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Front Matter

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

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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.

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GUIDE BOOK

of the

Border Region

EDITORS

DIEGO A. CORDOBA

SHERMAN A. WENGERD

JOHN SHOMAKER

NEW MEXICO GEOLOGICAL SOCIETY

TWENTIETH FIELD CONFERENCE - OCTOBER 23, 24, AND 25, 1969

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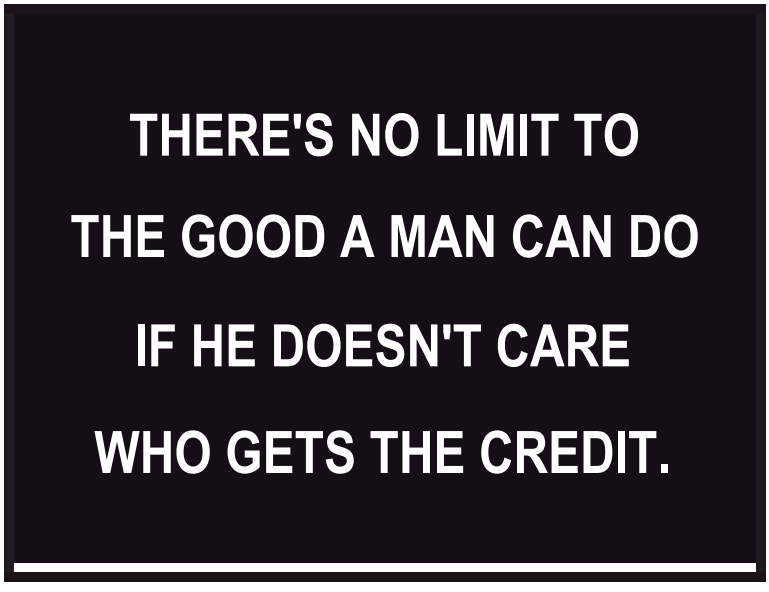
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PRESIDENT'S MESSAGE

On behalf of the Executive Committee and members of the New Mexico Geological Society, Inc., I welcome you to our Twentieth Annual Field Conference. The society is indeed honored and fortunate to be able to sponsor this tour in our neighboring State of Chihuahua.

Acknowledgment to the individuals and organizations who have contributed to the success of this field conference is made in the following messages and in the Guidebook texts. However, I would like to mention several people who have played particularly important roles in organizing this conference. First and foremost is William E. (Bill) King, our General Chairman. This tour of Northwestern Chihauhua has been Bill's labor of love for over two years. Without his pushing, prodding, words of encouragement, and just plain old hard work, this conference would not have been held.

Our editors, Diego Cordoba, Sherm Wengerd, and John Shomaker, have greatly assisted Bill in his task by compiling, and in part, creating, a guidebook that is as good as, and might even be better than, any of our previous guidebooks to the geology of New Mexico and adjacent areas.

The work of the Road Log Committee Chairmen, Roy Foster and Bob Weber, must also be especially acknowledged. The road logging for this conference involved some original geologic work, particularly in the volcanic range areas, in addition to compilation of a considerable amount of unpublished information furnished by our colleagues in various agencies of the Mexican Federal Government and the National and State Universities.

Finally, I want to acknowledge the contribution to the field conference that has been made by the West Texas Geological Society, and particularly by L.. W. (Dan) Bridges. The 1964 field trip of that group to east-central Chihuahua (W.T.G.S. Publication No. 64-50) in a real sense "broke the ice" and provided an inspiration and a mark to equal or exceed in terms of field conference organization and guidebook preparation. The two field conference guidebooks in no way represent a duplication of geological society efforts, and should be companion volumes on the bookshelf of any person really interested in the great international Border Region.

The "President's Message" is usually a place where past actions of the New Mexico Geological Society, Inc. are reviewed, and plans and hopes for the future are expressed.

Our twenty field conference guidebooks and other publications represent the fruits of many past labors by many people. The History of the New Mexico Geological Society, by Stuart A. Northrop, which 1970 members of the Society received at the conference registration, gives all the details of what we have done or have attempted to do.

As for the future, I expect that twenty more excellent field conference guidebooks will be prepared in the next twenty years. In addition, I expect to see the completion of geologic road logging of all major and many lesser highways in the State of New Mexico within the next several years. The newly elected slate of officers of the Society, demonstrates that our organization is a dynamic one in terms of new faces and ideas. The long-time Society stalwarts are always here to give the needed continuity to our operations, but ours is an up-and-going group, as is our profession, and new wine is needed to keep old skins in shape.

John Hawley

SOME COMMENTS BY THE GENERAL CHAIRMEN

Whether it will become apparent or not in the next three days, this Field Conference has been in preparation for over two years. Many problems not common to field trips in the United States have had to be solved. The cooperation of the Instituto de Gcologia, Pal-Oleos Mexicanos and SecretAria de Recursos HidrAulicos, as well as the aid of many individual Mexicans, has been invaluable.

The Conference will be beneficial to geologists of both nations in the understanding of the geology of the Border Region. It is our hope also that many lasting friendships will be fostered.

May we ask each of you to do in Mexico as the Mexicans do . . . relax. There will be malfunctions during the Conference, there is no doubt of that, but please accept these minor difficulties in good spirits. As a matter of fact, if you do not have a sense of humor, you probably should not beon this Conference. You will find the Mexican scientists a charming people who, while they do not necessarily have the same compelling and possibly idiotic sense of urgency as North Americans do, accomplish very sophisticated scientific work and organize their resources very efficiently.

If the coverage of some aspects of the geology is less than adequate, remember that Chihuahua is relatively virgin territory, and little is known about some parts of this beautiful region.

Finally, we will say that if we had the task of being General Chairmen of a Mexico field conference to do again, we would.

Bienvenidos A Chihuahua y feliz viaje!

Bill King John Hawley

A CO-EDITOR'S LETTER FROM MEXICO

Sr. John W. Hawley
Prcsidente de la Sociedad
GeolOgica de Nuevo Mexico
P r e s e n t e .

Estimado John:

Por fin hemos terminado la ediciOn del vigesimo Libreto Guia de la Conferencia Anual de Campo. Creeme que la labor de editor en un trabajo de esta envcrgadura no es nada sencilla y en ocasiones es cansada, pero puede llegar a ser agradable, como en este caso, cuando se ha tenido una colaboraciOn, tan amplia de toda la Mesa Directiva de la Sociedad GeolOgica de Nuevo Mexico. Creo que la Sociedad puede, una vez mas, estar orgullosa de la calidad de este libreto Guia, no solo por los trabajos que contiene, sino por su presentaciOn y principalmente por su significado.

Los geOlogos mexicanos que hemos colaborado en la ediciOn, preparaciOn y cn la presentacien de trabajos geologicos en este Libreto Guia, estamos orgullosos de la labor realizada por la Sociedad GeolOgica de Nuevo Mexico, al lograr la integraciOn de una serie de estudios cientificos en la zona frontcriza. Este esfuerzo debe scrvir como ejemplo para otras organizaciones, tanto mexicanas como norteamericanas.

Estoy seguro de que una vez mas, nuestra Conferencia de Campo sera un exito.

Tu amigo,

Diego A. Cordoba Co-Editor (Mexico)

OBSERVATIONS BY A CO-EDITOR

Appropriately enough, this Guidebook for the 20th Field Conference is one of the most comprehensive yet published by the New Mexico Geological Society, and, although the articles cover a large segment of the Border Region of northern Mexico and the southwestern United States, the entire trip is in Chihuahua, our first conference entirely outside the United States! Always a large state filled with big enterprising people, Chihuahua has produced a great part of the mineral wealth of Mexico and has nurtured some of Mexico's most dedicated revolutionaries in that country's fight for freedom. The political stability and financial acumen of this fast-growing Republic allow one now to turn the coin around and call Mexico today a veritable "Colossus of the South."

Many authors, committee members, and field trip leaders have done the considerable amount of work represented by this Guidebook and the field conference. Errors there no doubt are, for production of such a Guide involving diverse authors from two different countries (including Texas!) is a long involved process. Nonetheless, and perhaps in misplaced apology, the editors have given authors almost completely free rein in presenting the results of their work. Editors are seldom well-enough versed in all facets of geology, hence care was exercised not to challenge their many diverse opinions or to "play" judge without having done all of the geological work. If some authors have taken what to you look like untenable positions in their papers, challenge them on the trip, at *the* microphone. I can assure you that some authors will challenge each other! Much discussion, vigorous defense, offensive sallies, downright arguments short of fisticuffs, and new observations are sought in this Conference, so let's have at it, with vigor!

Ouien no se atreve, no pasa el mar.

Sherman A. Wengerd Co-Editor (United States)

FIELD TRIP LEADERS

The men who will lead this three-day field conference include: Roger Morrison, C. C. "Tex" Reeves, Co-chairman John Hawley, Co-editor Diego Cordoba, William Strain, Jorge Tovar, Robert Weber, Carlos Garcia-Gutierrez, David LeMone, Donald Webb, Jose Guerrero, Edward Berg, Harold James, Roy Foster, Luis Caire, Jerry Hoffer, Alejandro Solis, and your conference General Chairman, William King. There may well be others, among them such hecklers as Jim Wilson, Dan Bridges, Frank "Irish" Kottlowski, Santiago Reynolds, Sherm Wengerd, Zoltan de Cserna, Keith Young, Larry Werts, and Ron DeFord. You may see almost all of these names also asauthor, committeeman, road-logger, or editor; but this is not a closed corporation, and every conference participant who has observations to make will be handed the microphone upon request, volume turned up LOUD! The field trip leaders may even allow some of the officers of the New Mexico Geological Society to have a word or two. Last, possibly least, but never on purpose, if we've left any field trip leader out of the list, below is a prominant blank space designated specifically so that every conference participant who adds to the success of this trip can write his name in his own Guidebook!

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Harold James, Chairman ..... New Mexico Highway Commission

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Mobile Sound Equipment ..... WELEX, a Division of Halliburton
Beverages, en route ..... Schlumberger



View north from south flank of Alamo Hueco anticline to Big Hatchet Mountains. Rig is Humble State BA No. 1 in NW NE Sec. 25, T 32 S, R 16 W. Photo by Sherman A. Wengerd

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. \Vest-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

20. The Border Region [Chihuahua and the United States], 1969, Cordoba, Wengerd, Shomaker eds. $13.50

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. $3.00

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 Serv. ice, Roswell; and the Museum of Northern Arizona, Flagstaff, Arizona.

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



Mt. Riley, and lava flows and plugs of West Potrillo Mountains. Organ Mountains in right distance. Air photo NE from 8000 feet by Sherman A. Wengerd.

SCHEDULE OF CONFERENCE

Wednesday, October 22 — *Registration Day*

9:00 A.M.-10:00 P.M. Registration in lobby of Camino Real Hotel, Juarez, Mexico. Early breakfast tomorrow is on you.

Thursday, October 23 — First Day *Field Trip*

7:30 A.M.-8:00 A.M. Caravan buses assemble at Camino Real Hotel, Juarez, Mexico. Departure time 8:00 a.m. (Sharp, it says here!) Late pre-registered arrivals check with Bill King.

Lunch, Stop 2, Camel Mountain Escarpment. (Who knows when? Or what?)

Barbecue at Motel El Ranchito, Casas Grandes, late p.m. (After the necessary pre-prandial dust-cutting refreshments.)

Friday, October 24 — *Second Day Field Trip*

7:30 A.M.-8:00 A.M. Caravan buses assemble at Motel El Ranchito, Casas Grandes; departure time 8:00 a.m. sharp, *after* an early breakfast.

Lunch stop somewhere between Buenaventura and Mina La Mojina around the middle of the day (maybe!)

AL-Ac-Li

Banquet, and cocktail hour or two, at 8:00 p.m. (or later), Hotel **Feffftetit-,** Ciudad Chihuahua. Banquet speaker will be Ing. Guillermo P. Salas. "Big Bill," formerly Director of the Mexican Geological Institute, and that famous torero of the 1968 G.S.A. Convention in Mexico City, was General Chairman of that convention, and is now with Recursos Minerales Non-renovables.

Saturday, October 25 — *Third Day Field Trip*

7:30 A.M.-8:00 A.M. Board buses near Hotel Fermont ready to leave at or near 8:00 a.m. after breakfast at the hotel.

Lunch stop mile 143.2, placita at Villa Ahumada at high noon. A box lunch —just like yesterday—and the day before.

Late afternoon arrival at Camino Real, Ciudad Juarez, after a great exploratory tour of northern Mexico. Dinner on you and don't forget your car!