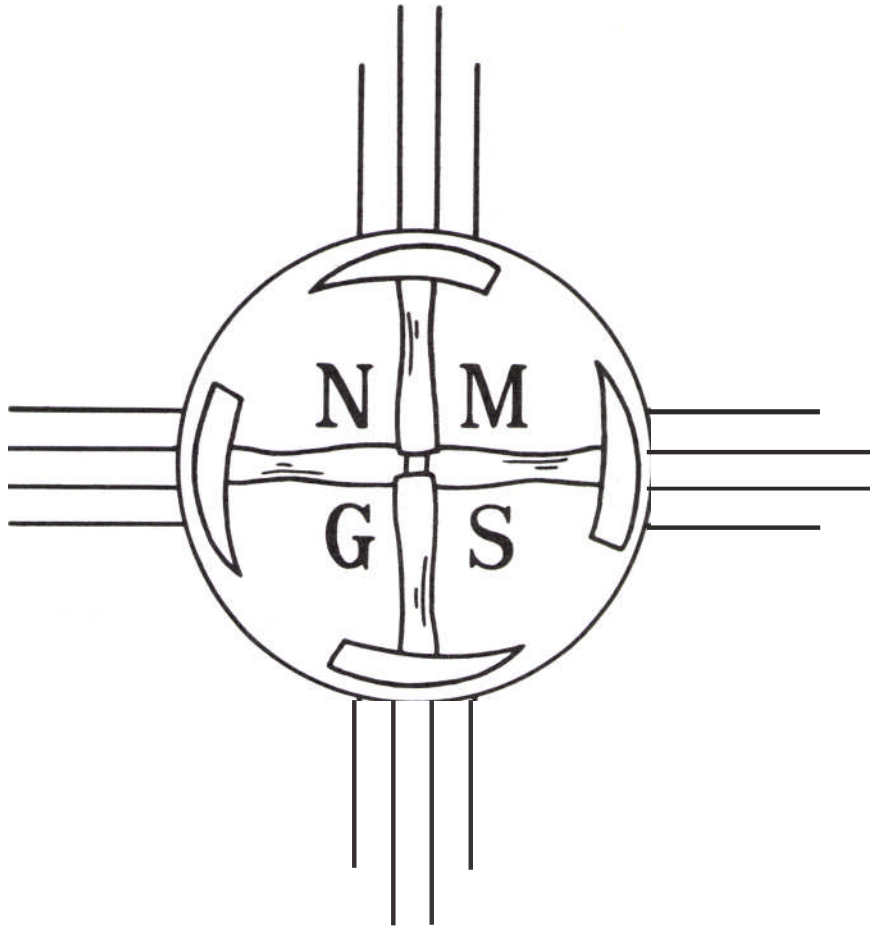


NEW MEXICO GEOLOGICAL SOCIETY



Guidebook
of

WEST-CENTRAL NEW MEXICO

Edited by

James E. Weir, Jr. and Elmer H. Boltz

TENTH FIELD CONFERENCE

October 15, 16, and 17, 1959

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NINE YEARS . . .

. . . and ten field trips ago the New Mexico Geological Society undertook the first in this series of annual field conferences. Through these endeavors we have sampled the geology of all the parts of New Mexico, and have, on occasion, ventured into the neighboring states. We of the Society feel that we have made a permanent and significant contribution to the geologic understanding of the areas visited. Furthermore, we should like to believe that by adding to the knowledge and focusing the attention of outsiders on these areas we have also contributed to their economic development.

The conferences quickly pass. The derived benefits linger on. These on-the-spot gatherings of geologists provide an atmosphere conducive to frank discussion of the geologic problems at hand. And equally important, they provide an opportunity to obtain an intangible sense of feeling for an area, something most difficult for most of us to achieve from a distance. Perhaps the most important contributions, and certainly the most lasting, are to be found in the by-products of the field conferences . . . the guidebooks.

The guidebooks of this Society and other geologic societies in the Rocky Mountain and Southwest regions have provided an important segment of the literature. In addition to having provided several thousand miles of road log, the guidebooks have given the profession an untold number of fine topical and general articles in geology and related fields. A few years ago bibliographers did not recognize the guidebooks as an official medium of publication; today the guidebooks are to be found in the major geologic libraries of the nation, and are indispensable parts of the personal libraries of geologists working in the Rockies and the Southwest. Many of us know the value of these publications as foundations for acquaintanceship in unfamiliar areas. Indeed, there are many areas in which guidebook papers constitute the only modern source of geologic information.

The value of the field conference and the resultant literature cannot be denied. There is another side, however. Complaints are becoming increasingly common to the effect that the various geological societies are sponsoring too many field trips, that these mobile conferences

are becoming too complex and elaborate, and that the increased frequency has resulted in a lessening of the quality of papers accompanying the guidebooks. The frequency of these excursions definitely is a point for concern. There are times when it would seem that one's entire professional career could be devoted to the attendance of conferences.

Furthermore, the manpower needed to carry out the preparation of the various phases of the field conference seriously taxes the staffs of the public and private organizations upon which the responsibilities fall. It is also becoming prohibitive both in terms of time and money to attend all the field trips one would like to attend. As for the complaint that the frequency of these conferences is draining the reservoir of geologic thought and accomplishment at a rate greater than it is being replenished, I do not see this as a particularly serious threat. Certainly a number of the very worthwhile papers presented in the guidebooks would have never found their way to press had it not been for the express opportunity afforded by a trip in a specific area—and the sometimes not so gentle coaxing and urging of guidebook editors.

While we all recognize the value of the field conference, we must at the same time consider the problem. The solution I do not pretend to have. Perhaps it lies in closer coordination between the officers of the various societies in planning field conferences and in a reduction of the number of trips, offered by each society. The answer could lie in a more favorable balance between field conferences and static conferences; or it could be that an effort should be made to simplify the trips either through brevity or a shedding of some of the frills. None of us is anxious to see a reduction in the geologic literature; perhaps we should direct our society's efforts toward more of the symposium-type publications, or perhaps a professional journal.

Whether we as individuals feel that there is a problem, we must recognize that in the minds of a considerable segment of the members of the profession one does exist. For this reason alone, we as responsible members of the geologic profession must be concerned, and if it appears after careful review and evaluation that the situation calls for action, then we must act collectively in a manner which will prove to be beneficial to our profession.

Edward C. Beaumont
President

ACKNOWLEDGEMENTS

The Society is indebted to those of its members and friends who have given their time and resources to stage this field conference. Both commercial and public organizations diverted their staffs to prepare the guidebook and organize the field trip. Special commendations are due the staffs of the Mobil Oil Company in Albuquerque for general arrangements and preparations; the New Mexico Bureau of Mines and Mineral Resources for a major part in preparing the road logs; and the staff of the Ground Water Branch of the United States Geological Survey in Albuquerque for compiling the guidebook.

Affiliations of trip leaders and authors of papers in the guidebook are diverse and to these people and their respective academic, oil, mining, public service, and other types of organizations go the Society's gratitude for contributing the heart and soul of the guidebook. Some of the papers in this guidebook were contributed anonymously, and to the writers of these papers go the Society's appreciation for work without benefit of personal credit.

The Society expresses thanks to the Navajo, Acoma, Laguna, and Zuni Indians for permission to cross their lands in the course of the field trip. Also the Society is grateful to the National Park Service for hospitality and help at El Morro National Monument.

ELEVENTH FIELD CONFERENCE

The decision about the frequency of future field conferences, and whether the New Mexico Geological Society will divert some effort to other professional pursuits, rests squarely with the members. Discuss these matters and be prepared to give your opinions to the executive committee on demand and at a meeting, probably in Gallup, during the tenth field trip.

If the majority of the members want a field trip in 1960, it can be staged in northeastern New Mexico, north-central New Mexico, or it can be a re-run (with slight modification) of an early field trip staged by the Society, perhaps one of those for which the guidebook is now out of print. As a member or friend of the Society, please give some careful consideration to the above and to the thoughts set forth in the President's message.

EXECUTIVE COMMITTEE

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James E. Weir, Jr.	Secretary	U. S. Geological Survey, Ground Water Branch
A. A. Koenig	Treasurer	Sinclair Oil & Gas Company
Rex Alcorn	Past President	Sun Oil Company

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Elmer H. Baltz	Editor	Associate	U. S. Geological Survey, Ground Water Branch
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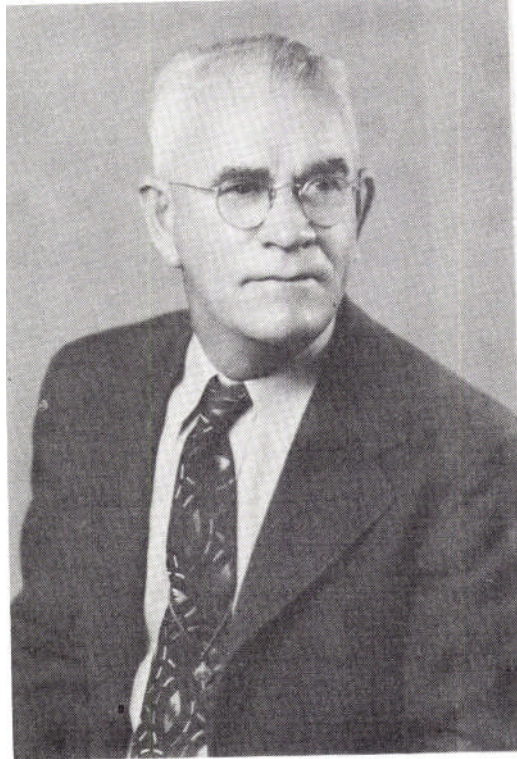
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 John W. Harshbarger Department of Geology, University of Arizona
 Kathryn H. Klisby Department of Geography and Geology, Oberlin College, Oberlin, Ohio

**PUBLICATIONS
OF THE
NEW MEXICO GEOLOGICAL SOCIETY**

1. Guidebook of the San Juan Basin, New Mexico and Colorado ; First Field Conference, 1950; edited by Vincent C. Kelley et al.; 153 pages, 40 illustrations. (out of print)
2. Guidebook of the south and west sides of the San. Juan Basin, New Mexico and Arizona ; Second Field Conference, 1951; edited by Clay T. Smith and Caswell Silver ; 163 pages, 69 illustrations. (out of print)
3. Guidebook of the Rio Grande country, Central New Mexico ; Third Field Conference, 1952 ; edited by Ross B. Johnson and Charles B. Read ; 126 pages, 51 illustrations. (out of print)
4. Guidebook of southwestern New Mexico ; Fourth Field Conference, 1953 ; edited by Frank E. Kottlowski et al.; 156 pages, 67 illustrations. \$5.00
5. Guidebook of southeastern New Mexico ; Fifth Field Conference, 1954; edited by T. F. Stipp ; 213 pages, 83 illustrations. \$5.00
6. Guidebook of south-central New Mexico ; Sixth Field Conference, 1955; edited by J. Paul Fitzsimmons ; 193 pages, 70 illustrations. Prepared with the cooperation of the Roswell Geological society. \$7.00
7. Guidebook of southeastern Sangre de Cristo Mountains, New Mexico (Raton Basin) ; Seventh Field Conference, 1956; edited by A. Rosenzweig; 154 pages, 61 illustrations. \$7.00
8. Guidebook of southwestern San Juan Mountains, Colorado (Four Corners Area) ; Eighth Field Conference, 1957; edited by Frank E. Kottlowski ; 258 pages, 109 illustrations. \$7.00
9. Guidebook of the Black Mesa Basin, Northeast Arizona ; Ninth Field Conference, 1958. Edited by Roger Y. Anderson and John W. Harshbarger. 205 pages, 105 illustrations, hard binding. Prepared in cooperation with the Arizona Geological Society. \$8.50

Available by mail (25a charge) from New Mexico Bureau of Mines and Mineral Resources, Socorro ; and over the counter at the Bureau of Mines, or at the Geology Department, University of New Mexico, Albuquerque, New Mexico.

Alentorium



JOHN ALEXANDER FROST
(1896 - 1958)

With the death of John A. (Jack) Frost on December 18, 1958 the members of the New Mexico Geological Society lost a good friend and the Society a valued member. He died at the age of 62 after a successful professional career in the oil and gas industry of the Southwest.

Frost was born at Dover, Oklahoma on April 27, 1896. He was graduated from Oklahoma State University in 1917 with a Bachelor of Science degree in Mechanical Engineering, and in 1924 was granted a Master's degree. During World War I he served two years in the United States Navy and was discharged with a rating of Machinist's Mate, First Class.

Except for a brief period in the oil fields Frost's civilian service was all as a petroleum engineer in the service of the United States Geological Survey, Conservation Division, Oil and Gas Leasing Branch. He reported for duty at Casper, Wyoming in 1927, and served as district engineer at Thermopolis, Wyoming 1927 - 1929; Farmington, New Mexico, 1929 - 1942; Roswell, New Mexico, 1942 - 1943, and Artesia, New Mexico, 1943 - 1958, where he was stationed at the time of his death, after having spent 34 years in Government Service. During the latter part of this period he ranked as Deputy Oil and Gas Supervisor. While in the service of the Geological Survey he was engaged primarily in the supervision of oil and gas operations on public, acquired, and Indian lands. His duties included inspection and supervision of operations on leases with the purpose of preventing waste, damage to oil, gas, and water-bearing formations, and the securing of compliance with lease contract terms. His knowledge of drilling and producing operations and his fair, courteous, and tactful treatment of all operators was recognized, and earned for him the respect of the entire oil industry of the region.

While stationed at Farmington Frost's alertness and zest for inquiring into new and unusual things led to the discovery in 1943 at the Rattlesnake field, of helium gas which later supplied the Bureau of Mines helium recovery plant at Shiprock, New Mexico. He was commended by the Secretary of the Interior and granted a meritorious promotion for his work in this project and since his death he has been given a Citation for Meritorious Service by the Department of the Interior.

Aside from the oil and gas industry Frost was best known for his avocations which he pursued with energy and success. One of these was boating during vacations down the San Juan and Colorado Rivers, from Mexican Hat, Utah, to Lee's Ferry, Arizona. He made eighteen trips in all, usually guiding a party of ten or more in several boats. His skill in conducting these parties through this rugged,

uninhabited region without serious mishap brought him renown as a capable explorer and riverman. On these trips he was frequently accompanied by geologists who studied the rocks of the canyon and nearby areas. Their investigations have played a part in the encouragement of oil and gas development in southern San Juan County, Utah.

Frost loved the deserts and mountains of the southwest and took many photographs of their scenic features. His color photographs were exhibited upon request at many gatherings and were accompanied by appropriate comments which gave evidence of his knowledge of the natural features and the early inhabitants of the region. Some of Frost's other interests included improving his knowledge of geology, polishing stones, wood carving, and metal working. In his shop he constructed a working scale model of a Santa Fe locomotive that aroused much comment and admiration.

Frost was civic minded and enjoyed knowing and working with people. At one time he was adopted into the Navajo Indian Tribe and given the name of "Hosteen Yazzi" (Chief Short Man). His son was named "Hosteen Yazzi Begay" (Chief Short Man's Son). The Navajos came to know him well and appreciated his sympathy with their affairs and his straightforward manner in his dealings with them.

Frost held important offices in the Lion's Club, and was a charter member in the Roswell Geological Society and the New Mexico Geological Society. In the latter organization he served as Secretary-Treasurer 1952 - 1953, and Vice-President 1957-1958. He made contributions to several guidebooks of the various geological societies on the subjects of the natural features, history, and development of the Southwest

Frost is survived by his widow, Mrs. Nana Frost, who resides at Artesia; his son, Frank Edward Frost of Albuquerque; his daughter, Ruth Elaine Myers (Mrs. Charles D. Myers) of Denver; and two brothers, Ellis Mark Frost of Amarillo, Texas; and Rueben L. Frost of Wilmington, North Carolina.

Frost led a good life and left a clean trail behind him. We regret that he was not permitted to complete his professional career and to enjoy a long and happy retirement.

T. F. STIPP

Roswell, New Mexico

June 25, 1959

Foreword

The Tenth Annual Field Conference of the New Mexico Geological Society traverses a region which has received little attention by geologists. Mining in the mountains south of Magdalena has been an industry of some note for decades, but only recently has the petroleum geologists' interest in west-central New Mexico been aroused. As in all parts of New Mexico, there are geologic problems of interest to those working in any branch of the geological sciences.

The structure of most of west-central New Mexico is simple. Broad folds typical of the Colorado Plateau province account for the main part of the structural deformation in the region. The eastern part of the field-trip area is characterized by complex block faulting and, locally, overthrusting on the western margin of the Rio Grande trough.

Rocks exposed in the field-trip area range in age from Precambrian to Recent, and consist of sedimentary, metamorphic, intrusive igneous, and volcanic types.

In the subsurface somewhere near the southern part of the field-trip area a thick wedge of Cambrian, Ordovician, Silurian, and Devonian rocks present in southern New Mexico pinches out. These rocks are overlapped by Pennsylvanian rocks which thin northward onto an ancient positive area—the ancestral Zuni uplift. Permian rocks are present throughout most of the region and are overlain by Triassic rocks. A thick sequence of Jurassic rocks present in the northern part of the area wedges out to the south. Cretaceous rocks, deposited during transgressions and regressions of a great seaway, crop out over much of the region. Tertiary sedimentary and volcanic rocks of considerable thickness blanket the southernmost part of the area, and basalt flows of Tertiary and Quaternary age can be seen from almost any hill.

The history of west-central New Mexico is of interest to almost all people acquainted with the region. For untold centuries it has been the dwelling place of the Indians. Artifacts of the Folsom and Sandia cultures, believed to be from 7,000 to 25,000 years old, have been found in the San Augustin Plains. Camp sites of the Cochise people, a group of wandering seed-gatherers, also are found in this area. Ruins of pueblos ranging in age from more than 1,000 years to as recent as Spanish colonial time are present in many places, and Pueblo Indians still inhabit the region. The Navajo and Apache people are thought to have arrived in the Southwest in the Twelfth or Thirteenth centuries and are flourishing at present. The cultural contributions of the Indians are apparent and their influence is noted on people ranging from the most gullible tourist who pays to see the "ancient" cliff dwelling (built as a movie set), to the artist, ethnologist, and archaeologist.

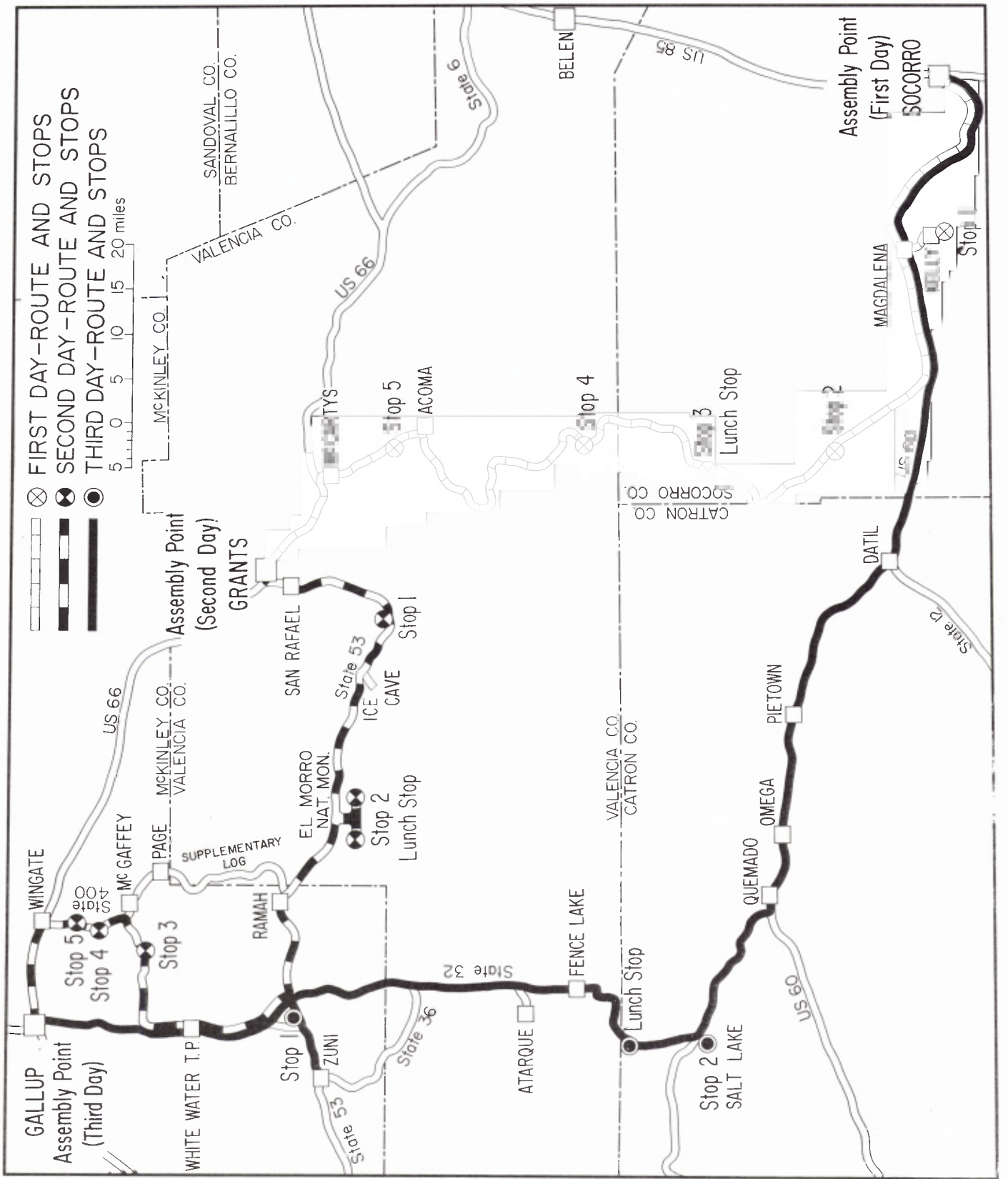
Early Spanish explorers, beginning in 1539 with Fray Marcos de Niza, traversed the region converting, enslaving, and colonizing, and the mark of Spain is still strong upon the land.

Engineers, naturalists, and geologists came with the U. S. Army following the Mexican War and such famous geologists as G. K. Gilbert made treks through the region and wrote vividly of what they saw.

Thus, it may be said that the route of the Tenth Annual Field Conference is through one of the most interesting regions in North America. The caravan will travel mainly over roads not usually seen by the tourist; through the abode of the Indian and domain of the geologist.

We feel that the excellent technical quality of the road log and the papers in this guidebook will make it a valuable addition to your personal and organizational libraries, and sincerely hope you enjoy the field conference.

James E. Weir, Jr.
Elmer H. Baltz
Editors



Route Map - 1959 Field Conference

SCHEDULE

Wednesday, October 14

5:00 - 9:00 p.m.

Registration, Research Building, New Mexico Institute of Mining and Technology, Socorro, New Mexico.

6:00 - 10:00 p.m.

Open house on Campus of the Institute, Socorro.

Thursday, October 15

6:45 a.m.

Assemble caravan in south parking lot of Research Building, New Mexico Institute of Mining and Technology, Socorro. PLEASE BE PROMPT. This day's trip demands that we hold to a tight schedule.

Friday, October 16

6:45 a.m.

Caravan assembles on west side of Grants along U. S. Highway 66. Caravan leaves at 7:00 a.m.

6:30 p.m.

Cocktail hour at El Rancho Hotel, Gallup.

8:00 p.m.

Banquet at El Rancho Hotel. Perhaps one short technical paper will be given, plus an open discussion regarding next field trip and other matters of vital interest to members and friends of the Society.

Saturday, October 17

6:45 a.m.

Caravan assembles on U. S. Highway 66 westbound in Gallup. Caravan leaves at 7:00 a.m. PLEASE BE PUNCTUAL. Field trip ends back in Socorro late in the afternoon. However, attendees travelling west after field trip may wish to leave the caravan about 3:00 p.m. on U. S. Highway 60 about 1.5 miles west of Quemado.