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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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Geology of the Chupadera Mesa

Editors Virgil W. Lueth Spencer G. Lucas Richard M. Chamberlin

New Mexico Geological Society 60th Annual Field Conference October 7-10, 2009





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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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Geomorphology

 Ben Donegan, along with his late brother Bob, has played a central and generally unsung role in the furthering the geological understanding of New Mexico since the early 1950's. Ben and Bob, and later Ben by himself, were integral to early uranium exploration efforts in the state and later generated prospects for dozens of oil and gas prospects in the state, many in sparsely drilled and geologic basins that were poorly understood. Data obtained from his wells, and the ideas that he generated in order to get the wells drilled, have proved essential to understanding the geology of many remote basins.

Ben was born in Amarillo in 1927 and grew up during the Great Depression. Ben's father passed away when Ben was young and his mother moved the family frequently throughout the Panhandle and West Texas in order to provide for them. During his youth he went to school as any normal child but also worked a variety of jobs to help support the family. One job was bottling samples collected from drill rigs in the San Angelo Texas area and Ben, showing his inquisitiveness at an early age and being something of a prodigy, learned the basics of the stratigraphic section in the process as well as initiating his lifelong love affair with exploration geology. Later, he spent a high-school summer on a seismograph crew where he took the opportunity to become familiar with geophysical operations.

Ben's difficult early years, chaotic and stressful, produced a man of immense inner strength and self reliance, characteristics that would serve him well throughout his life. Ben studied geology for three years at Texas Tech, put in a stint in the Navy that included a year at Stanford, and then another year at the University of Texas. His journey as a professional geologist began when Ben, his wife Ruby and infant daughter Nancy journeyed west to Albuquerque where he began his career as a uranium exploration geologist. Soon Ben, joined in work by his brother Bob, turned his attention to oil and gas exploration, an endeavor that has lasted to the present. For about a decade, Ben and Bob operated as Coral Oil and Gas and El Dorado Oil Co. and later expanded into mineral exploration ventures as well. Eventually the brothers' interests diverged with Bob working for Quintana Mining Corp. and Ben working on mineral interests for the Leonard family of Fort Worth.

Ben's association with the Leonard family lasted until the early 1990's when he became an independent exploration geologist in order to pursue frontier exploration targets that put his geological experiences and sometimes unconventional ideas to work. His quest became discoveries of major magnitude and his tools were solid geologic reasoning based on geologic examination of massive amounts of diverse data. This, in conjunction with a keen mind and studies of geologic provinces throughout the world, resulted in new and unconventional interpretations of areas previously written off as unprospective or just plain geologically simple. Backed by his sound science, Ben has been able to attract professional oil and gas partners in project after project and in the process has become the foremost wildcatter in the state. For those of us who have had the privilege of being associated with Ben through the years, we never cease to be amazed by his expansive interests and breadth of knowledge and the intensity with which he pursues each new project. Ben will follow every reference, clue and lead no matter how obscure or insignificant it may seem. He never will accept being "close enough" if there is one more small piece of data to be uncovered and integrated into his work. Generous to others in sharing his data and ideas, an afternoon spent discussing geology with Ben is a true geological education that rivals the finest that any university has to offer.

One of Ben's latest projects started in the 1990's – the pursuit of oil and natural gas in the seemingly resource-barren wilderness of Chupadera Mesa, the site of this year's field conference. His efforts typify Ben's thoroughness and dogged persistence. Ben worked with a variety of partners to drill six exploratory wells, a truly amazing feat for an independent exploration geologist. But alas, although the wells recovered gases upon testing the gases



Ben Donegan at a drill site on Chupadera Mesa in xxxx.

mostly turned out to be nonflammable and comprised of varying amounts of nitrogen and carbon dioxide and mostly devoid of hydrocarbons. At this point, most other prospectors plug their wells and walk away. Not Ben for he had noticed anomalous ratios of minor gases in the samples recovered from his wells. After consulting obscure references in his extensive personal geological library, he concluded that helium might be present in the gases. So Ben had the gas samples analyzed for helium and it was there in amounts exceeding 3 percent. This is unusually high in almost any geologic setting. Ben turned his unsuccessful oil and hydrocarbon gas prospects into helium prospects and has attracted additional partners to pursue this gas that is indispensable to many everyday technologies in our modern society.

Ben is frequently accompanied in his geological adventures by his ever-gracious wife Ruby. His daughter Nancy and sonin-law Steve ably assist him in the office as well as provide him with the support so often needed by the independent exploration geologist. Ben's son Mike is also a geologist and resides in Texas where he operates a nation-wide blasting business.

Ben's geological knowledge is vast by anyone's standards. Several years ago the late Vin Kelley, a professor of geology at the University of New Mexico and a widely recognized expert in the geology of the state, remarked that Ben had the broadest understanding of the geology of New Mexico of any geologist. Many others concur. Were Vin still here, he would join us in recognizing Ben Donegan, geologist and explorationist *extraordinaire* and stalwart member on the New Mexico Geological Society, as this year's guidebook dedicatee.

Ed Beaumont and Ron Broadhead

PRESIDENT'S MESSAGE

This year's Fall Field Conference to the Chupadera Mesa area, led by Virgil Lueth, Spencer Lucas, Richard Chamberlain and Steve Cather will be a fascinating trip. This marks the first field conference to visit this part of New Mexico and, as such, promises to be a very interesting and informative conference on many levels.

The 2009 Spring Meeting was co-chaired by Jim Fassett (USGS Emeritus) and myself and featured a variety of presentations on the multi-faceted development and current uses of geochronologic methods, including radiometric dating, magnetostratigraphy, biostratigraphy and others. Our keynote speaker, Bill Dickinson, gave an exceptional presentation on uses (and pitfalls!) of geochronologic methods. Many thanks to Jim for his tireless efforts at organizing the conference. I would also like to extend a big thank-you to all of our student presentation judges: thank you for taking the time to listen to our student members and give constructive criticism.

Membership in the New Mexico Geological Society is holding steady at around 680 members. 2009 marked the first year that annual dues have increased since before this particular president was born, though the increase is not substantial when compared to dues paid to other professional societies. In spite of the wobbling of the national and global economies, NMGS Inc. and NMGS Foundation are doing moderately well. This year, NMGS awarded 11 graduate grants-in-aid and four undergraduate Pipkin Awards. Matt Zimmerer of NM Tech was this year's Kottlowski Award recipient and his research focuses on dating of plutons in central and southwestern New Mexico. Matt's project is also a pilot study for the use of extra scholarship funds to pay for an undergraduate field or lab assistant. Matt also won best student oral presentation and Amy Williams of UNM won best student poster presentation at the Spring Meeting.

Upcoming Fall Field Conferences include 2010 in the Four Corners, 2011 in the Tusas Mountains, and 2013 in Sierra County. Any proposals for future Fall Field Conferences are welcome and can be sent to any NMGS officer. Thank you for your continuing membership in NMGS and we look forward to seeing you in Socorro!

Kate Zeigler President

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CONFERENCE ORGANIZERS' MESSAGE

Welcome to a place you may never have seen before, Chupadera Mesa. For our 60th fall Field Conference we will visit a place never before traveled by a NMGS caravan. We will have the marvelous opportunity to ponder beautiful scenic vistas and and a wide variety of rocks, from the Proterozic basement to radioactive fallout from the first atomic bomb!

Virgil W. Lueth

MEMORIAL

PASO POR AQUI - ROBERT HARRISON WEBER

New Mexico lost one of its most respected and revered geoscientists with the passing of Robert Weber in February 2008. Bob wore many hats and wore them well but few outside his immediate circle of family and professional colleagues are aware of them all. The "hats" include, but are not necessarily limited to, those of geologist, mineralogist, chemist, metallurgist, mining engineer, mining historian, meteoriticist, and archaeologist. These have been discussed in some detail in memoirs and biographical sketches appearing in publications of the Archaeological Society of New Mexico, the Department of Anthropology, Texas A&M University, and a special remembrance presented at the 29th Annual Mineral Symposium in Socorro in November 2008.

"Paso por aqui" ("passed through this way") is both a fitting and appropriate metaphor to introduce those who follow in his footsteps to the wide-ranging and all-encompassing fieldwork of the man. Hardly a site in this guidebook wasn't previously visited by Bob and studied in some detail. The astute reader will note that his native copper specimens embellish the mini-paper on the San Lorenzo copper prospects. He was the first to note the presence of sphene in the Jones Camp iron deposits and he visited the Fraley limestone quarry at a time when many artifacts could still be observed and made note of the sources of black powder used therein.

The many geological maps published in his career such as the Canon Largo, Reserve, and Mogollon thirty-minute quadrangles highlight Bob's geological skills. Much of his published economic geology work focused upon industrial minerals such as perlite and gypsum while his unpublished work (as reflected by his field notes and recon reports) focused on the precious and noble metals. Bob was especially knowledgeable in regard to the mineralogy of the platinum group.

While on uranium reconnaissance work in the Grants District in 1951 Weber discovered and, along with Bureau mineralogist colleague Dr. Ming San Sun described, the new mineral species "Santafeite," a hydrated manganese vanadate. He should have been so credited with the discovery of Murdochite, an anhydrous oxide of copper and lead, as well. Visiting the Mex-Tex mine at Hansonburg



Bob Weber on an archeological field trip in Arizona a few years ago.

during the early 1950s Bob collected what was soon to become the new mineral murdochite. Back in Socorro, he and Dr. Sun first thought the mineral, based upon a strong lead and oxide indications, was plattnerite (simple lead oxide). But the latter mineral is tetragonal and this one, as suggested by the minute cubic crystals and later confirmed by his x-ray diffraction work, was very clearly isometric. Moreover this mineral yielded, in addition to the lead, an even stronger copper indication. He concluded he had a new mineral species on his hands but set it aside in favor of his reconnaissance geologic mapping in west-central New Mexico. In 1955 the new species murdochite was described from material collected not at Hansonburg but at the Mammoth-St. Anthony mine near Tiger, AZ. So while our museum in Socorro holds perhaps the original "type" specimens they are not from the "type locality!" Bob accepted it all with good grace and moved on.

Bob's observational skills shone at their brightest in his ability to find that most elusive of all terrestrial prizes: the non-metallic, or stony, meteorite. Many New Mexico meteorites are carefully preserved in his collection at Socorro, and some may be from otherwise undocumented falls. Most are generally classified as chondrites but remain to be scientifically described in detail. How he was able to "see" the non-descript stony and stony irons on the desert floor and distinguish them from the almost identical rocks adjacent to them, always amazed his colleagues. At least seven of these, The Alamillo, Jornada 1, 2, and 3, Old Carthage, Sand Mountain and Lambing Lake chondrites occur within the present Field Conference area.

And finally his many contributions to the study and knowledge of Paleo-Indian sites on the San Augustin Plains, at Mockingbird Gap, and elsewhere are near legendary. Yes, Bob Weber passed this way often and we will follow in his footsteps and long be enriched by the knowledge he imparted and the research data he left behind.

FIELD CONFERENCE SCHEDULE

Wednesday, October 7, 2008—registration and ice-breaker

6:00—9:00 pm Registration and ice-breaker at the Macey Confernce Center - New Mexico Institute of Mining and Technology Campus, Socorro, NM.

Thursday, October 8, 2008—First Day: Socorro to Broken Back Crater and return

6:30-7:30 am	Breakfast (not provided.)
7:30 am	Buses depart from Macey Center parking lot.
12:00 noon	Lunch provided.
5:30 pm	Barbeque dinner on the north lawn of the Macey Center.
8:00 pm	Macey Center Bar closes

Friday, October 9, 2008—Second Day: Socorro to Buffalo Springs and return

6:30-7:30 am	Breakfast (not provided).
7:30 am	Buses depart from Macey Center parking lot.
12:00 noon	Lunch provided.
6:00 pm	Return to Socorro
7:30 pm	Banquet at Macey Center

Saturday, October 10, 2008—Third Day: Socorro to Gran Quivera National Monument

6:30-7:30 am	Breakfast (not provided).
8:00 am	Car caravan departs from Macey Center parking lot.
12:00 noon	Lunch provided.
1:00 pm	Conference ends in at Gran Quivera National Monument