

New Mexico Geological Society

Downloaded from: <https://nmgs.nmt.edu/publications/guidebooks/23>



Front Matter

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

in:
East-Central New Mexico, Kelley, V. C.; Trauger, F. D.; [eds.], New Mexico Geological Society 23rd Annual Fall Field Conference Guidebook, 236 p. <https://doi.org/10.56577/FFC-23>

This is a section from the 1972 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.

Free Downloads

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.

Copyright Information

Publications of the New Mexico Geological Society, printed and electronic, are protected by the copyright laws of the United States. No material from the NMGS website, or printed and electronic publications, may be reprinted or redistributed without NMGS permission. Contact us for permission to reprint portions of any of our publications.

One printed copy of any materials from the NMGS website or our print and electronic publications may be made for individual use without our permission. Teachers and students may make unlimited copies for educational use. Any other use of these materials requires explicit permission.

This page is intentionally left blank to maintain order of facing pages.



GUIDEBOOK
of
EAST-CENTRAL
NEW MEXICO

EDITORS
Vincent C. Kelley
Frederick D. Trauger

NEW MEXICO GEOLOGICAL SOCIETY

TWENTY-THIRD FIELD CONFERENCE—September 28, 29, and 30, 1972

CONTENTS

President's Message	v
Committees	vi
Publications of the New Mexico Geological Society	viii
Schedule of Conference	ix
Stratigraphic Table	x

ARTICLES

Lexicon of Stratigraphic Names Used in East-Central New Mexico and Adjacent States	<i>Christina Lochman-Balk</i>	1
----------------------------------------------------------------------------------------------	-------------------------------	---

ROAD LOGS

First Day: Tucumcari, Mosquero and San Juan Country	<i>F. D. Trauger, C. J. Mankin, J. P. Brand</i>	12
Second Day: Tucumcari, Canadian Escarpment, and Santa Rosa Country	<i>V. C. Kelley, R. W. Kelley</i>	46
Third Day: Santa Rosa, Clines Corners, Encino, Duran, and Vaughn Country	<i>V. C. Kelley, R. W. Kelley</i>	56

HISTORICAL

Marcou in East-Central New Mexico	<i>R. K. DeFord</i>	65
---------------------------------------------	---------------------	----

STRATIGRAPHY

Outcropping Permian Shelf Formations of Eastern New Mexico	<i>V. C. Kelley</i>	72
Problems of the Triassic Stratigraphy in the Canadian River Basin, Quay, San Miguel, and Guadalupe Counties, New Mexico	<i>Zane Spiegel</i>	79
Triassic Rocks of the Santa Rosa Country	<i>V. C. Kelley</i>	84
Jurassic Strata in Northeastern New Mexico	<i>C. J. Mankin</i>	91
Pre-Dakota Cretaceous Formations of Northwestern Texas and Northeastern New Mexico	<i>J. P. Brand and R. B. Mattox</i>	98
An Analysis of Dakota Sandstone in the Vicinity of Las Vegas, New Mexico, and Eastward to the Canadian River Valley	<i>A. D. Jacka and J. P. Brand</i>	105
Tertiary-Quaternary Stratigraphy and Geomorphology of West Texas and Southeastern New Mexico	<i>C. C. Reeves, Jr.</i>	108
Cenozoic Geology of the Canadian River Valley, New Mexico	<i>Zane Spiegel</i>	118

PALEONTOLOGY AND ANTHROPOLOGY

Vertebrate Faunas of the Dockum Group, Triassic, Eastern New Mexico and West Texas	<i>J. T. Gregory</i>	120
Upper Triassic Dockum Flora of Eastern New Mexico and Texas	<i>S. R. Ash</i>	124
Vertebrate Paleontology of the Southern High Plains	<i>G. E. Schultz</i>	129
A New Late Pleistocene Fauna from Northeastern New Mexico	<i>T. L. McMullen and R. J. Zakrzewski</i>	134
Indians of Eastern New Mexico	<i>G. A. Agogino and G. N. Egan</i>	137
Tours of Archeological Interest in East-Central New Mexico	<i>G. A. Agogino and D. E. Stevens</i>	141

GENERAL GEOLOGY

Petrology and Structure of Precambrian Rocks of the Pedernal Hills, New Mexico	<i>R. A. Gonzalez and L. A. Woodward</i>	144
Earthquakes of Northeastern New Mexico and the Texas Panhandle	<i>S.A. Northrop and A. R. Sanford</i>	148
Structural Interpretation of the Fractures Associated with the Bonita Fault	<i>D.W. Stearns</i>	161
Channel Geometry, Development, and Variation, South Canadian River, Eastern New Mexico and West Texas	L. G. Kessler, II	165
Karst and Solution Phenomena in the Santa Rosa Area, New Mexico	<i>M.M. Sweeting</i>	168

ECONOMIC GEOLOGY

Uranium in Eastern New Mexico	<i>W.L. Finch</i>	171
Geology of the Pintada Mine	<i>C. L. Sandusky and W. H. Kaufman</i>	176
Geology of Los Esteros Dam Site	T. E. McDowell	178
Engineering Geology Problems at Dam and Reservoir Sites in East-Central New Mexico	<i>Zane Spiegel</i>	184
Aggregate Resources in Central Eastern New Mexico	<i>A.D. Lovelace</i>	187
Carbon Dioxide in Northeastern New Mexico	R. W. Foster and J. G. Jensen	192
Ground Water in East-Central New Mexico	F. D. Trauger	201
Saline Ground Water in East-Central New Mexico	<i>IL Kunkler</i>	208
Urban Geology of Tucumcari	F. D. Trauger	210
Urban Geology of Clovis	<i>S.E. Galloway</i>	212
Urban Geology of Portales	R. G. Taylor and W. D. Pitt	214
Urban Geology of Fort Sumner	V. C. Kelley	216
Urban Geology of Vaughn	V. C. Kelley	217
Geology of the Santa Rosa Area	V. C. Kelley	218

ABSTRACTS

Abstracts of Technical Papers, New Mexico Geological Society, 26th Annual Meeting Farmington, New Mexico, May 19-20, 1972		221
PROFESSIONAL DIRECTORY		225

PRESIDENT'S MESSAGE

The twenty-third field conference of the New Mexico Geological Society is a milestone in the fact that it will complete areally the coverage of the geology of the entire state begun in 1950. Previous conferences have covered areas both within and without the state and have repeated certain areas as their geological interest waxed again. Somehow the east-central portion of New Mexico was neglected as a conference site, despite its great diversity of geology, its unique beauty and its varied economic possibilities. The Society is pleased to help illuminate this largely unknown blank on our geological map with this conference. An excellent guidebook, edited under the able guidance of two of the Society's stalwarts, Vin Kelley and Fred Trauger, gives broad coverage to the area and should serve as the prime reference work for the region. Its content is as varied as the geology itself. It covers structure, the sedimentary sequence and the igneous provenance. It details economic subjects as diverse as asphalt, ground water, highway aggregate, and uranium. It includes paleontological and stratigraphic papers which help to tie together geologically dissimilar areas of the state which heretofore have been studied largely as separate entities. Unique is the guidebook's introduction of two, not new, but relatively unrecognized facets of the profession—engineering geology and urban geology for municipal resource planning. Recognition of these underdeveloped disciplines helps emphasize some of the ways in which geology is aiding in the common problems created by a burgeoning population. It is evident that in the public sector of our national life more professional voices must be heard as plans regarding the best use of the nation's natural resources are formulated by governing bodies. Recognition of these considerations has been long overdue in our publications and research. The guidebook also includes papers in the related fields of anthropology and history in the area of our travels. The presentation of such a wide variety of subjects helps to promote the Society's goals of stimulating interest in the geology and allied sciences of New Mexico and in encouraging cooperation among the Society's members. In the diversity of interests presented we recognize that common interests abound, are interrelated and stimulate us individually in our separate fields.

Besides providing a means of calling attention to the interrelationship of various disciplines within the profession, the Society's field conferences also provide an opportunity to transgress political boundaries, which also have a tendency to isolate us in our profession. This year we are pleased to acknowledge the cooperation and support of geologists from the adjoining state of Texas. Their help in tying together the geology of the interstate region by a series of excellent papers, as well as their contribution to conference arrangements and participation, are greatly appreciated.

There is a tendency on all our parts to forget that these conferences don't just materialize one day for our convenience. We need to be reminded that someone must undertake the generally onerous task of organizing the myriad of details that allows us to assemble together annually to enjoy the comradeship and learn the geology. This year's chief sufferer is Bill Pitt, serving as the field conference's general chairman. He and his committee chairmen, listed elsewhere, are offered our heartfelt thanks in behalf of the executive committee, the membership and the conference attendees.

It is impossible to recognize the many dedicated contributors within the Society who come forth year after year to put on these field conferences and annual meetings and consistently produce publications of the highest quality. Generally these people don't seek acknowledgment, but are fired by the larger goals of participation in and contribution to our profession. Almost without exception past presidents have marveled at the manner in which such busy and diverse interests of our profession are able to congeal periodically and with regularity long enough to produce such valuable and lasting efforts. It is true that a geologist prizes most highly his individuality, but it is equally true that he recognizes his allegiance to the profession and is willing to devote a large part of his time and talents to this allegiance. Our greatest thanks to you individually and collectively.

William R. Speer

COMMITTEES

EXECUTIVE COMMITTEE

William R. Speer, <i>President</i>	Consulting Geologist
William W. Baltosser, <i>Vice President</i>	Kennecott Copper Corporation
William L. Hiss, <i>Secretary</i>	U.S. Geological Survey
Christina Lochman-Balk, <i>Treasurer</i>	New Mexico State Bureau of Mines
John W. Shomaker, <i>Past President</i>	New Mexico State Bureau of Mines

FIELD CONFERENCE COMMITTEES

William D. Pitt, <i>General Chairman</i>	Eastern New Mexico University
------------------------------------------------	-------------------------------

GUIDEBOOK

Vincent C. Kelley, <i>Co-Editor</i>	University of New Mexico
Frederick D. Trauger, <i>Co-Editor</i>	U.S. Geological Survey
Stuart A. Northrop, <i>Technical Editor</i>	University of New Mexico

ROAD LOGGING

Robert W. Kelley, <i>Chairman</i>	New Mexico State Bureau of Mines
Vincent C. Kelley	University of New Mexico
Frederick D. Trauger	U.S. Geological Survey
Charles J. Mankin	University of Oklahoma
John P. Brand	Texas Tech University
Harold L. James	New Mexico State Highway Commission

REGISTRATION

Antonius J. Budding, <i>Chairman</i>	New Mexico Institute of Mining and Technology
--------------------------------------------	-----------------------------------------------

ADVERTISING

George Dobervich, <i>Chairman</i>	Consulting Geologist
P. Robert Grant	Consulting Geologist
J L Kunkler	U.S. Geological Survey
William D. Pitt	Eastern New Mexico University
Eugene Saucier	Continental Oil Company
William R. Speer	Consulting Geologist
Carl Ulvog	State Land Office

CARAVAN

Lonnie L. Corbitt, <i>Co-Chairman</i>	Eastern New Mexico University
Frederick L. Nials, <i>Co-Chairman</i>	Eastern New Mexico University

CATERING

Robert E. Murphy, *Chairman* Consulting Geologist

PUBLICITY

Harold L. James, *Chairman* New Mexico State Highway Commission

FINANCE

Christina Lochman-Balk, *Treasurer* New Mexico State Bureau of Mines

William L. Hiss U.S. Geological Survey

PUBLICATIONS

Frederick D. Trauger, *Chairman* U.S. Geological Survey

Frank E. Kottlowski

Robert W. Kelley

PHOTOGRAPHY

Harold L. James, *Chairman* New Mexico State Highway Commission

Frederick D. Trauger U.S. Geological Survey

PUBLICATIONS OF THE NEW MEXICO GEOLOGICAL SOCIETY

FIELD CONFERENCE GUIDEBOOKS

Out of Print

1. San Juan Basin [covering north and east sides], New Mexico and Colorado, 1950, Vincent C. Kelley, ed., 152 p., 40 illus. Second printing, 1971, \$5.00.
2. San Juan Basin [covering south and west sides], New Mexico and Arizona, 1951, Clay T. Smith and Caswell Silver, eds., 163 p., 71 illus. Second printing, 1971, \$5.00.
3. Rio Grande country, central New Mexico, 1952, Ross B. Johnson and Charles B. Read, eds., 126 p., 50 illus. Second printing, 1972, \$5.00.
- *4. Southwestern New Mexico, 1953, Frank E. Kottowski, ed., 153 p., 70 illus.
5. Southeastern New Mexico, 1954, T. F. Stipp, ed., 209 p., 76 illus., \$5.00.
- *6. South-central New Mexico, 1955, J. Paul Fitzsimmons, 193 p., 66 illus. Prepared with the cooperation of the Roswell Geological Society.
7. Southeastern Sangre de Cristo Mountains, New Mexico, 1956, A. Rosenzweig, ed., 151 p., 61 illus., \$7.00.
8. Southwestern San Juan Mountains, Colorado, 1957, Frank E. Kottowski and Brewster Baldwin, eds., 258 p., 110 illus., \$7.00.
9. Black Mesa Basin [northeastern Arizona], 1958, Roger Y. Anderson and John W. Harshbarger, eds., 205 p., 106 illus. Prepared in cooperation with the Arizona Geological Society, \$8.50.
10. West-central New Mexico, 1959, James E. Weir, Jr., and Elmer H. Baltz, eds., 162 p., 91 illus., \$8.50.
11. Rio Chama country [New Mexico and Colorado] 1960, Edward C. Beaumont and Charles B. Read, eds., 129 p., 35 illus., \$8.50.
12. Albuquerque country [New Mexico], 1961, Stuart A. Northrop, ed., 199 p., 83 illus., \$9.50.
13. Mogollon Rim region [east-central Arizona], 1962, Robert H. Weber and H. Wesley Peirce, eds., 175 p., 77 illus. Prepared in cooperation with the Arizona Geological Society, \$9.50.,
14. Socorro region [New Mexico], 1963, Frederick J. Kuellmer, ed., 240 p., 90 illus., \$9.00.
15. Ruidoso country [New Mexico], 1964, Sidney R. Ash and Leon V. Davis, eds., 195 p., 64 illus., \$9.00.
16. Southwestern New Mexico II, 1965, J. Paul Fitzsimmons and Christina Lochman Balk, eds., 244 p., 73 illus., \$9.50.
17. Taos-Raton-Spanish Peaks country [New Mexico and Colorado], 1966, Stuart A. Northrop and Charles B. Read, eds., 128 p., 40 illus., \$7.50.
18. Defiance-Zuni-Mt. Taylor region [Arizona and New Mexico], 1967, Fred Trauger, ed., 228 p., 98 illus., \$9.00.
19. San Juan-San Miguel-La Plata Region [New Mexico and Colorado], 1968, John Shomaker, ed., 212 p., 95 illus., \$9.00.
20. The Border Region [Chihuahua and the United States], 1969, D. A. Cordoba, S. A. Wengerd, J. W. Shomaker, eds., 228 p., 159 illus., \$13.50.
21. Tyrone-Big Hatchet Mountains-Florida Mountains Region [New Mexico], 1970, L. A. Woodward, ed., 176 p., 84 illus., \$12.50.
22. San Luis Basin (Colorado), 1971, H. L. James, ed., 340 p., 226 illus., \$15.00.
23. East-central New Mexico, 1972, Vincent C. Kelley and Frederick D. Trauger, eds., 236 p., 128 illus., \$15.00. Special publication No. 4 included with purchase.

SPECIAL PUBLICATIONS

1. Bibliography and index of the New Mexico Geological Society Guidebooks, 1950-63; compiled by Sidney R. Ash, \$0.75.
2. History of the New Mexico Geological Society 1947-1968; by Stuart A. Northrop.
3. The San Andres Limestone: a reservoir for oil, gas and water ... [a symposium]; F. E. Kottowski and W. K. Summers, eds., 51 p., 35 illus., \$3.00.
4. Subsurface geology of East-central New Mexico by R. W. Foster, R. M. Frentess, and W. C. Riese, 22 p., 11 fig. (includes 8 isopach maps), \$2.00.

MAPS

- a. Geologic highway map of New Mexico (in color, 23 x 29 in.), compiled by Frank E. Kottowski and others, \$1.00 folded; \$1.25 rolled.
- b. Geologic map of the Sierra County Region, compiled by Vincent C. Kelley; in Guidebook 6, \$0.50.
- c. Geologic map of the Albuquerque country; compiled by Stuart A. Northrop and Arlette Hill; in Guidebook 12, \$0.50.
- d. Tectonic map of the Ruidoso-Carrizozo region, by V. C. Kelley and Tommy B. Thompson; in Guidebook 15, \$0.75.
- e. Tectonic map of the Defiance-Zuni-Mt. Taylor region, by V. C. Kelley; in Guidebook 18, \$1.50.

All publications are available by mail (please add 25 cents for postage and handling each guidebook) from, or over the counter, at the New Mexico Bureau of Mines and Mineral Resources, Socorro, New Mexico. Guidebooks, and the geologic highway maps are available over the counter at the Dept. of Geology, Univ. of N. Mex., Albuquerque; Holmans, Albuquerque; Roswell Map Service, Roswell; and the Museum of Northern Arizona, Flagstaff, Arizona.

Checks should be made payable to the New Mexico Geological Society.

1 9 7 2

FIELD CONFERENCE SCHEDULE

WEDNESDAY, September 27th REGISTRATION

The Pow Wow Inn, 301 West Tucumcari Blvd. (U.S. 66).

3:00 P.M. TO 11:00 P.M. ICE-BREAKER PARTY in patio.

THURSDAY, September 28th

FIRST DAY FIELD TRIP

Auto-caravan assembles at 7:00 A.M. at northeast edge of Tucumcari, on U.S. 54 and State Road 18, west of Tucumcari Lake.

DEPARTURE TIME 7:30 A.M.

Catered Bar-B-Q lunch at Mosquero.

FREE EVENING

FRIDAY, September 29th

SECOND DAY FIELD TRIP

Auto-caravan assembles at 7:00 A.M. at New Mexico State Police parking lot at west edge of town, 0.5 mile west of Pow Wow Inn.

DEPARTURE TIME 7:30 A.M.

Conferees provide their own lunch.

EVENING 8:00-10:00 P.M.

BANQUET—Midtown Santa Rosa Elementary School gymnasium.

Speaker: Dr. Frank B. Conselman, Texas Tech University, *Role of the Geological Generalist*.

SATURDAY, September 30th

THIRD DAY FIELD TRIP

Auto-caravan assembles at 7:30 A.M. on U.S. 66, half mile west of Pecos River bridge in west part of Santa Rosa.

DEPARTURE TIME 8:00 A.M.

Conferees provide their own lunch.

CONFERENCE TERMINATES AT VAUGHN
(mid-afternoon)