

# New Mexico Geological Society

Downloaded from: <https://nmgs.nmt.edu/publications/guidebooks/19>



## ***Front Matter***

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

*in:*

*San Juan, San Miguel, La Plata Region (New Mexico and Colorado)*, Shomaker, J. W.; [ed.], New Mexico Geological Society 19<sup>th</sup> Annual Fall Field Conference Guidebook, 212 p. <https://doi.org/10.56577/FFC-19>

---

*This is a section from the 1968 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.*

# New Mexico Geological Society

Downloaded from: <https://nmgs.nmt.edu/publications/guidebooks/19>



## ***Front Matter***

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

*in:*

*San Juan, San Miguel, La Plata Region (New Mexico and Colorado)*, Shomaker, J. W.; [ed.], New Mexico Geological Society 19<sup>th</sup> Annual Fall Field Conference Guidebook, 212 p. <https://doi.org/10.56577/FFC-19>

---

*This is a section from the 1968 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  
San Juan -- San Miguel -- La Plata  
Region  
New Mexico and Colorado

JOHN SHOMAKER

Editor

NEW MEXICO GEOLOGICAL SOCIETY

NINETEENTH FIELD CONFERENCE — SEPTEMBER 19, 20, AND 21, 1968

CONTENTS

PRESIDENT'S MESSAGE ..... 5

COMMITTEES ..... 6

PUBLICATIONS OF THE NEW MEXICO GEOLOGICAL SOCIETY ..... 7

SCHEDULE OF CONFERENCE ..... 9

NOMENCLATURE CHART .....10

PAPERS PERTAINING TO FIRST DAY

ROAD LOG FROM FARMINGTON, NEW MEXICO TO CORTEZ, COLORADO, VIA FOUR  
CORNERS POWER PLANT, LA PLATA CANYON, LA PLATA MINING AREA AND MANCOS .c.  
M. Molenaar *and* Larry Werts 11

SUMMARY OF GEOLOGIC DATA OBTAINED FROM BOREHOLE GB-1,  
PROJECT GASBUGGY .....*James E. Fassett* 24

FLUVIOGLACIAL FEATURES OF THE ANIMAS RIVER VALLEY, COLORADO AND  
NEW MEXICO ..... Charles A. *Bandoian* 28

COAL-BEARING FORMATIONS IN THE WESTERN PART OF THE SAN JUAN BASIN OF  
NEW MEXICO .....Edward C. *Beaumont* 33

GEOLOGY AND ORE DEPOSITS OF THE LA PLATA DISTRICT  
COLORADO ..... Edwin B. Eckel, J. S. Williams, F. W. Galbraith, and Others 41

PAPERS PERTAINING TO SECOND DAY

ROAD LOG FROM CORTEZ, COLORADO TO OURAY, COLORADO VIA DOLORES,  
RICO, LIZARD HEAD PASS, TELLURIDE, PLACERVILLE, DALLAS DIVIDE AND  
RIDGWAY J. H. Steward, E. T. McKnight, A. L. Bush, L. R. Litsey, C. T. Sumsion, *and* C. M. Molenaar 63

SUMMARY OF THE GEOLOGY OF THE RICO REGION, COLORADO ..... Walden P. Pratt 83

RICO, COLORADO: A CENTURY OF HISTORIC ADVENTURES IN MINING ..... Charles M. Engel 88

MULTIPLE INTRUSIONS IN THE SAN MIGUEL MOUNTAINS,  
COLORADO ..... Calvin S. Bromfield and Alfred L. Bush 94

VANADIUM DEPOSITS OF THE PLACERVILLE AREA, SAN MIGUEL COUNTY, COLORADO ..... R. P. Fischer 100

PAPERS PERTAINING TO THIRD DAY

ROAD LOG FROM OURAY, COLORADO TO FARMINGTON, NEW MEXICO VIA  
SILVERTON, EUREKA, DURANGO, AND  
AZTEC ..... C. M. Molenaar, J. W. Shomaker, L. L. Werts, and J. A. Campbell 104

THE IDARADO MINE ..... James R. *Hillebrand* 130

JOINT ANALYSIS APPLIED TO STRUCTURES OF THE SILVERTON  
VOLCANIC CENTER ..... Frederick P. Schwarz, Jr. 141

A BRIEF GEOLOGIC HISTORY OF THE PRECAMBRIAN ROCKS OF THE NEEDLE MOUNTAINS, SOUTHWESTERN COLORADO .....	Fred Barker 148
CHARACTER OF PART OF THE HERMOSA FORMATION (PENNSYLVANIAN), SAN JUAN MOUNTAINS, COLORADO .....	W. Arch <i>Girdley</i> 150
PENNSYLVANIAN CORRELATIONS IN SOUTHWESTERN COLORADO	Sherman A. Wengerd <i>and</i> Ernest Szabo 159

## PAPERS OF GENERAL INTEREST

PHOTOGEOLOGIC COLOR ANALYSIS AN EFFECTIVE SUPPLEMENT TO MINERAL EXPLORATION .....	Raymond P. <i>Platt</i> 165
PLACER GOLD IN SOUTHWESTERN COLORADO .....	Ben H. Parker, <i>Jr.</i> 168
RELATIONSHIP OF URANIUM IN THE ROCKY MOUNTAINS OF SOUTHWESTERN COLORADO TO LOCAL AND REGIONAL METALLOGENESIS .....	Roger C. <i>Malan</i> 185

## ACCESS LOG

ROAD LOG FROM ALBUQUERQUE TO FARMINGTON .....	Clay T. Smith, V. C. Kelley, E. H. <i>Baltz</i> , Jr., and R. A. Bailey 193
--	---

ARTICLES OF INCORPORATION, CONSTITUTION, AND BY-LAWS OF THE NEW MEXICO GEOLOGICAL SOCIETY, INC.....	202
ABSTRACTS OF TECHNICAL PAPERS .....	206

## PRESIDENT'S MESSAGE

According to a popular travel guide, "Colorado's San Juan Mountains and the adjacent San Miguel-La Plata Mountain region, with many peaks rising over 14,000 feet, is the closest thing to Switzerland this side of Europe and one of the most beautiful areas of the United States." One might add that the beauty of the region is, to a large degree, dependent upon tremendously interesting and spectacular geological relationships. The New Mexico Geological Society takes pleasure in welcoming you to its Nineteenth Annual Field Conference in this splendid blend of geology and scenery.

Perhaps you might think it unusual that the New Mexico Society welcomes you to a conference largely in Colorado. Quite to the contrary, it is not at all unusual that the Society has elected to explore a region adjacent to the northern boundary of New Mexico. The fact that geology does not respect political boundaries is self-evident. As a matter of fact, present plans call for us to assemble on another border of New Mexico next year when we will hold our Twentieth Field Conference in the Juarez-Sueco-Casas Grandes-Palomas Area of northern Chihuahua.

The fact that we will be outside of New Mexico for two consecutive years does not imply that we have exhausted the possibilities for conferences in New Mexico. While it is true that most of the areas of the state have been visited by the Society, the great success of our Sixteenth Field Conference, Southwestern New Mexico II, demonstrates that a given area can and, indeed, should be revisited after a time. With a new generation of geologists, immigrants to the Land of Enchantment, and new research and economic emphasis, it is entirely appropriate to revisit areas that have previously been considered. Further, we have a few areas of New Mexico to visit for the first time.

The past several years have been good ones for the

Society. We are financially in a satisfactory position, thanks, in part, to clever management of guidebook sales by Fred Trauger. Our new constitution, which incorporates the privileges of a non-profit organization, is a major step forward. We look to the future with confidence.

It has often been said that the New Mexico Geological Society is a "loosely-knit" organization. No one who has been intimately associated with the month to month workings of the Society could deny that fact. However, therein lies much of the charm of the Society. It is merely a group of geologists, catering to no particular specialized segment of the profession, who give unselfishly of their time and talent to further geologic knowledge and strengthen the geologic fraternity. To cite a couple of outstanding examples, Larry Werts was President of the Society last year and is General Chairman of this Conference, while John Shomaker served as Secretary of the Society last year and is the present guidebook editor. In the finest tradition of the Kelleys, Kottlowskis, Reads, Smiths, Beaumonts, Buddings, and many others equally deserving of recognition, we have geologists who care about the Society and are willing to work diligently to see that its activities are excellent ones. Without devoted individuals, the Society would have become extinct several geologic "periods" in the past. With such geologists caring for the well-being of the Society, we continue to be one of the finest and largest organizations of its kind in the nation.

But enough of the state of the Society! The immediate business at hand is the geology and resources of the Field Conference area. We sincerely hope that you will enjoy the Conference, that you will learn much, and that you will join the New Mexico Geological Society and participate in its continuing programs.

Bill King



COMMITTEES

EXECUTIVE COMMITTEE

William E. King, <i>President</i>	New Mexico State University
William R. Speer, <i>Vice President</i>	El Paso Natural Gas Company
Charles E. Chapin, <i>Secretary</i>	New Mexico Institute of Mining and Technology
Robert A. Bieberman, <i>Treasurer</i>	New Mexico Institute of Mining and Technology
Larry Werts, <i>Past President</i>	Kerr-McGee Corporation

FIELD CONFERENCE COMMITTEES

Larry Werts, <i>General Chairman</i>	Kerr-McGee Corporation
--------------------------------------	------------------------

GUIDEBOOK

John Shomaker, <i>Editor</i>	U.S. Geological Survey
------------------------------	------------------------

ROAD LOGGING

C. M. Molenaar, <i>Chairman</i>	Shell Oil Company
Larry Werts	Kerr-McGee Corporation
John Shomaker	U.S. Geological Survey
Access Log:	
Clay T. Smith	New Mexico Institute of Mining and Technology
V. C. Kelley	The University of New Mexico
E. H. Baltz, Jr.	U.S. Geological Survey
R. A. Bailey	U.S. Geological Survey

CARAVAN

J. R. Peterson	Texaco, Inc.
----------------	--------------

REGISTRATION

R. S. Farrar	Texaco, Inc.
--------------	--------------

ADVERTISING

Jerry Jackson	Kerr-McGee Corporation
---------------	------------------------

PUBLICITY

Curtis J. Little	Consulting Geologist, Albuquerque
------------------	-----------------------------------

FINANCE

Robert A. Bieberman	New Mexico Institute of Mining and Technology
---------------------	---

## PUBLICATIONS OF THE NEW MEXICO GEOLOGICAL SOCIETY

### FIELD CONFERENCE GUIDEBOOKS

\* Out of Print

- \*1. San Juan Basin [covering the north and the east sides], New Mexico and Colorado, 1950, Vincent C. Kelley, ed., 152 p., 40 illus.
- \*2. South and west sides of the San Juan Basin, New Mexico and Arizona, 1951, Clay T. Smith and Caswell Silver, eds., 163 p., 71 illus.
- \*3. Rio Grande country, central New Mexico, 1952, Ross B. Johnson and Charles B. Read, eds., 126 p., 50 illus.
4. Southwestern New Mexico, 1953, Frank E. Kottlowski, ed., 153 p., 70 illus. . . . . \$3.00
5. Southeastern New Mexico, 1954, T. F. Stipp, ed., 209 p., 76 illus. . . . . \$3.00
- \*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. \$4.00
8. Southwestern San Juan Mountains, Colorado, 1957, Frank E. Kottlowski and Brewster Baldwin, eds., 258 p., 110 illus. . . . . \$4.00
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. . . . . \$5.00
10. West-central New Mexico, 1959, James E. Weir, Jr., and Elmer H. Baltz, eds., 162 p., 91 illus. . . . . \$5.00
11. Rio Chama country [New Mexico and Colorado], 1960, Edward C. Beaumont and Charles B. Read, eds., 129 p., 35 illus. . . . . \$5.00
12. Albuquerque country [New Mexico], 1961, Stuart A. Northrop, ed., 199 p., 83 illus. . . . . \$6.00
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. . . . . \$7.00
14. Socorro region [New Mexico], 1963, Frederick J. Kuellmer, ed., 240 p., 90 illus. . . . . \$7.00
15. Ruidoso country [New Mexico], 1964, Sidney R. Ash and Leon V. Davis, eds., 195 p., 64 illus. . . . . \$7.00
16. Southwestern New Mexico II, 1965, J. Paul Fitzsimmons and Christina Lochman Balk, eds., 244 p., 73 illus. . . . . \$7.50
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. . . . . \$9.00

### SPECIAL PUBLICATIONS

1. Bibliography and index of the New Mexico Geological Society Guidebooks, 1950-63; compiled by Sidney R. Ash. . . . . \$0.75
2. A history of the New Mexico Geological Society; by Stuart A. Northrop. In preparation.
3. The San Andres Limestone: a reservoir for oil, gas and water . . . [a symposium]; F. E. Kottlowski and W. K. Summers, eds. In preparation.

### MAPS

- a. Geologic highway map of New Mexico, in color, 23x29 in.; compiled by Frank E. Kottlowski 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 Rio Chama country; compiled by Clay T. Smith and William R. Muehlberger; in Guidebook 11. . . . . \$0.50
- d. Geologic map of the Albuquerque country; compiled by Stuart A. Northrop and Arlette Hill; in Guidebook 12. . . . . \$0.50
- e. Tectonic map of the Ruidoso-Carrizozo region; compiled by V. C. Kelley and Tommy B. Thompson; in Guidebook 15. . . . . \$0.75
- f. Tectonic map of the Defiance-Zuni-Mt. Taylor region; compiled by V. C. Kelley; in Guidebook 18. . . . . \$1.50

### ROAD LOGS

Set of nine entry and exit road logs to supplement Guidebook of the Ninth Field Conference. . . . . \$1.00

- (a) Albuquerque to Gallup (N.M.) and return.
- (b) Mountainair to Correo (N.M.) and return.
- (c) Gallup (N.M.) to Cortez (Colo.) and return.
- (d) Socorro (N.M.) to Holbrook (Ariz.) and return.
- (e) Globe to Showlow and to Sanders (Ariz.) and return.
- (f) Monticello (Utah) to Tuba City (Ariz.) and return.

- (g) Kingman via Grand Canyon Junction to Flagstaff (Ariz.) and return.
- (h) Flagstaff to Prescott (Ariz.) and return.
- (i) Gap Trading Post (Ariz.) to Kanab (Utah) and return.

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.

## SCHEDULE OF CONFERENCE

Wednesday, Sept. 18

5:00-11:00 P.M. Registration at the Townhouse Motel on Highway 550, west side of Farmington, New Mexico.

Thursday, Sept. 19

7:00-8:00 A.M. Late registration at the Townhouse Motel.

8:00-8:30 A.M. Caravan assembles on north side of Highway 550 about one mile west of Townhouse Motel.

Departure time: Promptly at 8:30 A.M.

6:00-7:00 P.M. Late registration, Turquoise Motel, Cortez, Colorado.

7:00-7:30 P.M. Cocktail Party, Pony Express Lounge, Cortez, Colorado.

7:30 P.M. Banquet, Pony Express Restaurant.

Friday, Sept. 20

7:30-8:00 A.M. Caravan assembles at intersection of U.S. Highway 160 and Colorado Highway 145, east of Cortez. Assemble on gravel cut-off immediately west of intersection, facing north.

Departure time: Promptly at 8:00 A.M.

Saturday, Sept. 21

7:00-7:30 A.M. Caravan assembles facing east on street in front of Twin Peaks Motel in Ouray, Colorado.

Departure time: Promptly at 7:30 A.M.

12:00-1:00 P.M. Buffet luncheon at the Grand Imperial Hotel, Silverton, Colorado. ( approx.)

PARTICIPANTS WILL BE RESPONSIBLE FOR PROVIDING THEIR OWN LUNCHES ON SEPTEMBER 19TH AND 20TH.