



Front Matter

(Usually includes Dedication, President's Message, & Conference Organizer's Message.)

in:

Geology of the Sierra Blanca, Sacramento, and Capitan Ranges, New Mexico, Barker, J. M.; Kues, B. S.; Austin, G. S.; Lucas, S. G.; [eds.], New Mexico Geological Society 42nd Annual Fall Field Conference Guidebook, 361 p.

<https://doi.org/10.56577/FFC-42>

This is a section from the 1991 NMGS Fall Field Conference Guidebook.

Annual NMGS Fall Field Conference Guidebooks

Every fall since 1950, the New Mexico Geological Society (NMGS) has held an annual [Fall Field Conference](#) that explores some region of New Mexico (or surrounding states). Always well attended, these conferences provide a guidebook to participants. Besides detailed road logs, the guidebooks contain many well written, edited, and peer-reviewed geoscience papers. These books have set the national standard for geologic guidebooks and are an essential geologic reference for anyone working in or around New Mexico.

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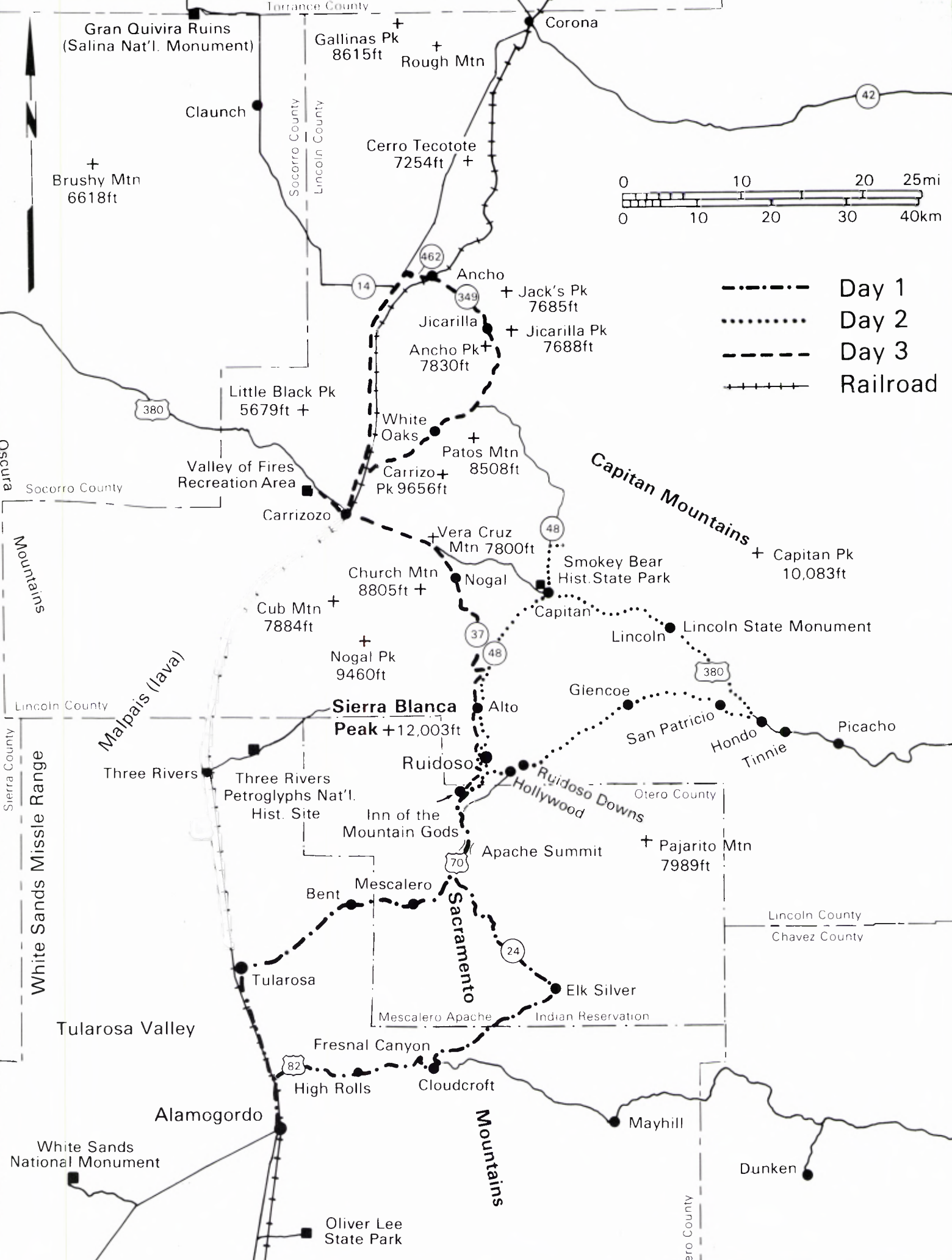
NMGS has decided to make peer-reviewed papers from our Fall Field Conference guidebooks available for free download. This is in keeping with our mission of promoting interest, research, and cooperation regarding geology in New Mexico. However, guidebook sales represent a significant proportion of our operating budget. Therefore, only *research papers* are available for download. *Road logs*, *mini-papers*, and other selected content are available only in print for recent guidebooks.

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Gran Quivira Ruins
(Salina Nat'l. Monument)

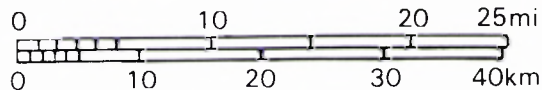
Gallinas Pk
8615ft
Rough Mtn

Corona

Claunch

Brushy Mtn
6618ft

Cerro Tecotote
7254ft



- Day 1
- Day 2
- Day 3
- Railroad

Little Black Pk
5679ft

Valley of Fires
Recreation Area

Carrizozo

Ancho

Jack's Pk
7685ft

Jicarilla

Jicarilla Pk
7688ft

Ancho Pk
7830ft

White
Oaks

Patos Mtn
8508ft

Carrizo
Pk 9656ft

Vera Cruz
Mtn 7800ft

Church Mtn
8805ft

Nogal

Smokey Bear
Hist. State Park

Capitan Pk
10,083ft

Cub Mtn
7884ft

Nogal Pk
9460ft

Sierra Blanca
Peak +12,003ft

Ruidoso

Ruidoso Downs

Lincoln State Monument

Glencoe

San Patricio

Hondo

Picacho

Tinnie

Three Rivers

Three Rivers
Petroglyphs Nat'l.
Hist. Site

Inn of the
Mountain Gods

Apache Summit

Pajarito Mtn
7989ft

Bent

Mescalero

Sacramento

Tularosa

Elk Silver

Tularosa Valley

Fresnal Canyon

High Rolls

Cloudcroft

Alamogordo

Mayhill

Dunken

Oliver Lee
State Park

White Sands
National Monument

Geology of the Sierra Blanca, Sacramento and Capitan Ranges, New Mexico

E d i t o r s

JAMES M. BARKER

BARRY S. KUES

GEORGE S. AUSTIN

SPENCER G. LUCAS



New Mexico Geological Society
Forty-second Annual Field Conference
October 9-12, 1991

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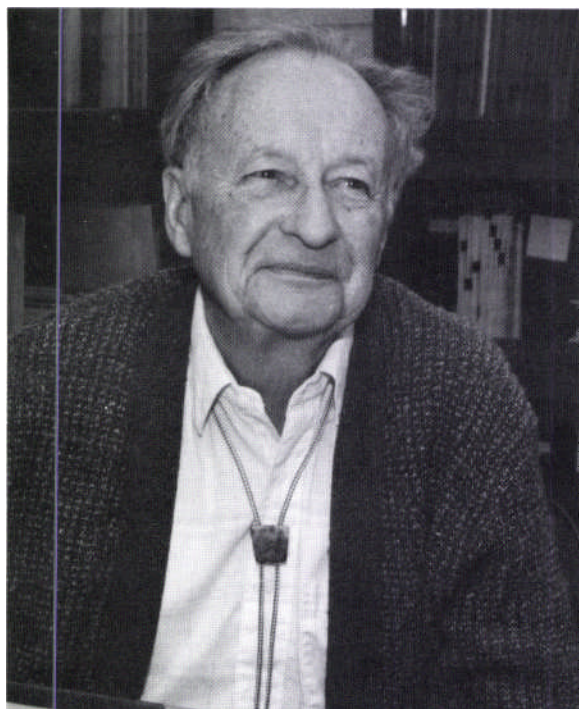
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Advertising



Frank E. Kottlowski

DEDICATION

Aren't we lucky that Frank Kottlowski took a geology course from Charles Deiss, an exciting teacher at Indiana University, when he was only one semester away from completing his certified public accountant degree? Instead of sitting on a high chair, wearing a green visor, adding columns of numbers, he is sitting on a high chair (wearing a green visor?) correlating columns of rocks, dissecting the geology of a region and putting it into intelligible report form.

Aren't we lucky that Eugene (Pat) Callaghan, another of his stimulating teachers at Indiana, came to Socorro to be Director of the New Mexico Bureau of Mines and Mineral Resources, and that he enticed Frank in 1951 to join the staff as an Economic Geologist?

Since then, Frank has been involved in all aspects of the economic geology of New Mexico, including a series of basic stratigraphic studies of Paleozoic and Mesozoic rocks in southern New Mexico, Mesozoic rocks in northwestern New Mexico, and Cenozoic and Quaternary rocks of the Rio Grande rift. His list of significant papers, reports and a textbook (*Measuring Stratigraphic Sections*) now totals well over 170!

When Frank took over as Director in 1974, he continued to contribute to an understanding of and to the promotion of the resources of New Mexico. Frank entered the Directorship well liked and well known as a highly respected scientist. From the very beginning of his administration, he enjoyed the support of all the varied constituencies of the extractive industries in the state. He has continued to keep the NMBM&MR in the top handful of State Geological Surveys in terms of both service and science. Furthermore, he is obviously a master at getting along with politicians—of any party! They all seem to be part of his team! Again, aren't we lucky!

Within the state, he has been chairman or a member of many boards, panels, committees and other euphemisms for groups to supervise, advise, oversee or otherwise offer advice on a wide variety of mineral resource, extractive or environmental activities. But more importantly for this occasion, both he and the NMBM&MR have been longtime active supporters of the New Mexico Geological Society in a manner which, in some ways, has produced an almost symbiotic relationship; a relationship that provides significant mutual benefit by furnishing continuity, stability, and a pool of capable and enthusiastic volunteers, a publication home for the Society, a variety of forums to present, discuss and publish new geological research, and a continuing challenge to produce the "ultimate" Fall Field Conference and Guidebook. Frank has also been on numerous NMGS committees, twice a guidebook editor and a president. The Society has awarded him an honorary membership in partial recognition of his endeavors on its behalf. In 1987, the NMGS established the Frank E. Kottlowski Graduate Student Fellowship for Outstanding Research.

Frank has a management style that is clearly successful _____ he has built and maintained a quality research team (some of them date back to the late 1950s when I was working summers under NMBM&MR auspices, first in northeastern New Mexico and then in the Chama Basin and Brazos Uplift). He has a low key, "laid back" management style that has created an atmosphere that allows people to be productive in their own fashion, i.e., to make mistakes and learn from them. He can also convince you that "this" project is important science, more so than "that" project you wanted to work on; and when you walk away you are convinced he is right and that you are happy to be working on it. He continues to read widely. When a new project is presented to him, his insightful comments make you quickly aware that he isn't just an administrator but is also an active scientist.

Frank also has been willing to go the extra mile _____ if no one else would do some necessary job, he would take it on. AND he would deliver, regardless of how many other tasks were in front of him being done simultaneously.

Frank has served on numerous committees and, more importantly, as a Councillor and as Chairman of the Coal Geology Division for the Geological Society of America; as Bulletin Editor (1971-75) and President of the Energy Minerals Division (1987-88) of the American Association of Petroleum Geologists. AAPG has presented Frank with the Distinguished Service Award (1981) and an Honorary Membership (1985) for his services to the Association. He has been a member and Chairman of the American Commission on Stratigraphic Nomenclature during the period when major revisions of the Code of Stratigraphic Nomenclature were being considered or made. He has taken on many roles within the Association of American State Geologists, including President (1985-86). The above list is only a small fraction of the seemingly endless committees and organizations that he has worked with or awards that he has received. For a vivid biography of Frank, I recommend to you the citation by William E. King (longtime NMGS member and Honorary State Fossil) of Frank for the AAPG Honorary Membership in the AAPG Bulletin, May 1985.

And isn't Frank lucky that he has Florence, his wonderful wife for all these years. Her love, understanding and support have made it possible for us to be the beneficiaries of all he has contributed to society. Aren't we lucky to have had Frank amongst us all these years!

William R. Muehlberger
The University of Texas at Austin

PRESIDENT'S MESSAGE

Welcome to the 42nd New Mexico Geological Society Fall Field Conference. It has been 27 years since our 15th Fall Field Conference in 1964 to the Sacramento Mountains. To many of us, this will be our first visit to the area with the Society. I am also pleased that this guidebook is dedicated to Frank Kottlowski, who has retired this year as the State Geologist and Director of the New Mexico Bureau of Mines and Mineral Resources. Frank has been one of the most active and supportive members of the Society. I would also like to congratulate Chuck Chapin, the new State Geologist and Director of the New Mexico Bureau of Mines and Mineral Resources and honorary member of the New Mexico Geological Society, and wish him well. I would like to thank the entire membership for making the New Mexico Geological Society one of the best in the country and ask for your continued support in our activities and membership recruitment.

The Society is once again indebted to the folks who make our annual miracle of the Fall Field Conference happen. Every year a group of highly motivated and dedicated members step forward to put the bits and pieces together to make a future field conference happen. Our thanks and appreciation go to General Co-Chairmen George Austin and James Barker, Guidebook Editors James Barker and George Austin, Managing Editors Barry Kues and Spencer Lucas, and the many other volunteers listed on the committees page of your guidebook. A special thanks to the Los Alamos Geological Society for their continued support of student scholarships for the field conferences.

Next year's trip will be to the San Juan Basin and is organized by Spencer Lucas and Tom Williamson. Now is the time to let them know what articles or support you might contribute.

The Society continues to support grants-in-aid to graduate and undergraduate students for research in geology in New Mexico. We have presented the Kottlowski and Wellnitz Fellowships, Pipkin undergraduate book and research scholarships, Fall Field Conference student scholarships, and matching registration scholarships for students presenting papers from New Mexico at this year's co-regional meeting of the Geological Society of America in Albuquerque. We continue to honor the outstanding graduating seniors in geology from New Mexico universities and offer awards to the winners in the junior and senior divisions of the State and Regional Science Fairs in New Mexico.

The Society owes a debt of gratitude to the members who put together the Spring Conferences in Socorro. This year, we would like to thank the Spring Conference Committee composed of Neil Whitehead, Richard Chamberlin and Bill Chavez, and the many others who assisted them. Other members who serve on committees are Christina Balk, Ed Smith and Bill King, Scholarship Committee; Jamie Robertson and Jerry Mueller, Finance Committee; Richard Chamberlin, Publications Committee; and Frank Kottlowski, Orin Anderson, Bill Speer, Jack Ahlen and Bill King, Nominating Committee. We also would like to thank the numerous other volunteers who help the Society in many ways.

So, let's see some great geology, visit with old friends, make new friends and have a great time!

Robert G. Myers, President

EDITORS' MESSAGE

The 1991 New Mexico Geological Society Fall Field Conference tours the south-central part of New Mexico after a 27-year hiatus. When we proposed to the NMGS Executive Committee some three years ago that 1991 was the time to revisit that area of New Mexico last visited by the Society in 1964, it was mainly because it had been so long since the Society had been in that area. We were counseled by some against such an action because "no one is working there" and "except for the Lincoln folds, the geology is not very inspiring." Little did we know what to expect.

Well, the skeptics were wrong. The geology is terrific and many people are interested in south-central New Mexico. Topics in this guidebook range from several papers on the Precambrian, both as basement rocks and exposures, to Pleistocene glaciation. From discussions of the most basic and fundamental structures of the crust in this part of the world to the nuts-and-bolts of the economic potential for mineral development and to the history of Lincoln and Otero Counties. We started out to try to examine as much as we could of the Sierra Blanca basin, the northern Sacramento Mountains, the Capitan Mountains and the Tularosa Basin. Did we succeed? Well, we think that now many people know that others are interested in this area. And we hope that the next visit to the Ruidoso area won't be in 2018, another 27 years!

In addition to the many people listed as authors, we wish to express our appreciation to all those who contributed to this guidebook and to the field trip. As in many times in the past, the New Mexico Bureau of Mines and Mineral Resources has provided personnel, vehicles, drafting, photographic work, secretarial work, and encouragement. Past director Frank E. Kottowski (to whom this book is dedicated) and present director Charles E. Chapin have always indicated that they thought of the NMGS guidebooks as equal to the Bureau's own publications in getting the word out on the rocks and minerals of the state. Their support has certainly been important to us and to the NMGS. The Bureau's drafters, including Rebecca Titus, Kathryn Campbell, Janette Thomas, Monte Brown and Michael Wooldridge, helped us with many hours of effort over drafting tables. Jan's rendition of the scene one sees when first viewing the Inn of the Mountain Gods that graces our cover and the flyer used to entice you to this part of the world shows you both her talent and the beauty of the region. Monte Brown worked long hours in the field and photo lab, and would have done more had not remodeling of his facilities intervened. Lynne McNeil (the Bureau's principal technical typist), Theresa Lopez, Lois Devlin, Ann Lanning, Judy Viaza all contributed to this guidebook and fully deserve your thanks. The crew at the UNM Printing Plant, as always, took what we gave them and turned it into the professional publication you have in your hands. We are very grateful to them. Finally, we thank the authors of the manuscripts, minipapers and the contributors to the road logs for their input to this volume. Their knowledge, communicated through these pages, is what will live beyond these few days in October 1991.

*James M. Barker
Barry S. Kues
George S. Austin
Spencer G. Lucas*

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1 9 9 1

FIELD CONFERENCE SCHEDULE

Wednesday, October 9—Registration Day

- 12:00 noon Optional pre-meeting tour of Sierra Blanca igneous pile. Limited to 8 vehicles and 30 people. Assemble in parking lot, Inn of the Mountain Gods, Ruidoso.
- 4:00-8:00 p.m. Registration in lobby, Inn of the Mountain Gods.
- 5:30-7:00 p.m. Icebreaker in lobby, Inn of the Mountain Gods.

Thursday, October 10—First Day

- 7:45 a.m. Buses depart from Inn Convention Center entrance for first day's tour.
- 12:00 noon Lunch provided in parking lot of Space Hall of Fame. Participants will be able to tour the museum, attend special showings of the Omnimax theater, or visit nearby Pennsylvanian outcrops. You will be able to choose two of the three possibilities, but if you choose the Omnimax theater, you must check that possibility on your registration form.
- 5:30 p.m. Arrive at the Inn of the Mountain Gods.
- 7:00 p.m. Leave in buses from the Inn Convention Center entrance for the barbecue and Old West show at the Flying J Ranch.

Friday, October 11—Second Day

- 7:45 a.m. Buses depart from Inn Convention Center entrance for the second day's tour.
- 12:00 noon Lunch provided at Lincoln.
- 5:30 p.m. Arrive at the Inn of the Mountain Gods.
- 6:30 p.m. No-host cocktail party in lobby of the Convention Center, Inn of the Mountain Gods.
- 7:00 p.m. NMGS Annual Field Trip banquet, Convention Center, Inn of the Mountain Gods.
- 8:00 p.m. Keynote speaker: Dr. Charles Mankin, Oklahoma Geological Survey.

Saturday, October 12—Third Day

- 7:30 a.m. Caravan gathers in parking lot of the Inn of the Mountain Gods.
- 7:45 a.m. Caravan departs for third day's tour.
- 12:00 noon Lunch provided at Ancho.
- 4:00 p.m. Field conference ends at the Valley of Fires Recreation Area.

CREDITS

Front Cover: The Inn of the Mountain Gods, Mescalero Apache Indian Reservation, Lincoln County, south of Ruidoso, New Mexico, and Sierra Blanca (White Mountain) in the background. Drawn by Janette Thomas, New Mexico Bureau of Mines and Mineral Resources, from photographs by Monte M. Brown, New Mexico Bureau of Mines and Mineral Resources.

Front End Sheet: LANDSAT false-color composite image of south-central New Mexico and corresponding map of topographic features, highways and road-log routes. Drafted by Kathryn E. Campbell, New Mexico Bureau of Mines and Mineral Resources.

Back End Sheet: Stratigraphic column for field conference area. Drafted by Janette Thomas, New Mexico Bureau of Mines and Mineral Resources.

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Captions for Historical Photographs: Robert W. Eveleth, New Mexico Bureau of Mines and Mineral Resources, and Spencer Wilson, New Mexico Institute of Mining and Technology.

Printer and Graphic Design: University of New Mexico Printing Plant.

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