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Front Matter

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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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Geology of the Gila Wilderness - Silver City Area



New Mexico Geological Society
Fifty-ninth Annual Field Conference
October 23-25, 2008

Editors

Greg Mack

James Witcher

Virgil W. Lueth



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The New Mexico Geological Society is a tax-exempt corporation registered in the State of New Mexico that promotes interest in geology and associated sciences, fosters scientific research and publications, encourages cooperation among its members, and stimulates interest in New Mexico geology. These goals are met through annual fall field conferences held in different locations in New Mexico or adjoining states and annual spring meetings, generally held in Socorro, New Mexico, where oral and poster presentations on different aspects of New Mexico geology are given.

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DEDICATION

JOHN “JACK” CUNNINGHAM

Southwest New Mexico and the Silver City area have been Dr. John (Jack) Cunningham's stomping ground for nearly 45 years, so it is appropriate that this guidebook be dedicated to him. As the professor of geology at Western New Mexico University from 1964 until his retirement in 1994 and beyond he introduced many students and visitors to the geology of the region. Along the way he explored and thoroughly mapped the area resulting in the publication of the geologic map of the Silver City Quadrangle in 1974 and the later release of the Circle Mesa Quadrangle as an Open File Report.

Jack grew up with his feet planted on Precambrian rocks in Malone, New York on the north side of the Adirondack Mountains. After graduating from high school in Malone he headed for Dartmouth College in New Hampshire, where he received his AB degree. It was at Dartmouth that he also first took up the bagpipe. After completing two years of military service he headed west to the University of Arizona, where he studied hydrothermal alteration in the Tumacacori Foothills for his doctoral dissertation.

In 1962 he began his teaching career in New Mexico at Eastern New Mexico University and in 1964 he arrived in Silver City to teach at Western New Mexico University, where he remained until his retirement in 1994. As the only geology professor at Western, Jack taught a broad range of courses, but one of his greatest passions was field geology. Silver City is a great place to teach geology because of the easy accessibility to many kinds of rocks and structures in a small area. Jack organized and directed a summer geology field camp at Western from 1974 until 1989. The six week course drew students from Harvard to California and from Wisconsin to Louisiana. The students lived in the dorms on campus and worked on a series of field problems in the area. Jack admits that he

would turn the hotshots loose to map Treasure Mountain with its complex structures. A highlight included a trip through the four corners region when students were given the opportunity to hike the Grand Canyon.



Jack playing the bagpipes at the at a past field conference.

In 1983 Jack used equipment money from the state to purchase two Ford Quadravans for the Natural Science Department to provide easier access to the field. When told that the equipment money could not be used to buy vehicles he said it was too late, he had already purchased them. The 15-passenger, four-wheel drive vans were rugged field vehicles lacking any amenities beyond the AM radio, but they will go anywhere and are still in use by the department.

In addition to summer field camps and later workshops for teachers, Jack spent many summers doing geological exploration and field mapping in the west for the United States Geological Survey, the Arizona and New Mexico Bureaus of Geology, and for mining companies.

Service was also a cornerstone of Jack's career. He served several stints as the Chairman of the Department of Natural Sciences at Western and also as acting Vice President of Student Affairs. In 1984 he won a University Presidential Teaching Award at the University.

Jack is probably best known in the New Mexico Geological Society for his impromptu bagpipe concerts in the field during the Fall Field Conferences, but he has also served on the Executive Committee (Secretary, Treasurer, Vice-president and President) of the New Mexico Geological Society twice. He was awarded Honorary Membership in the Society in 1990.

Jack married Paul Ratcliffe in 1959 and together they have 4 children and 6 grandchildren.

Mary E. Dowse

PRESIDENT'S MESSAGE

Welcome to the 59th annual Fall Field Conference, which is held this year in the Silver City region. Greg Mack (New Mexico State University) and Jim Witcher (Witcher and Associates) have put together a wonderful trip designed to examine the delightfully complex geologic history of the southwestern corner of our state. Mesoproterozoic tectonism, middle Cenozoic volcanism, and middle to late Cenozoic sedimentation are among the topics that will be discussed. Everybody will learn something on this excursion! We thank Greg and Jim for the countless volunteer hours that they have put into organizing what is sure to be a memorable trip. Once again, Virgil Lueth, our gifted managing editor, has designed a great guidebook.

Both the 1965 and 1970 Fall Field Conferences were held in the Silver City region, a testament to the exciting research going on in this area at that point in the history of our understanding New Mexico geology. Several names that appeared in the 1965 and 1970 guidebooks appear in this book. Happily, Wolf Elston and John Hawley will be with us to share their wisdom. Sadly, Fred Tragger, who helped with the 1965 guidebook by co-authoring the roadlogs, the dedication, and a couple of papers, passed away this year. Fred was a great geologist and a good friend to NMGS. He set up a fund to help NMGS reprint our out-of-print publications and finance future publications. NMGS Special Publication 11 — The Geology of New Mexico — was published because his generosity.

This field trip is made possible by the support of so many volunteers. We thank our many colleagues and their students in southern New Mexico for their help, for without you, we would not gain the knowledge that you are about to impart. I suspect that we will have a lot of fun, as well.

The New Mexico Bureau of Geology and Mineral Resources has long been a supporter of NMGS. We thank Peter Scholle, director, for his ongoing support of this organization. The efforts of our registration chairs, Kitty Pokorny and Connie Apache, and our refreshment truck helpers, Lewis Gillard and Mark Mansell, are greatly appreciated.

The New Mexico Geological Society, as we approach our 60th year, continues to be a thriving organization. Last year, the NMGS Foundation gave out more than \$35,000 in student grants and scholarships, thanks to generous donations of past members and wise investments by previous Executive Committees, and more recently, by the Foundation. NMGS is lucky enough at this point in its history to have a set of dedicated volunteers that keep the Society moving forward. Maureen Wilks is our publications chairwoman. Maureen is amazing — she sells our publications, plans our future publications, manages our mailings, and provides helpful guidance to current Executive Committee members because of her experience as an Executive Committee member between 1999 and 2003. Personally, I do not know what we would do without the able, cheerful help of Maureen Wilks. Our other NMGS rock star for 2008 is Adam Read, our webmaster. Our website has improved dramatically over the years — now you can register for the Spring Meeting and the Fall Field Conference online, you can purchase our publications online, and, oh, so much more. Thank you, Adam, for bringing NMGS into the 21st century! The significant work of these two individuals was recently recognized by the NMGS Foundation.

Enjoy the trip and learn lots!

Shari Kelley
President - NMGS

CONFERENCE ORGANIZERS' MESSAGE

Welcome to the 59th New Mexico Geological Society Fall Field Conference. It has been forty-two years since the Fall Field Conference was last held in the Silver City region, resulting in the 16th Fall Field Conference Guidebook. In the 1970's, two Spring Meetings of the New Mexico Geological Society were held in Silver City. Abstracts from the collaborative New Mexico Geological Society and Arizona Geological Society 1975 Spring Meeting were published in the 26th Fall Field Conference Guidebook, and papers and road logs from the 1978 New Mexico Geological Society Spring Meeting were published as NMGS Special Paper 7. In addition, NMGS Special Paper 5, published in 1976, contains seminal papers that detail Cenozoic volcanism of the Silver City area. Although this and other early work laid the foundation for our understanding of the geologic history of the region, many problems across a broad spectrum of geology remain to be addressed.

The Silver City-southern Gila Wilderness region owes its wide variety of geologic features to its location along the southern margin of the Mogollon-Datil volcanic field and to the fact that it straddles the boundary between the Basin and Range,

southern Rio Grande rift, and Mogollon Slope. As a result, rocks spanning a vast range of geologic time are exposed in the region, including Precambrian crystalline basement, Paleozoic and Late Cretaceous sedimentary rocks, Late Mesozoic, Paleogene, and Neogene igneous rocks, and Neogene basin fill. Also present are ore deposits, the mining of which has contributed so much to the economy of the greater Silver City area. We will have the opportunity to examine stratigraphic units and structures representative of the region, as well as to enjoy the beautiful landscape.

We wish to thank the following people and organizations, who helped us in the planning and execution of this field conference: Mary Dowse, Jack Cunningham, Jim Ratté, Wolfgang Elston, Virginia McLemore, Barry Kues, Catherine Giles, Jeff Amato, Bill Seager, Shari Kelley, Kate Zeigler, Marilyn Huff, Lewis Land, Maureen Wilks, Jane Love, Leo Gabaldon, Nicole Robins of the Silver City/Grant County Chamber of Commerce, and the U.S. Forest Service for group access to the Catwalk Recreational Trail and the Little Walnut Creek Picnic Site. We also thank the authors of the papers for taking the time and effort to share their research with us. Finally, we offer a special thanks to Virgil Lueth, managing editor of the Guidebook.

Greg Mack and Jim Witcher

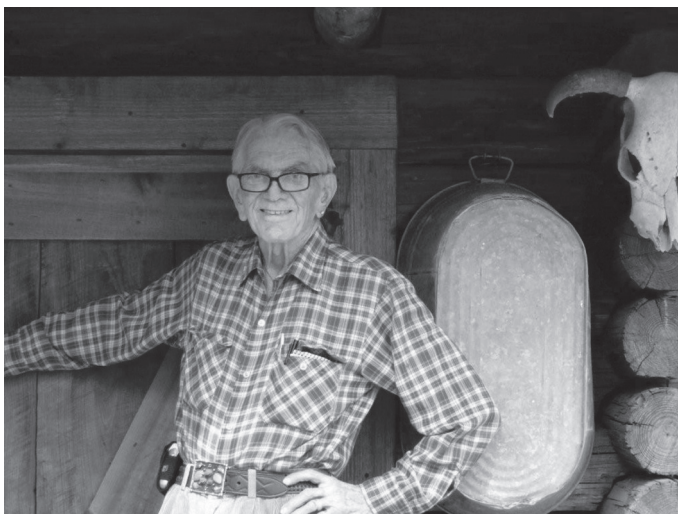
MEMORIAL

FREDERICK DALE TRAUGER

The setting for this fall's NMGS fall field conference in the Silver City area evokes fond memories for many members of the community of geoscientists in New Mexico. As we traverse this region of great natural beauty and spectacular geology, we should remember with great appreciation the hard work and generosity of those who came before us and troubled themselves to commit their observations to posterity. Thinking of our esteemed predecessors in the Silver City area, many will quickly remember Frederick Dale Trauger, who passed away on May 3, 2008. Of special note were his contributions to our 16th Field Conference Guidebook. Fred worked much of his career in New Mexico as a member of the U.S. Geological Survey's water resources group in Albuquerque. An excellent biographic sketch for Fred was presented in the 2001 NMGS Field Conference Guidebook's dedication, but on this occasion, we are moved to share a few additional memories of our friend.

Fred was one of the earlier investigators who documented New Mexico groundwater resources in publications of the U.S.G.S., the New Mexico Bureau of Mines, and the New Mexico State Engineer Office. Beginning in the late 1940's, these agencies collaborated on a series of ambitious county-level or regional hydrogeologic investigations, many of which were performed and published entirely by one or two individuals. Fred and other members of this group could best be described as "renaissance men". They were rugged individuals who worked mostly alone, used their knowledge, intuition, interpersonal skills and persistence to locate and test wells, springs and water-relevant features

of their study areas, and brought their measurements and observations forward to the published works that we still use to discover, quantify and protect groundwater resources in New Mexico. Fred



understood his role in these efforts and the importance of the data he accumulated. He made many sacrifices to do his job well, living for extended periods in the field, working on major assignments in Grant, Quay, and Harding Counties. He immersed himself in these projects, making many lifelong friends in the process. Fred's efforts to collect, interpret and present data were, in a word, relentless. His production of basic hydrogeologic data was prolific by any measure. His reports are enduring, and are

distinguished by the sheer quantity and quality of their data and their compelling graphic images, as well as their contributions to understanding of the structural geology and consolidation of stratigraphic nomenclature of the areas he investigated.

Yes, Fred Trauger left footprints in New Mexico as a groundwater scientist and geologist. But those who knew him well will likely remember him more fondly and vividly for his generosity, insatiable curiosity, sense of humor, and appetite for fun. Fred left the woodpile higher than he found it.

While you enjoy this field conference and travel down the roads our benefactors knew so well and stand on the same outcrops where they stood, please take a minute to reflect on how fortunate we are that the "renaissance men" were once here. Reflect also on what you might give, and perhaps, leave a footprint or two.

Clay Kilmer

FIELD CONFERENCE SCHEDULE

Wednesday, October 22, 2008—registration and ice-breaker

6:00—9:00 pm	Registration and ice-breaker at the Red Barn Steakhouse next to the Copper Manor Motel, Silver City
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Thursday, October 23, 2008—First Day: Silver City to Glenwood via Mangas Valley

6:30-7:30 am	Breakfast (not provided.)
7:30 am	Buses depart from Copper Manor Motel parking lot.
12:00 noon	Lunch provided.
5:30 pm	Barbeque dinner at Little Walnut Creek group picnic area.
7:30 pm	Return to Silver City

Friday, October 24, 2008—Second Day: Silver City to Lake Roberts via the Mimbres Valley

6:30-7:30 am	Breakfast (not provided).
7:30 am	Buses depart from Copper Manor Motel parking lot.
12:00 noon	Lunch provided.
6:00 pm	Return to Silver City
7:30 pm	Banquet at Red Barn Steakhouse

Saturday, October 25, 2008—Third Day: Burro Mountains via Tyrone

6:30-7:30 am	Breakfast (not provided).
7:30 am	Car caravan departs from Copper Manor Motel parking lot.
12:00 noon	Lunch provided.
1:00 pm	Conference ends in the Burro Mountains about 15 miles north of Lordsburg and Interstate-10.