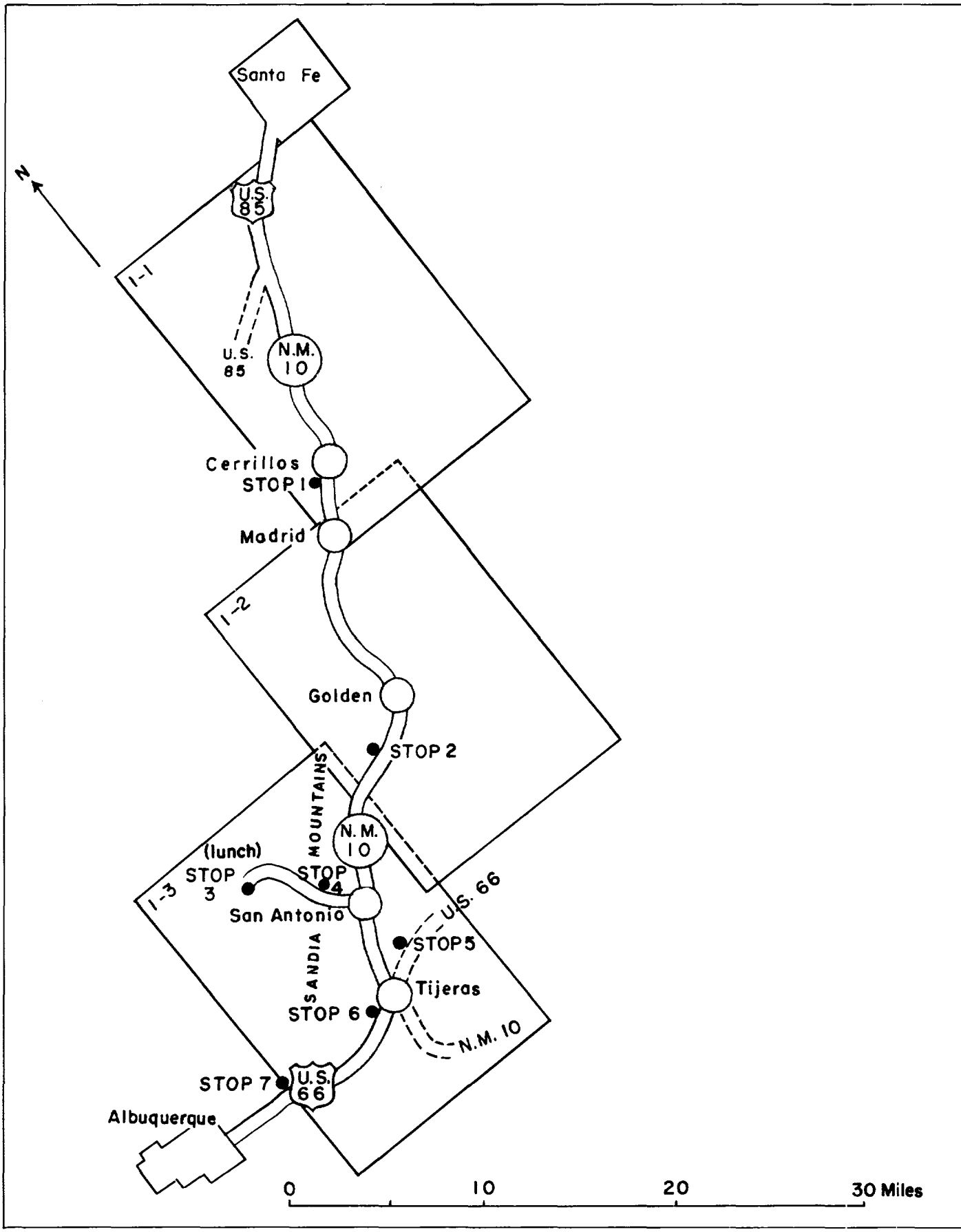
Several thousand feet of early Cenozoic continental sediments underlie late Cenozoic sediments in a large portion of at least several of the basins, and as a result, Mesozoic and Paleozoic rocks that may be petroliferous lie at great depths within these basins. Although there is considerable evidence for lack of conformity between the Cenozoic and older rocks along the margins of the basins, it is by no means certain that the central parts of the larger basins are marked by similar marked unconformable relations.

The Rio Grande basins and their flanking uplifts are only one group of basin-like structures in the central province of New Mexico. Others are the Jornada del Muerto, Estancia, and Tularosa basins. In these the Cenozoic sediments are generally thin, and in wide areas older rocks lie at or near the surface. The approximate areas and possible thicknesses of pre-Cenozoic rocks in each of these basins is as follows:

Areas and Thicknesses of Pre-Cenozoic Sedimentary Rocks

Basin	Area (Sq. miles)	Sediments (Cu. miles)	Thickness (Feet)	Age
Estancia	2000	1000	2500	Carboniferous and Permian
Tularosa	6000	6000	6000	Cambrian to Permian
Jornada del Muerto	3000	4500	8000	Cambrian to Cretaceous

To visit the Rio Grande Country and closely review all of its geology, would be under any circumstances a trip of several weeks' duration, and hence far beyond the scope of this conference. Therefore, the conference committee decided to route the trip so that the country could be generally sampled. Perhaps as a result of this sampling some of the conferees will return for more leisurely examinations of the country and its geology. In any event, if this guidebook serves to stimulate thinking or further work in the country, the New Mexico Geological Society will feel amply repaid for its efforts.



INDEX MAP

First day

(Showing location of geologic maps)