The Geologic Division Retirees Newsletter

Number 72 **Spring 2016**

An organization of retirees of the Geologic Division, U.S. Geological Survey, who seek to keep in touch with each other and with their former Agency.

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About the Cover: Sampling trip into the Sierra Agua Verde, Sonora, Mexico, February 20, 1983. Left to right: Juan Manuel Morales-Ramirez, Anita Harris, Bruce Wardlaw, Jack Stewart, and Barney Poole. Before his recent death, Bruce told John Keith that each person collected about 20 kilos of rock, and the hike out was a very long one. Anita was lagging behind, and Bruce dropped back to check on her. She said, “I just can’t make it with my samples—can you put them in your pack and not tell the others?” So Bruce hauled 40 kilos for the rest of the trip. (Photo by Barney P. with camera on timer)

From the President

Many of you are familiar with the American Geosciences (formerly Geologic) Institute. Each time there is a Presidential election, the AGI Government Affairs Committee produces a document on "critical earth science issues" to inform and advise the incoming administration. The latest version of this document can be found on the AGI website. The five basic issues are climate, energy, hazards, minerals, and water. The five issues are further subdivided with short explanations under each subdivision, and with references for further, detailed information on each topic. This document is a good overview of the fundamental importance of geosciences to policy making by the government. For those of you who are actively "advising" legislators and other public officials, this information should be a useful resource. So be sure to look at the critical issues section on agiweb.org.

I am happy to report that Volume 4 of USGS history is now being printed (see the previous issue of GDR News). Copies will be sent to USGS and other major libraries. They will also be for sale from the Survey Publications Warehouse in Denver. When the books are actually distributed, I will pass the word around by email so that you can obtain a copy if you wish.

When Jack Reed died last June, we were planning on a memorial to him that would describe his unusually productive career. However, Jack had written his own short biography in 2014, published in the *Rocky Mountain Geologist*. This document is exceptionally interesting reading, so we are printing it as a memorial to him in the History section of this News. As you will see later in this issue, we recently lost two other Survey "institutions," Robert L. Smith and Wally Hansen. Their memorials will appear in future editions.

John Keith

Treasurer's Report and Membership Statistics

This report summarizes the financial situation of the Geologic Division Retirees as of the end of 2015. Our present financial health is good because we have found a printer for our newsletters and directory who does a good job at a lower cost than our former printer. We printed only one newsletter in 2014 and 2015, so our expenses were lower than usual. We currently have a large surplus and added to that surplus during 2013-2015, even though we decreased dues to $6. At current levels of expenses, the current surplus could fund the organization for four or five years - this seems too large a surplus for a non-profit organization like ours. If the surplus continues to grow, we will have to decrease dues further, but for the present, we are leaving dues at $6 per year. Recent decreases in membership suggest that the surplus may not be a problem for long, however.

Net worth, January 1, 2015	12,320.85
2015 Income	
Dues and contributions received	
Dues for 2014 and prior years	156.00
Dues for 2015	1,342.00
Dues for 2016 and beyond	645.00
Contributions	533.00
Total income	2,676.00
2015 Expenses	
Dues notices (envelopes, stamps, labels)	318.62
Preparation and mailing of newsletter and directory	2,059.81
Bank charges	4.00
Total expenses	2,382.43
Net increase in net worth	293.57
Net worth, December 31, 2015	12,614.42

Assets, December 31, 2015

Checking account, Wells Fargo	12,614.42
Undeposited dues & donations	00.00
Total assets	12,614.42

Notes:

Comparison with 2014: The amount received for dues in 2015 is $51 less than in 2014, and the amount received as contributions is $162 less. Dues billing cost $10 less (this cost varies considerably from year to year because of advance buying of envelopes and labels in some years).

Escrow for future dues: Of the assets at the end of 2015, $1221 represents advance dues payments and must be regarded as funds in escrow for 2016 and future years.

Dues billings: For 2016, dues notices were sent out in a single batch. Members who have not paid dues since 2013 will be dropped from the active membership list if they do not pay by the fall. They will no longer receive newsletters and their names will no longer be listed in the directory.

Membership statistics:

Year-end membership:

2015 - 398	2009 - 484
2014 - 390	2008 - 504
2013 - 407	2007 - 519
2012 - 414	2006 - 531
2011 - 434	2005 - 555
2010 - 453	2004 - 579

Since 2004, we have had an average annual net loss of 19 members. Of our members at the end of 2015, 75 were in arrears, 207 were paid up through 2015, and 113 were paid up through 2016 and beyond; 3 are life members. All members who have not paid dues since 2012 have been dropped from the active membership list. About 107 of our members were Emeritus geologists with the USGS at the end of 2015.

2016 data:

We have already received nearly all the dues income and donations for 2016, and I will summarize that data here. As of the middle of May 2016, we have received $1882 in dues, about 85% of the dues receipts for 2015, and $351 in donations, about 51% of the donations for 2015, for a total income of $2233, about 77% of that in 2015. Cost of producing the newsletter mailed in early winter was $1371, and cost of the dues billing was $350. If cost of the current newsletter and directory is about the same as last year, total expenses for 2016 will be about $3780. If we receive no additional dues or donations, we will show a loss of about $1550 for 2016. As we need to reduce our reserve, this kind of loss is not a problem for the present year. The membership trend is a problem for the future, however. Through death, resignation, and non-payment of dues, our membership has decreased to 381 as of the middle of May 2016, and only 92 of our current members are emeriti. Please encourage your retired USGS friends to join our organization if they are not already members

Odette James
Secretary/Treasurer

New Members

Robert J. Kamilli
Sue Kropschot
Gloria McCleneghan
Robert G. (Game) McGimsey
Jean Noe Weaver
Rob Wesson

Essays, Anecdotes, and History

A Field-Work Adventure in Hawaii

Wendell "Duff" Duffield

In 1975, Keith Howard, Mel Beeson and I (all USGS geologists) had a fieldwork adventure on the island of Molokai, Hawaii, that none of us will ever forget. We were headquartered in Menlo Park, CA, at

that time. Mel was in the midst of studying the chemistry of the 1,600-foot-thick section of lava flows exposed along the foot trail that descends to Father Damien's well known leper colony on the Kalaupapa Peninsula of Molokai. I was mapping volcanic rocks here and there in California. Keith was plugged into the USGS program of Astrogeologic Studies. Somehow he convinced his money managers that one could learn a lot about the geology of Mars by studying the caldera of East Molokai Volcano. The three of us … young, enthusiastic, and in search of adventure … teamed up to do so.

A helicopter ferried us and our equipment into this very remote rainforest area. The pilot assured us that he would pick us up three weeks later. As our last glimpse of "civilization" for those coming weeks choppered out of sight, we made camp, filled with energy and grand expectations of improving the pioneering geologic mapping done in the 1940s by Harold Stearns and Gordon Macdonald.

We began in Wailau Valley, a deep north-flowing drainage carved into the east flank of the volcano. We quickly discovered that lush tropical vegetation hid virtually all bedrock. Desperate to put our geology picks to use, we shed our clothing and swam streams to the few rocks that peeked through greenery. By day eight of nude fieldwork, we were very discouraged by the paucity of real rocks. And almost worse, by then we were completely bummed out by our victuals.

Keith had purchased a pallet of surplus military K-rations, as our sole source of nourishment. They were light weight, highly caloric and the price was right. But with only four different meals, we soon ate solely to stay alive. Adventuresome Keith tried snails from Wailau Stream and raw taro root. Ugggh! Smart Keith was a one-trial learner and went back to K-rations.

Hoping for better outcrops, we headed west into Pelekunu, a deep valley eroded across the caldera. Getting there was a two-day seemingly life-threatening adventure. What we had been told would be a well marked trail, definitely wasn't. Nonetheless we found Malihini Cave, the bedroom target for our first night. We slept outside in the rain though, rather than on a cave floor covered ankle-deep in goat poop. Next day we crested 3,000-foot-tall razor-back drainage-divide Kolo Ridge, and stumbled more than walked down to a USGS stream-gauging-station shack where we found a meal's worth of Spam … Yummy!!!

Field traverses in Pelekunu Valley verified what we had discovered on the first day in Wailau. Most of the landscape was covered by ferns and grasses and bushes and trees. But along some stream banks we found outcrops of dike swarms and hydrothermally altered lava, presumably parts of the guts of the caldera. Other enticing outcrops stared down at us from inaccessible tall cliffs.

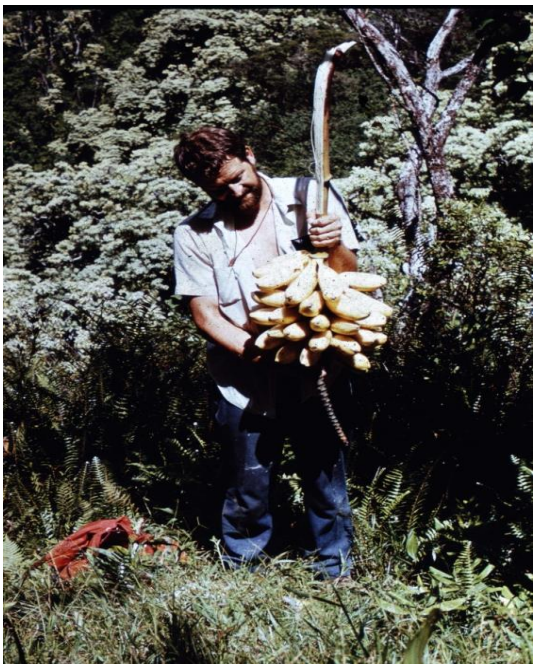
And of course at one of the planet's wettest places, it rained and rained and then rained some more. We entertained ourselves during down times by carving Hawaiian flutes from sections of bamboo and trying to make music. For variety, we gathered the pea-sized shiny off-white seeds (called Job's Tears) of a tall grass and strung them into attractive necklaces. Thirty-four years later, I still have my Job-Tear creations and am wearing one of those necklaces as I type these words. But with each passing Pelekunu day, we were getting sicker and sicker and sicker of K-rations.

Flutists Duff (left) and Keith

In semi-desperation for dietary variety, Keith and I went on the bare-handed hunt for one of the many feral pigs that thrive in Hawaiian rainforests. We caught one, about a thirty pounder. The three of us gathered, catch in hand, and salivated until we realized that we didn't have the heart to kill the little porker. The fact that piglet was crawling with lice was another deterrent to slaughter and feast.

Keith (left), piglet, and Duff

It was to be K-rations to the end, other than the fruit of a banana tree we found near camp.



Mel with fresh bananas

February 25: Our escape helicopter arrived on schedule and deposited us at the Molokai Airport. A wiki wiki cab took us to a hotel in Kaunakakai, the island's main town. My wife Anne, who normally is terrified to even get near an airplane, had flown in from the mainland to greet me. I paused long enough to plant a cursory kiss. Then we all headed to the nearest café, where Keith, Mel and I overate. Next morning, as Anne and I awoke in a warm embrace, my first words were "I've been dreaming about an apple turnover." Later that morning, back at the café, Keith, Mel and I ate two full breakfasts each. To this day, Anne likes to teasingly remind me of how much more interested I was in food, than in her, during our Kaunakakai reunion.

The USGS Discovery of the Cortez Gold Mine, Nevada, in the 1960s

Ralph L. Erickson

After I finished work on the Magnet Cove, Arkansas, igneous complex (Prof. Paper 425) in the early 1960s, I wanted to work on mineral deposits in a different terrane. I became very interested in north-central Nevada, as there were previously-known heavy metal deposits associated with the Roberts Thrust, a major structural feature. Jim Gilluly and Hal Mazursky had recently completed detailed geologic mapping of an area in the Cortez Mountains, and their work provided the excellent geologic control that I needed for geochemical sampling. I began reconnaissance work there in 1961, with Al Marranzino as my field assistant; he was succeeded by Sherm Marsh and others later in the project.

We spent three field seasons sampling areas of mineral potential and began to home in on specific sites. We were sampling in particular for an associated suite of elements—arsenic, mercury, and antimony, with gold. Two important new analytical techniques had become available during the time of the project. Bert Lakin and Harry Nakagawa had developed a

rapid, sensitive method for determining trace amounts of gold in rocks and soils, and Bill Vaughn and Howie McCarthy had invented a mercury sniffer.

These two techniques helped enormously with our geochemical exploration in the search for favorable ground for mineral discovery. In 1964, when Congress was concerned about the lack of U.S. production of gold and silver, Director Bill Pecora succeeded in obtaining funds for a Heavy Metal Program for the Survey. By 1966, the Bureau had had the money for two years, but had small positive results to show for it.

It was with pleasure that I called Pecora in September of that year to say that we had a very promising discovery. He was so excited that he flew out to view the area. After his visit, he saw to it that our Circular 534 announcing the results was rushed by George Becraft through Technical Reports. The crucial information in the Circular was that a silicified limestone outcrop in the lower plate of the Roberts Thrust at Cortez had as much as 3.4 ounces per ton of disseminated gold. In order to give the public equal access to this information, the Circular was released simultaneously in Washington, Denver, and Menlo Park.

In 1968 the Cortez Mine opened. From that time to the present, they have produced over 20 million ounces of gold. Last year Suzi and I were invited to travel out to Nevada and take a tour of the mine.

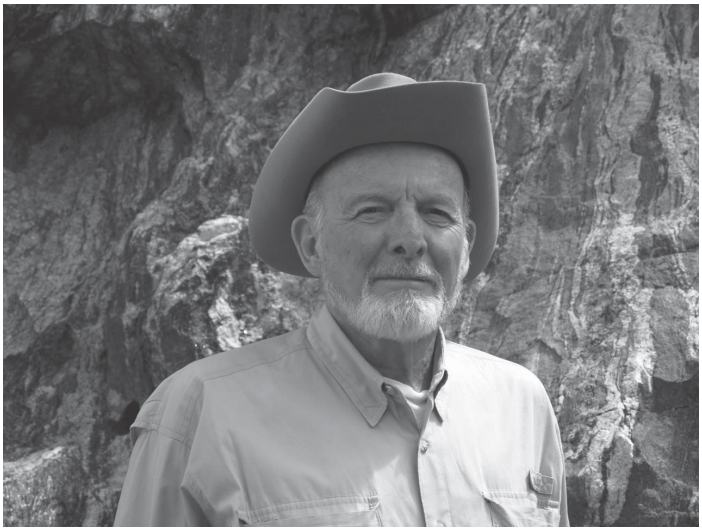
Ralph and Suzi on their trip to Nevada to see the Cortez Mine

I was amazed by the extent of the operation and also the fact that there are still substantial reserves to be extracted. The significant productivity of this mining operation show how geologic mapping, combined with geochemical exploration techniques, and a lot of hard work by all of the Survey people involved, led to a major economic success.

Thinking Back

Jack Reed

(The following memoir was published in the journal *Rocky Mountain Geology* in November 2014, as part of their continuing series, "Profiles of Rocky Mountain Geologists." Jack died June 25, 2015; this essay, reprinted with permission, serves as his memorial.)



John 'Jack' C. Reed

As a volunteer guide on Dinosaur Ridge west of Denver, I'm occasionally asked by some bright-eyed middle school student: "Why did you become a geologist?" I generally answer with the usual list of pious platitudes: a chance to do exciting outdoor work in interesting places; opportunities to perform research in a variety of fascinating fields; and the possibility of making major contributions to society through exploration for mineral, energy and water resources, understanding and predicting geologic hazards, and

reducing threats to the environment. In my case, however, this is not the complete truth. My decision was made under rather special circumstances. I was, in effect, playing with loaded dice.

My dad joined the U.S. Geological Survey (USGS) in 1927, three years before I was born. He was John C. Reed; I am officially John C. Reed, Jr., but have always been 'Jack'. I grew up in the close-knit society of USGS geologists and their spouses and kids, so almost all of the adult males I was exposed to were geologists of one kind or another. Some of my earliest memories are of summer fieldwork in western Idaho where Dad worked with Phil Shenon and Jim Gilluly. I especially recall the summer of 1938 when the family spent the summer on the outer coast of Chichagof Island in southeastern Alaska, where Dad was mapping the Chichagof mining district. It was there that I got to go underground in a real mine, watch the pouring of gold bricks, and hang around the assay office and mill.

At that time, the USGS was headquartered in a stately old building in downtown Washington, DC. It had a wonderful and unforgettable smell—a subtle mixture of index oils from the labs and printers ink from the printing plant in the basement. I was often invited to accompany Dad to the office on Saturday mornings and was allowed to browse in the library or visit many of his associates, including N.H. Darton, who, at that time, was a small, wizened old man about the same age as I am now.

Particular treats were visits with Jewel Glass and Taisia Stadnichenko. Miss Stadnichenko was a coal geochemist who emigrated to the U.S. during the Russian Revolution. She taught me elementary laboratory techniques—how to use an analytical balance, how to measure volumes, how to determine densities, etc. Miss Glass (yes, that was her real name) was a mineralogist who gave me patient instruction in elementary mineralogy and trained me in making heavy mineral separations using bromoform— under conditions that today would surely elicit frowns from OSHA and EPA! She also introduced me to the Potomac Appalachian Trail Club, where I learned rock climbing and mountaineering techniques that stood me in good stead in several of my projects. The limitations on the careers of both of these distinguished ladies in an otherwise all-male scientific staff are a lamentable unwritten page in USGS history.

My first temporary job with the USGS was in 1946. I was a rodman in a topographic party in western Vermont making some of the last topographic maps that were ever done with traditional plane table and alidade surveys. The following summer I worked as a field assistant to Roger Morrison, who was mapping shorelines of Pleistocene Lake Lahontan in western Nevada. I spent the next summer with Andy Brown doing inch-by-inch sampling of the Chattanooga Shale in central Tennessee to evaluate its potential as a source of uranium.

In 1948, I matriculated at Johns Hopkins University to major in geology, but I continued fieldwork with the USGS in the summers. During the 1949 field season, I worked with Bob Fellows, who was starting a long-term project to make a geologic map of Mount McKinley National Park (now Denali National Park and Preserve) in Alaska. The most memorable event of the season was a very close encounter with a Toklat grizzly bear that left me with a torn backpack and a couple of claw marks on my back, but otherwise undamaged. Regrettably, Bob died of a sudden heart attack a few weeks after the season ended and I had returned home. The project was never reactivated.

The following two seasons I assisted Dick Ray. The first season was spent mapping parts of the Talkeetna batholith in the Willow Creek mining district. The second season involved examining mineral claims elsewhere in central Alaska to evaluate their potential and recommend whether they should receive federal loans for further exploration.

After two years as an undergraduate at Johns

Hopkins, I was invited to join a special program that allowed me to enter graduate school without an undergraduate degree. Subsequently, I have often wondered whether this was such a great idea. As my crystallography professor, J.D.H. Donnay, pointed out: "You will have a Ph.D., but you will not be an educated man." In spite of his advice, I accepted and ultimately settled on a study of the Neoproterozoic Catoctin Greenstone in the Blue Ridge of Virginia as a dissertation project under Ernst Cloos and Aaron Waters. I was granted my degree in 1954 and have remained uneducated ever since!

I came aboard as a full-time member of the USGS in late 1953 and joined the Photogeology Section of the Alaska Branch, headquartered in Washington, DC. Initially, I was involved in producing photogeologic maps of various parts of the Colorado Plateau. Later, I was assigned to compile a reconnaissance geologic map of the Mt. McKinley 1:250,000 quadrangle using photogeology and field reconnaissance. The project also included studying field notes and examining thin sections and sketch maps from some of my childhood heroes including A.H. Brooks, Steve Capps, and John Mertie, Jr. The resulting map was reasonably good for the day, but soon became totally outmoded as the new concepts of plate tectonics and exotic terranes began to be applied to Alaskan geology.

My stint with photogeology was interrupted by two years of active duty in the Army. I had received my commission as a second lieutenant of infantry through ROTC at the same time I received my university degree, and I was later transferred to the Corps of Engineers. I was assigned to the Army Map Service and placed in a small detachment consisting of two officers and three enlisted men, two of whom had Ph.D.s in geology. Our job was to try to produce maps that depicted surficial geology, vegetation, slopes, streams, and other terrain features as they might affect military operations, especially the movement of tanks and other vehicles. We mapped about a dozen quadrangles around Anchorage and in parts of the Matanuska Valley in Alaska and in the Santa Lucia Range in California. I have no idea whether these maps were judged to be useful by the army, but we had a lot of fun making them.

Shortly after returning to the USGS, I was summoned to a meeting with Jim Gilluly, chief of the Branch of General Geology. Jim convinced me to move to Denver, join the branch, and team up with Bruce Bryant in a study of the Grandfather Mountain window in western North Carolina. The decision to accept Jim's offer was a critical turning point in both my life and my career. The move to Denver eventually led to my meeting Linda Hassel in a ski lesson at Winter Park Resort. She has been my friend and loving wife for more than half a century and gave up many chances to further her own career in clinical psychology to allow me to pursue mine. We have two children, Becky, a psychologist like her mom, who lives in Minneapolis, Minnesota, and Rob, a practicing attorney in Golden, Colorado.

The Grandfather Mountain project lasted until spring 1962. We typically worked field seasons in the spring and fall, partly because it was a lot easier to see the outcrops when the leaves were off the trees, but also because most of the stills were shut down as the absence of leaves made their smoke more visible. The project produced geologic maps of four quadrangles and a major professional paper, Geology of the Grandfather Mountain Window and Vicinity, North Carolina and Tennessee, which is still regarded as a significant contribution to Southern Appalachian geology, even though some of our interpretations have been modified subsequently.

As the fieldwork in North Carolina was winding down, I was offered a chance to undertake a project in Wyoming's Teton Range. Dave Love, who was considered the dean of Wyoming geology, had been mapping in and around Jackson Hole for many years. He had requested someone to map the Precambrian

rocks of the Teton Range for the geologic map of Grand Teton National Park that he was compiling. Would I like the job? Having done some climbing in the Tetons previously and having led a Colorado Mountain Club outing there in 1959, I jumped at the chance!

I began mapping in the Tetons in 1962 and made good progress for four field seasons. But my idyll in the hills was rudely interrupted in 1965 by a summons back to D.C. to serve as chief of the Eastern States Branch. It was tough for the family to leave our mountain home in Colorado, but a wonderful chance for me to be introduced to the inner workings of a scientific bureaucracy. The branch included 30-some geologists working in areas from the New Jersey Coastal Plain to the Georgia Piedmont to the volcanic rocks of Puerto Rico. Visiting the field projects provided marvelous opportunities to be introduced to the diverse geologic problems in a wide range of geologic settings. It also allowed me time to help edit a volume on geology of the Southern Appalachians in honor of my mentor, Ernst Cloos. Providentially, it also gave me the occasion to coauthor a paper with Jim Gilluly in which he first admitted that there might be some compelling evidence for continental drift after all.

On the slopes of Buck Mountain during a reconnaissance trip with Charlie Bradley, 1963.

All this is very well, but most of the branch chief's job was personnel management, and this had its ups and downs. Perhaps the biggest up was the chance to hire Nina Lucas as branch secretary. She was the first African American woman to hold a job at that level in the Geologic Division and probably the first in the entire USGS. The biggest down came as an order from the chief geologist to terminate two well-liked and extremely competent laboratory technicians near the end of their probationary year because it was alleged that they were gay. I carried out the order, but have always regretted that I did not strongly object.

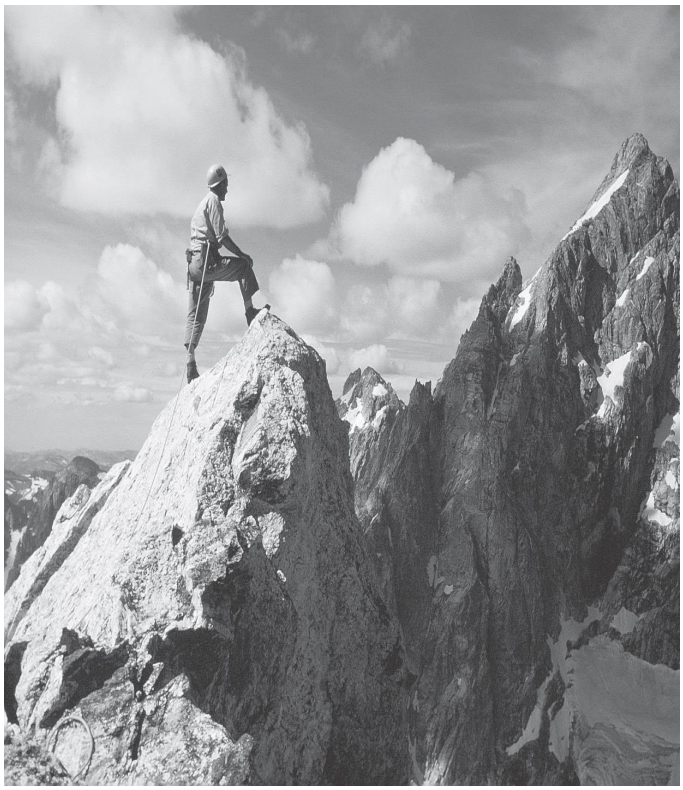
I was paroled from my job as branch chief in spring 1969 and the family returned to Denver. That summer, Bob Zartman and I visited the Tetons and collected samples for radiometric dating. I spent much of the following winter learning the techniques of Rb/Sr and K/Ar dating in the laboratories of the Isotope Geology Branch in order to establish general ages on several of the major map units.

During the 1970 field season, I completed mapping on the west side of the Teton Range and began final compilation of my part of the Grand Teton National Park geologic map; however, because of delays in other segments of the project and the need to adjust our geologic mapping to a newly published topographic base, the map was not published until 1992.

Early in the Teton project, Dave Love had discussed compiling a general-interest book on the geologic story of the Tetons and Jackson Hole. Bill Dilley, then chief park naturalist, was extremely enthusiastic about the idea and indicated that the Grand Teton Natural History Association would be delighted to publish such a volume. I began work on the book in 1965 and continued as time allowed during my stint as branch chief and my subsequent work in the Tetons. Preparation of illustrations and ironing out various disagreements on content and style between the authors dragged on for several years, but the first edition of Creation of the Teton Landscape: The

geologic story of Grand Teton National Park was finally published in 1971. It was well received and has gone through at least a half-dozen printings.

After completing fieldwork on the Tetons, I was assigned to join Ogden Tweto, Bob Moench, and Penny Hanshaw in mapping the Leadville two-degree quadrangle in central Colorado. This was part of Ogden's efforts to complete 1:250,000-scale geologic mapping of Colorado in preparation for his compilation of a new geologic map of the state. Bob and I worked together in reconnaissance mapping of several sizable areas, chiefly in the Sawatch Range, which includes many of Colorado's highest peaks.



On the summit of Teewinot [Teton Range], 1965.

In the summer of 1974, however, my luck ran out again. I was summoned east to the new USGS headquarters in Reston, Virginia, to serve as chief of the Office of Environmental Geology. The office was responsible for directing the efforts of a diverse array of branches including four geologic mapping branches, the Branch of Paleontology and Stratigraphy, Branch of Engineering Geology, Special Projects Branch, and Branch of Astrogeology. It was also required to develop programs and to prepare and defend budgets before the USGS and Interior Department budget officials, the Office of Management and Budget, and appropriate congressional committees. Occasionally, I was called on to testify at congressional hearings on subjects such as the surface mining bill, dam safety, and potential geologic hazards to nuclear reactors. I remember one such hearing in which I gained the distinction of being one of the few employees of the Department of the Interior to get official permission of the department solicitor to go to the men's room.

Perhaps the most exciting time during my tenure as office chief was in July 1976, when:

- the Engineering Geology Branch was finalizing its report on the failure of the Teton Dam;
- the Special Projects Branch was putting together a report on the geology of the Nevada Test Site to exchange with the Soviets for a similar report on their nuclear test site under the Strategic Arms Limitation Talks treaty (SALT 1); and
- the Astrogeology Branch was involved with the rapid selection of landing sites for the two Viking landers on Mars on the basis of imagery returned by the mission's orbiter.

Just a few days before I was scheduled to rotate out of the Office of Environmental Geology chief position in 1979, all of the Office Chiefs were transferred into the prestigious new Federal Senior Executive Service (SES). I resigned about 10 days later to return to Denver, and I'll bet that I hold the record for the shortest membership in the SES. I do, however, have a fancy framed diploma signed by President Jimmy Carter in a back closet of our home certifying that I was a charter member.

Fording North Leigh Creek on the west side of the Teton Range, 1970.

Although we had some regrets leaving Reston, the family was enthusiastic about the return to Denver. Becky was in her first year of college, Rob was starting high school, and Linda was able to establish her own private practice in clinical psychology. I joined the Central Environmental Geology Branch and was asked to work with Pete Lipman, who was mapping the Tertiary Questa Caldera in the Taos Range in northern New Mexico. My job was to map the Proterozoic basement rocks into which the caldera was emplaced. The project involved sorting out Proterozoic, Paleozoic, Laramide, and mid-Tertiary deformations and establishing the age relationships of more than a dozen major Proterozoic map units. Fieldwork was completed in 1982, and the final map was published in 1984.

As fieldwork on the Questa project ended, I, along with fellow USGS team members John Aleinikoff and John Pallister, were awarded a Gilbert Fellowship for a project with the rather grandiose title "Transect of the southern margin of Proterozoic North America." The project was to study the Proterozoic rocks in southern Wyoming, Colorado, and New Mexico. We assembled published radiometric ages, determined additional ages, and examined field relations in critical areas. We were attempting to clarify the accretionary history of the volcanic arcs, which, according to the current dogma, were stacked against the southern margin of Laurentia during the Paleoproterozoic to form the so-called Transcontinental Proterozoic provinces. We made a number of significant contributions, but all of our interpretations were based on the assumption that modern-style plate tectonics operated in the mid-Proterozoic. Although many geologists identify modern-style plate tectonic processes in the formation of Paleoarchean crust, my long-time friend and colleague Warren Hamilton has argued that modern plate tectonics did not begin until about 850 Ma. Depending on how this question is settled, the accretionary interpretation of these Proterozoic rocks may be abandoned or greatly modified.

While working on the Questa project and Gilbert Fellowship, I found myself entangled in several interesting but time-consuming diversions. In 1979, I was asked to serve as USGS representative on the steering committee for the Geological Society of America (GSA) Decade of North American Geology (DNAG). This ultimately led to my assuming responsibility as coordinating editor of the DNAG volume on the Precambrian geology of the conterminous United States (published in 1993) and for coordinating compilation of the DNAG Geologic map of North America. I also was called on to serve as vice president for field excursions of the International Geological Congress in Washington, DC, in 1989. The latter job got Linda and me nothing except a few nights in a second-rate downtown hotel, a couple of free dinners, and a carefully supervised visit to the Soviet Embassy. I also served as chief of the Branch of Central Regional Geology in Denver from 1994 to 1995, when the branch was abolished. I believe this makes me the only person who has been both the youngest and oldest branch chief in the Geologic Division.

Another major diversion arose when the then Grand Teton Natural History Association requested an update and complete rewrite for a new edition of Creation of the Teton landscape. Dave Love and I

agreed to give it a try and decided to invite Ken Pierce, an expert in Quaternary geology, to join as a co-author. Dave also arranged with Michael Collier to provide a series of stunning oblique aerial photographs, which greatly enhanced the new book. All of the authors had to work on their contributions to the book in scraps of spare time, and there were many long and spirited debates about what to omit and what to include, but the new edition was published in 2003. It won a Spirit of the West Literary Achievement Award from the Mountain and Plains Booksellers Association. Sadly, Dave died in 2002 and never got to see the results of our efforts.

As I've done during several parts of my career, I have to back up before moving forward. Compilation of the DNAG Geologic map of North America began in 1983, and the map was originally scheduled for completion in 1988, the date of the GSA centennial. John Wheeler of the Geological Survey of Canada was recruited to compile the geology of Canada, Greenland, Iceland, and a tiny piece of Ireland. Brian Tucholke of Woods Hole Oceanographic Institute in Woods Hole, Massachusetts, took on the momentous task of compiling the geology of the sea floors, and I took responsibility for compilation of the United States (including Alaska), parts of Siberia, Mexico, Central America, northern South America, and the Antilles. As principal compiler, I also had the job of designing the layout of the explanation, establishing the system of labeling the map units, picking the map colors, and working with Jim Queen, the chief map designer and cartographer. Because all of the compilers were working only part-time on the map, and because of complex problems of projection conversions and the transition from pen-and-ink to digital cartography, the map was not published until 2005—17 years after the original deadline. Even so, I consider it the most significant contribution of my career.

I retired in 1997 and have served as a scientist emeritus with the USGS ever since. This allowed time to finish the Geologic Map of North America, compile (with Chuck Bush) a very generalized map and accompanying text on the geology of the conterminous U.S. for the National Atlas of the United States (published in 2007), and author (with Gene Ellis) Rocks above the clouds: A hiker's and climber's guide to Colorado mountain geology (2008). As Linda and I now enjoy a more relaxed retirement, I often recall a poem by Showell Styles, a famous Welsh writer and mountaineer of the 20th century:

"These are my riches, these and the bright remembering
Of ridge and buttress and sky-shouldering spire;
These I shall count, when I am old, of an evening,
Sitting by the fire."

A Visit To Saudi Arabia In 1984

C.A. Wallace with
corrections by P.D. Rowley

Pete Rowley and I were invited by Paul Williams (Chief Geologist, USGS Mission, Jeddah, Kingdom of Saudi Arabia) to visit the Mission during the winter of 1984. Paul Williams was our former Branch Chief in Central Regional Geology so his connection with us was strong. Moreover, Pete and Paul worked together in Antarctica, which further cemented the friendship. Pete didn't have any tours to Antarctica or to Utah that winter, so he was able to go, and my ex-wife adjusted her schedule to take care of our kids; Pete and I took on 4 weeks of Saudi Arabia under Paul's guidance. This was a recruiting visit by Paul, make no mistake.

Dotty Kubicek, the OIG representative at the USGS in Denver made all of the flight and lodging arrangements with layovers in London and Rome. Travelling with Pete Rowley is different; he brought a large library of geologic articles to read on this trip. In early January we flew from Denver to New York Kennedy and from Kennedy to Heathrow, arriving at Heathrow at about 7:00 a.m. London time. With giant forethought we purchased an Imperial Quart of Scotch at the duty-free store at Kennedy. Our hotel was a

Sheraton near Heathrow, not far from the Tube. The hotel looked as if it were designed by Soviet architects according to the Massive Cement School of Architecture. The building was ugly, and the rooms were European small. We had to step into the hall to change our minds. We decided to go through our suitcases to be sure that we didn't have anything that might get us in trouble at Customs going into Saudi Arabia. That is when Pete discovered that his daughter, Jill, had carefully inserted dried elk turds between each layer of clothing in his suitcase. Had we been chosen for a detailed examination of our luggage at Heathrow, we'd have been sent back to Kennedy on the next flight! I don't know how many of you have tried to flush dried elk turds down the crapper (Thos. Crapper invented the flush toilet in the U.K.), but the damned elk turds kept floating because they were dried, and it took an immense amount of water to finally dispose of Jill's gift. In the meantime, Pete and I also had to address the huge bottle of scotch that we bought, and we decided to try an experiment—drink the bottle of scotch and try to retain as much as possible in our bodies for the duration of our visit in dry Saudi Arabia. Pete vomited several times that night. I was OK, perhaps because I drank less scotch.

We managed to get to Heathrow the next day, went through customs and got to Saudia Airlines for our flight to Jeddah. Our experiment with scotch failed, and we got on the airplane dragging our hangovers with us.

On arrival in Jeddah, we went through the interminable process of Immigration Control and Customs. Long lines, pushing, jostling, and incredible slowness typified the entry process into Saudi Arabia. That done, we emerged into a large atrium at the airport that was hectic with people holding up signs for arriving passengers who were to meet sponsors, and there were Paul Williams and Marty Kane. We both breathed a sigh of relief. Looking at Jeddah on our drive to a USGS compound (there were several USGS compounds) where we would be staying was exciting. What a culture warp!

Paul wanted us to go to the field, which is where we wanted to be. First, we were to go to the field to examine the Murdama Group (Neoproterozoic), a molasse that contained some volcanic rocks, located well north of Mecca. The Murdama had been studied by Robert C. Greene (from Menlo Park originally). Bob measured more than 50 km of stratigraphic section through the Murdama Group showing no faults and no folds. Paul wanted an isotopic age on the Murdama Group, and Pete and I figured that intermediate and silicic volcanic rocks might give us the best chance of finding zircons. Our task, then, would be to identify tuffs and lava flows. Then we were to try to determine relations between these igneous rocks and adjacent Biblical gold mines, purportedly mined for King Solomon. We set off from Jeddah with a small caravan of vehicles; Bob knew where we were going so Pete and I paid little attention to roads, towns, and desert tracks. Camp minders set up the tent at our first destination, and Bob brought all of the vittles that we needed. We looked at a lot of sills and dikes, and only one or two possible flows, and returned to camp. We carried on like this for several days, trying not to ridicule Bob's 50+ km of measured section, and then Bob had to return to Jeddah. We met a Skyvan at an unimproved airstrip, and Bob was gone. (Skyvans were made by the Short Aircraft Company in Ireland, and they were an ideal STOL aircraft to supply camps and drilling crews at remote locations in the Arabian desert. Skyvans looked like a Volkswagen Microbus with short wings and had an airspeed of about 50 mph, or so it seemed). So Pete and I were on our own to execute geologic research in a VERY foreign country where we had no handle on the language.

After Bob returned to Jeddah, Pete and I continued our field plans of doing field reconnaissance in the Murdama Group and examining old gold mines. We knew where we wanted to go and headed in that

general direction on desert tracks. Pete's skills at navigating in the desert were remarkable, skills that transferred directly from his numerous mapping tours in Antarctica. We used 100K orthophotos to get to the places of interest using desert tracks, and Pete was never lost. I learned from Pete how to navigate in the desert; these skills served me well for the next 25 years, mostly in Arabia.

As planned for the time after Bob left, the camp minders moved camp about 100 km from our first location. We found the new location of our camp by magic late that day after having worked on the Murdama age problem; the camp minders had already set up our tent and put our gear in the tent at the new location. Camping in the desert was different from anything I had done at the USGS. My field area was in Montana where tall timber and streams were everywhere, and Pete worked in Utah, where his desert was verdant compared to the desert in Arabia. At our Arabian camp there were virtually no plants from horizon to horizon. Camp was several kilometers from the main highway along a desert track. I am not sure why this place was selected, but the camp minders seemed to know this place, and we obliged.

We ate the remains of the food that Bob left us while we planned our next few days of field work. We were off early each morning, onto the macadam road, and then onto desert tracks that Pete figured would get us to the places we wanted to be. Pete was covered by 100K maps in the passenger seat, and occasionally he would pop up to say "Go left (or right) here." Then he submerged under the pile of maps again.

On our first day out from our new location, we stopped at a "bir" (a hand-dug water well) in the morning. There were several "bir" in this particular area, and as we stared down one of these structures, which was dry, we realized that the snake skins that littered the bottom were cobra skins. This discovery meant that cobras came to this place to molt and eat the small animals that searched for water. We hauled our butts to the safety of the Landcruiser and left.

For some reason, one day we stopped at a Bedouin camp. The men of the camp treated Pete and me as honored guests. We wanted to do field work, but they wanted to entertain us; we learned quickly not to stop at Bedouin camps. We were invited into the main tent where the women brought tea for all and retreated behind vertical rugs that divided the main tent. The tea was heavily sugared. Coffee was offered, but their coffee was made of cardamom rather than coffee beans, and we declined the offer. One of the children was learning English at a weekly school for nomadic Bedouin so we tried to communicate with the male adults through this youngster using our Arabic-English dictionary. To celebrate the arrival of Americans (this was in 1984, and Americans weren't disliked by the Bedouin as they are now) the leader of this Bedouin tribe wanted to fire his shotgun into the air to let the neighboring camps know that he had important guests. He had some shotgun shells. I didn't know the caliber of his shotgun, but it was an antique with a flared Damascus barrel. This elderly gentleman tried to cram a large shell into the breech of this antique shotgun. The shell bent. It became obvious that the shell was not going to fit into the shotgun, to our great relief. I am convinced that had he been able to fire that ancient shotgun, he would have been seriously injured or killed, which would have been a spectacular way to end our geologic careers in Arabia. The shotgun celebration was put away, and we continued our halting conversation with some of the young children. The language lessons were interesting and fun, and certainly less fearsome than the shotgun episode.

As we drove to our next outcrops, we passed a young Arab boy and a girl sitting under an Acacia tree, holding hands. That was not supposed to happen in Arabian culture.

One day we looked up from an outcrop to see a huge dust cloud approaching from the south. This dust cloud was at least 1,000 ft. high and looked like

something from a Hollywood movie set. We continued examining some outcrops for something or other, and the wind started to pick up. We agreed that we should get back to camp. The desert tracks are rough and our progress was slow, although our collective memory of how to return to camp was spot on. The sand storm descended on us before we got to the macadam highway, and visibility was only a few meters in front of our vehicle.

The sand-storm started with airborne mud-balls. Mud-balls splatted onto the windscreen. Big, heavy, wet, mud-balls. The mud-balls formed because high above the sandstorm, was a rain storm. The rain drops fell through the sandstorm and turned into balls of mud as they accumulated sand, silt, and clays during the descent to the ground. We cleaned the windscreen with washer fluid although we could hear the godawful screeching noise as the sand scratched at the glass.

Still, we made it to the macadam highway somehow, despite the near zero visibility and howling wind. Then, the question of when to cross onto the right lane of the macadam road became paramount. Tractor-trailer rigs didn't slow down despite the sand storm. Timing became critical. When should we jump onto the highway and risk getting crushed by a huge truck? A few trucks emerged from the brown swirling cloud and disappeared into the cloud just as quickly, shaking our Landcruiser as they passed. We decided to count from 10 to 0 and go. We did and survived. Our next problem was to find the desert track that would take us to camp. We drove by the desert track that we thought we should take, so we pulled off the road, and turned around on the verge and headed back to the track. We couldn't be certain that this was the correct track, but it seemed right for some reason. I set the odometer, and we drove slowly for about 2 km. We looked about in the swirling sand, but we couldn't see anything that looked like a camp, only a brown swirling cloud. Then I drove into a tent rope attached to a stake. Camp!

The camp minders had secured the tent edges with rocks to stop blowing sand from getting into the tent, and doubled the ropes and tent stakes. Inside the tent a light-brown "mist" of silt and clay slowly descended to the dirt floor, covering everything, including our sleeping bags, kitchen utensils, chairs, map cases—everything. The tent shuddered and shook as the wind buffeted the flimsy structure. I wondered if the wind would blow down our tent and wreck us. We were stuck. The wind was hot. We managed dinner, albeit a gritty affair, and there wasn't much left to do but go to bed. The temperature must have been 90° F, and the only way to avoid the constant downward-floating silt and clay was to get under the sleeping bag, which made the 90° F even worse. Rivulets of sweat became tracks of mud running down our faces and neck.

Light-brown dust and silt continued to accumulate inside the tent. We were careful about water consumption, and we used a rope to attach ourselves to the tent when we went outside to relieve ourselves. The rope was a life line in case we couldn't see the tent in the sand storm. Cooking was difficult. The tent shook against the restraining ropes, and I wondered if the tent might blow away. Imitating the essence of Pete's then-wife Adrienne (Pete got married a lot), I said to him: "YOU said that this was going to be a FUN trip! YOU said that we'd have a good time! YOU said that we'd have a cook and travel first class!" But NOOOOOOOOO." My imitation must have been decent because Pete laughed hard.

Two days.

Sometime during the night, the tent stopped shaking, and the howling stopped. Dawn was crisp and cool; visibility was limited only by the very fine dust and clay that remained in the air, rather like the smoke we see in the western U.S. during fire season.

We stopped at the local fuel station to fill the fuel tanks on the Landcruiser. Fuel stations are stuck in the desert at improbable locations, mainly to serve the nomadic Bedouins who need fuel for their Mercedes

water trucks and single–axle, stake body trucks; these are the Mercedes trucks that haul bags of alfalfa pellets and water for the camels and goats. These stations also fueled the flotilla of white Toyota pick-up trucks that were the main transport for the Bedouin. The tanker trucks, stake-body trucks, and white pick-up trucks were provided to the Bedouin through the local tribal heads from the King. Traditionally the King has provided support to the Bedouin tribes because the tribes maintained an emergency food supply (camels and goats) should the Nation be cut off from normal routes of commerce. Moreover, the loyalty of the Bedouin was important to the royals because the Bedouin provided a stabilizing keel for the Kingdom, and Abdul Assiz, who founded the Kingdom, was from Bedouin stock. Besides, fuel stations were controlled by anonymous Princes who profited handsomely from these investments.

At the fuel station we needed a receipt to turn in to people in Administration at the USGS Mission so we could get our money back. We had our handy Arabic-English dictionary to help secure the receipt. However, our pronunciation of the word for "receipt" baffled the attendant, who couldn't hear well, and we couldn't understand the hump-backed attendant because he stuttered and had a facial defect that affected his speech. Eventually we arrived at a conclusion and we got the receipt that we needed, but the humor of trying to get the receipt from this person was not lost. Many years later, comedian Richard Pryor's routine about the stuttering Chinese waiter brought back laughter about this isolated fuel station in the desert of Saudi Arabia. The fuel station also had non-alcoholic beer, although it took us less than a six-pack to conclude that it was not worth drinking.

We returned to camp to re-evaluate our schedule and by the end of the day we determined that we had enough time to sample several plutons on the return drive to Jeddah, a task that originally we had assigned two days to accomplish. We had no easy way to contact Paul Williams should our schedule go awry, so we concluded that it was best to return on schedule and not cause consternation for administrators.

The next day we left camp to the camp minders and set off to Jeddah early in the morning. In the past I drove trucks in Chicago, I survived Paris roundabouts on my motorcycle, and I mastered traffic in Rome, but I was not mentally prepared to drive in Saudi Arabia. Driving on a two-lane highway in Saudi Arabia became a potentially fatal circus as a Mercedes sedan passed us as we were passing a slower truck, and the Mercedes, which carried a family, blew by us on the verge (shoulder) to our left. This maneuver was surpassed (pun intended) when two sedans passed on each verge while we were passing a slower tractor-trailer. At that time in Arabia, when a sedan or sport car impaled itself into an oncoming truck or tractor-trailer, the wreckage was simply pushed to the side of the road where it remained, apparently forever. Usually, fire accompanied these impacts, so charred remains of the back part of the auto stuck out of the charred remains of the front of the truck. We saw a few wreckages in which the auto impacted a fuel hauler, and the wreckage was a melted mass. These autos contained entire families who perished along with the driver.

Again, as we approached our sampling targets, Pete took over as navigator to get us to our sampling target. We had to collect about 100 lbs. of granodiorite to get enough zircon to provide a reliable age. I'd done this before in the Anaconda-Pintlar Wilderness so I handled the hammer while Pete examined the results of my work to eliminate weathered and altered rocks.

I don't recall how many samples we took as we returned to Jeddah. We got back late to our Jeddah compound, to the surprise of our house cook, but we were clapped out and needed sleep. For the next few days we sorted samples, completed the forms needed by the Mission to process the samples, and completed descriptions of sampling sites and of the samples. We

awaited the return of our camp minders because they had the samples that we collected early in this field trip. For weeks the camp minders didn't show, much to our frustration and Paul's anger.

After about a week we left again for the field, and this time we stayed in Paul Williams' camp near Hail. Our task was to examine rocks that staff at the BRGM (Bureau de Recherches Géologiques et Minières) had mapped as "tillites" and affiliated deposits. This was a tough assignment. These matrix-supported conglomerates are difficult to classify unless one is lucky enough to find faceted cobbles, striated clasts, or drop-stones in laminated sediment that showed penetration of laminae (I spent considerable time examining tillites in California, Utah, Idaho, and Virginia in the USA with John C. Crowell and Max D. Crittenden, USGS). Pete and I found all three elements of positive identification for tillites at various places in the basal Phanerozoic sequence above Paul's beloved Neoproterozoic rocks.

Our helicopter pilot was John Jensen, retired from the Royal Navy. The helicopter pilots were Brits or Americans, and they flew on contract for Special Flights, an arm of Saudia. John brought an extra dimension to our flights in that he was an expert on pictographs (hieroglyphics) of the Middle East. At some places we landed near sites that contained abundant pictographs and John deciphered the drawings for us, determined which tribe did the drawings, and established when the drawings were made. After seeing some of the extensive drawing done on large, smooth rock faces, I found it amusing that the most recent drawings showed a pick-up truck with a camel in the back.

Paul Williams arrived at some point and we spent several days in the field with Paul as he squired us about to various outcrops where he wanted our thoughts. But soon we had to leave Paul's camp, so John volunteered to take us to the Hail airport to meet our Saudia flight back to Jeddah. John put his helicopter down next to the Boeing 737 near the departure lounge at the Hail airport, so theoretically we could simply get on the aircraft. Wrong. What followed was a tribute to panic and high disorder as we were intercepted by military with guns, with lots of wild gesticulation and shouts in Arabic, which we didn't understand, and lots of gun pointing. We were ushered into the terminal at gunpoint to go through security where we had to explain our rock hammers, knives and other bits that field geologists carried. Eventually we got onto the aircraft. By then, John was gone. Thanks, John.

The errant camp minders finally arrived in Jeddah just before we left for Rome. Apparently the camp minders took the opportunity to visit friends and relatives across Arabia on their return to Jeddah from our last camp. Inasmuch as they had many of our samples, we couldn't complete the paperwork needed to submit samples for laboratory analysis until they returned to Jeddah. Therefore, we spent the two days before we left Jeddah processing the massive volume of paperwork needed to submit samples for thin sections and isotopic ages. We completed the tasks needed to submit samples a few hours before we were to leave Jeddah.

Leaving Saudi Arabia was as difficult as getting into the country. All of the information on our departure documents had to match the information on our entry documents. And, of course, we waited in line a lot, which is common in Arabia, at 2 a.m.

Pete and I were off to Rome for three days on our return to the U.S.A. Because of our long day, I think that we slept during most of the flight to Rome. We arrived at the International Airport in Rome at about 6 a.m. local time, got through customs, and set out to find the pensione that had been recommended by Mike O'Neill. We took an "official" taxi from the airport, which deposited us, with our luggage, at the wrong place. We finally figured out where we should have been, and hauled our luggage to that place and checked

in at the pensione. Despite our reservations made in advance at this place, the folks at the pensione weren't expecting us even though they had been alerted regarding our arrival time. Yep, we were in Italy.

I hadn't been in Rome for more than 20 years, so we needed a map to get around. The pensione didn't have any maps, so the map that I grabbed at the airport would have to suffice. We decided not to waste any time sleeping, so we set off on foot to the Coliseum and Roman Forum. I discovered that many improvements (safety) had been made to the Coliseum and Forum in the 20+ years since I'd been there, and it was all quite nice now. We self-toured the Coliseum and moved on to the Roman Forum and later that day, to the Vatican. I have a picture of Pete standing in the Temple of the Vestal Virgins shading his eyes with his hand searching for a virgin in Rome. Apparently he found none. But we saw wall-to-wall, cheek-to-jowl marble statues of them.

My memory fades about our time in Rome after that first day. I recall that Italy excavated bits and pieces of the Roman Empire and preserved them in various places of this great city, so fenced areas that contained remnants popped up in unusual places. We toured the Castel Sant'Angelo, which was interesting with respect to evolution of the Papacy. Slowly my rudimentary Italian returned. At a restaurant, I reached back from my chair and plucked a blood orange from a tree, sharing wedges with Pete. It was the last day of January, and Colorado was locked in snow and ice!

Our return flight was uneventful. Merciful sleep. First Kennedy and then Denver, and a huge sigh. Home at last. Kids. Dog. Normality, such as it was. An Open-File Report eventually followed.

Note: Wallace went to Saudi Arabia on a part-time basis in 1991, and continued with the USGS Mission in Jeddah until 2001, when the Mission was closed. From 1995 until 2001 Wallace was a contractor with the USGS in Arabia. He continued with the Saudi Geological Survey from 2001 until 2011 as a contractor. Rowley returned to Antarctica in 1985, and then began a dismal downward career spiral (Ed. Note: this is a joke by Chet; Pete has a very long list of pubs) mapping in Nevada, and retired from the USGS in 2000. Both remain active in geology.

Some Recollections of Times at the USGS

Chet Wrucke and Joel Bergquist

Chet and Joel have been friends and colleagues for more than 35 years, dating back to their days as geologists in the Branch of Western Mineral Resources in Menlo Park. Chet joined the Survey before Joel, during what many refer to as the Golden Days of the USGS. In 1954, Chet went to Washington D.C. for an assignment in the Mineral Deposits Branch at the downtown headquarters. At that time, the branch was national in scope, with Charlie Anderson (future Chief Geologist) as Chief. The branch had its offices in the GSA building next to the Department of the Interior building.

In those golden days, the annual Pick and Hammer show was an eagerly anticipated event, and a chance for great mirth. These shows, which also were held in Denver, were elaborate productions, held in a large auditorium. As befit such a Survey occasion, the attendees came well dressed, with the men in coats and ties, and the women in elegant dresses. Of course the VIPs sat in the front row, and were often lampooned. The shows featured songs from Broadway productions, rewritten with hilarious lyrics about Survey foibles, especially those particular to geologists. These shows offered glorious opportunities to satirize strange or unpopular decisions made by managers. Such roastings were expected and looked forward to — at least by the performers and the audience! Famous songs, now well known throughout the Survey (and not necessarily from Washington D.C. shows) include such first lines as "Everybody loves a doctor, that's why I'm in love with me, call me doctor,"

"With my pencil and my pad, I figured it out," and "Lacking all compunction, move into Grand Junction." There was a full orchestra, consisting entirely of Survey employees. These shows were an expression of the enormous talents of the staff and the deep love of the Survey. More importantly, they revealed an enormous *esprit de corps* seldom found in any organization, but firmly inculcated into the culture of the USGS.

From another assignment at Survey headquarters, this time in Reston, Chet has an enduring, fond memory of one day walking into the Director's conference room for the first time and being enormously impressed. The large, ornate room with its high ceiling and dark-wood paneling projected dignity and importance. Around the stately walls were hung awe-inspiring portraits of all eight former directors to that time, from Clarence King to William Pecora. Two of the directors, Thomas Nolan and William Pecora, were paintings showing them in their academic gowns. A few years later, however, the next Director, Vince McKelvey, went a little down market. His oil painting shows him in khaki field clothes (freshly laundered we assume) with a hand lens hanging from a lanyard around his neck! Simple photographs might well have been adequate for any other federal agency, but certainly not for the USGS. We had *esprit de corps* and pride in our scientific work. Those academic robes told a noble story — the Geological Survey was a different kind of governmental agency, one proudly dedicated to scholarly excellence in pursuit of national goals. McKelvey's painting showed that even with an academic bent we could be field geologists.

The USGS celebrated its centennial in 1979. A number of fine centennial publications were put out, including a history of the Survey. A documentary movie was also made. At the time of the filming, Chet and Joel were working in the Sierra Ancha Wilderness, along the Mogollon Rim in southern Arizona. We were asked to assist a professional film crew in documenting an example of the fieldwork of the Survey. When the film crew showed up, they used our helicopter as they filmed in that ruggedly beautiful part of the American southwest. Chet and Joel were engaged in a mineral resource study of this wilderness area, which consisted mostly of Mesoproterozoic geology. Chet directed the film crew to fly northward across the boundary of the Basin and Range Province, and then to continue over the Mogollon Rim, which marks the southern edge of the Colorado Plateau. As we flew above the rim, the crew was delighted that suddenly there was a "reveal', as they called it, of the vast expanse of the plateau spread before us. Later we landed in an open forest of beautiful Ponderosa Pines and Douglas fir in the high Sierra Ancha, where we demonstrated some of our geologic mapping skills for the camera. In one staged scene, Joel, holding binoculars, was filmed while pointing and exclaiming "There's the Barnes Conglomerate!" as though he had made a brilliant discovery of a prominent stratigraphic unit in the Apache Group**.** We all had a great laugh at such a ridiculous 'profundity'. At another time, we found an unusually large rattlesnake, which was also dragooned into a starring role. Together with the film crew, we had great fun. We felt fortunate to have had this opportunity to be a part of the Survey's celebration. Inexplicably, despite our amazingly superb acting performances, neither Chet nor Joel was contacted by Hollywood agents. Nevertheless, we take great pride in knowing our fine acting is preserved for all time in the Library of Congress. Perhaps future generations will be more impressed than our own.

News from Retirees

Wendell Duffield: Anne and I continue to enjoy our life on Whidbey Island in Puget Sound, although a significant piece of our hearts remains at Flagstaff in remembrance of our 32 years there. Fortunately, Anne's asthma also remains in Flagstaff! Here on Whidbey, we pass the time with gardening, reading,

writing, and of course aging. I got two books into print in 2015. One (*Just In Case You Were Wondering*) is a collection of essays and short stories that I've written during the past couple of decades. An artist friend "bribed" me into doing this book with an offer of adding some sketches, gratis. The other book (*Jiggles, Rolf, And The Remarkable Finale To Frank Stone's Career*) is my attempt to educate readers about the history of basalt lava flows that spilled into Grand Canyon and dammed up the Colorado River there about 20 times during the past 800,000 years. Most folks (including many geologists) don't know that the youngest eruption that occurred near the rim of Grand Canyon was only about 900 years ago. Native Americans watched that event. But this lava flow didn't spill over the rim. So I created a new flow that did, and dammed the river. I was hoping that many readers would see and buy this book at bookstores in Grand Canyon National Park. But the folks who control what books get into those stores tell me that they do not permit fiction. This, in spite of the fact that for many years they permitted a book in those stores that touts the age of Grand Canyon to be 6,000 years. Sigh.

Bob Kamilli: I tutor and teach as a volunteer in science, math, and reading at the Imago Dei Middle School, which is celebrating its 10th year. The school's media page, http://www.imagodeischool.org/media/ has a link to a professionally produced film about the school; I appear at the 3:00, 5:10, 7:56, and 8:35 minute marks. Most of the black students are refugees from Rwanda or the Congo; the rest of the student body is largely Hispanic. You will also note that at the top of the page is a red rectangle that you can click on to donate funds to the school. Please consider making a tax-deductible donation. Tell 'em "Dr. Bob sent ya'." In return for a donation, if you visit Diana and me in Tucson, I can promise you a tour of the school that will knock your socks off. We'll even throw in a tour of the world-famous Desert Museum and free room and board chez Kamilli.

Barney & Pat Poole: Our routine activities last year (2015) were punctuated by several events. We traveled to East Africa (Tanzania safari) in March, enjoying the scenic landscape of the Great Rift Valley and the incredible native animals, plants, and amazing birds. We also visited native Maasai people and the vast Oldupai Gorge that has yielded important hominid fossils. During the summer we drove through eastern Colorado to enhance our knowledge of the terrain, agriculture, towns, and pioneer history. In late September and early October, we drove to western Colorado and southern Utah, visiting several national parks and monuments. While in Grand Junction, we visited many longtime friends who were part of the USGS Colorado Plateau uranium project in the 1950s. During Thanksgiving week we traveled to California, visiting Yosemite National Park and Napa Valley with son Gary and his family.

We continue to enjoy plays in Denver and Arvada theaters and Metropolitan Operas transmitted live in HD to our local movie theater. Pat continues with adult education classes at OLLI (Osher Lifelong Learning Institute) and with exercise classes. Barney spends most days working on legacy USGS products. In October, Barney and coauthor Charlie Sandberg had their central Nevada geological maps and accompanying reports published as Special Paper 517 by the Geological Society of America.

Memorials

Paul David Blackmon: Paul Blackmon, of Highlands Ranch, CO, died peacefully on March 25, 2015, surrounded by family. Paul worked on the Manhattan project in New York State. He became a WWII Navy veteran serving in the USS Denver. After earning a masters degree in Geology at the University of Buffalo, he spent all of his career working for the USGS where

he was a clay mineralogist. Paul is survived by his loving wife Nola Forsyth-Blackmon, his sister Carol Crook, his daughters Susan (Jim) Pilcher, Janet Wilson, Christine (Dougald MacDonald) Blackmon, Mary (Scott) Herbst, his son David (Karen) Blackmon, and eight grandchildren. He is preceded in death by his first wife Helen Carol Blackmon and his parents Alice Seely and Percy Childs Blackmon.

The Denver Post

Peggy Lou Gair: Peggy Lou (Davis) Gair died peacefully in her apartment at Brookdale Windsor, Windsor, CA, on December 18, 2015. Right up to the end she loved life and was engaged in the world around her. She met the world with curiosity, humor, and a sharp intelligence. In her social work career and throughout her life she promoted equality and justice for all. She treated everyone with respect and kindness.

Born in 1921 in Rochester, N.Y., Peggy Lou grew up there and in the small upstate New York towns of Savona, Wallace, and Fairport. Her parents brought music, joking, and a respect for education to their daughter while stoically facing severe Depression-era troubles. Peggy Lou's friendships from these early years, and later, from her time at the University of Rochester, remained strong for over 90 years. Peggy Lou entered the University of Rochester on a full scholarship and graduated with honors and a degree in Social Work. During a Victorian poetry class at the university, Peggy Lou and Jack (Jacob E.) Gair met and fell in love. They married in 1942, just before Jack entered World War II, a B-24 pilot flying in the 8th Army Air Force out of England. When the war ended, Peggy Lou supported the couple as Jack completed his PhD in geology at Johns Hopkins University. Jack's specialty in iron ore, working for the USGS, spurred the family to live in many different parts of the United States and beyond, including rural West Virginia, Denver, CO, Marquette, MI, Kensington, MD, and Belo Horizonte, Brazil. Peggy Lou and Jack's deep interest in new places, cultures, and people led them to travel all over the world, from Central America, to Europe, to Turkey and Russia. Peggy Lou and Jack had three children, Cynthia, Philip, and Dan, to whom they passed along their love of nature, intellectual discourse, practical jokes, travel art, music, and justice. Throughout her life, Peggy Lou believed in expanding opportunities to poor people, immigrants, and others facing difficulties. She was a beloved and respected social worker, first at YWCAs and later at the U.S. Job Corps, counseling girls trying to improve their lives. She opened the Washington, D.C. Job Corps in the early 1970s, cajoling government and private sector offices to give job opportunities to Job Corps' young women. Later, she worked for Montgomery County, MD, Social Services child care and foster care programs. She was a strong advocate for children's well being.

The Washington Post

Barbara Gordon: On April 12, 2016, Barbara Ann Walker Gordon, a long-time resident of Washington, D.C., passed into eternal life at 95. Mrs. Gordon was born in Baltimore, Maryland. She was married to the late MacKenzie (Mac) Gordon, Jr., a

career geologist at the USGS, for 40 years. Both were only children and had no children. Barbara grew up in Banes, Cuba, where her father was the manager of United Fruit Company's sugar plantation. She returned to the United States for high school and college at the Principia in Elsah, Illinois. After graduation, she earned an MA in political science at the University of California, Berkeley, and later did PhD work at Stanford. Her professional and Washington life began in 1948 at the State Department as a member of the U.S. delegation at the third GATT in England.

In 1961, Barbara and Mac settled in Georgetown in the District of Columbia. Barbara's professional life continued as Chair of Latin American Studies at the Foreign Service Institute. As an active volunteer she was President of the Pan American Liaison Committee and Program Director for the American Association of Foreign Service Women. Over the next decades, Barbara became a leader in the cultural milieu of the Nation's capital. She served as the President of the DC Chapter of National Society of Arts and Letters, on the Board of the National Symphony as well as president of its Women's committee. She was a founding member of the Washington Performing Arts Society, the Secretary of its first Board, and the first President of its Women's Committee. She was on the DC Commission on the Arts and Humanities, a fundraiser for the Capital Children's Museum, and a founder of the Friends of the Art Museum of the Americas. Barbara and Mac's passion for art led them to amass a remarkable art collection. She was the Director of the Art Barn and on the Acquisition Committee of the Friends of the Corcoran.

The Washington Post

Don R. Mabey: Don, a beloved and respected scientist, father, spouse and friend, died at home on October 10, 2015, from the effects of prostate cancer. He was born on March 29, 1927, in Bountiful, Utah, son of Judson A. and Ruby Pickett Mabey, and raised near Bancroft, Idaho, on the family's sheep ranch. Don graduated from Davis High School and the University of Utah (physics) and served as an Electronic Technician in the U.S. Navy in WWII. Don contributed to the understanding of the earth's structure while working as a geophysicist for the USGS (1951-1980) and the Utah Geological Survey (1982-1986). He received the Department of the Interior's Superior Performance Award in 1958 and 1961, the Meritorious Service Award in 1970, and the Department's highest honor, the Distinguished Service Award, in 1979 "in recognition of his outstanding contributions to solid-Earth geophysics and the exceptional leadership he provided scientific research programs." At the Utah Geological Survey, he led the Applied Geology Program, making the state safer from flooding, landslides, and earthquake hazards. In retirement he provided technical expertise and inspiration to Earth Science Education, a small not-for-profit that teaches Utah teachers about local Earth science.

In addition to many technical and professional papers relating to geophysics, Don wrote two books: *The Bend of Bear River* (a study of the geology and history of southeastern Idaho before 1860) and *The Canyon* (a cherished tribute to his father, his family and Monroe Canyon in Caribou County, Idaho and how place ultimately shaped their lives and his life). He beautifully and skillfully intertwined geology, history and a sense of place in diverse writings, including family histories and articles published in *The Journal of Mormon History* and *The Caribou County Sun.* Don married Janice Wynn in 1954; they divorced. He married Wendy Romney Hassibe in 1980; they divorced. He is survived by his three children: Deanna (Chris) Jeffrey, Danette (Art) Hantla, and Matthew (Kaylyn) Mabey; eight grandchildren, four great grandchildren, and beloved spouse and colleague Genevieve Atwood.

Salt Lake City Tribune

Peter Stauffer: It is with a heavy heart that I announce the passing of Peter H. Stauffer on March 10, 2016. Peter had been courageously fighting brain cancer for just over one year, and he died peacefully at home surrounded by his loving family. Peter was born in Venezuela, in 1935, and lived in Switzerland until he was about 10 years old. In 1945, his family moved to Palo Alto, California, and Peter graduated from Palo Alto High School in 1953. He served briefly in the Army Corps of Engineers Reserves from 1958 to 1962. Peter earned a Ph.D. in geology from Stanford in 1965. After earning his degree, he taught sedimentology at the University of Malaysia from August of 1965 until May of 1983. Tektites were a particular interest and specialty of Peter's. While teaching, he met his spouse Madeline, and they had two daughters, Mari and Heidi. Peter thoroughly enjoyed the culture and people of Malaysia.

In 1983, Peter and his family returned to Palo Alto to be near his aging father, and in that same year he began his distinguished career with the USGS. Peter began working as geologic text editor, a profession to which he brought extraordinary talent and quiet humility. During the 1990s, Peter served as the Associate Western Regional Geologist under Bill Normark. Peter initiated and coordinated the first Volunteer Appreciation Day, a celebration for the USGS volunteers, and worked on many outreach projects. Following reorganization, he returned to the publications group. Peter's love for editing was apparent to all the authors with whom he worked—his subtle but wise comments on manuscripts and figures made them glow—as well as to his fellow editors, for whom he was a guiding light as a scholar and mentor. Peter is survived by his wife Madeline, his daughters Mari and Heidi, and two brothers Henry and Karl.

Carolyn Donlin

Bruce Wardlaw passed away March 23, 2016, from injuries due to a fall. Personally, I will miss him greatly. I have had many interactions with Bruce from my early career starting at the National Museum of Natural History (NMNH), and have relied on his knowledge and expertise in my current position as center director. Bruce would never hesitate to offer his help and never complained about any assignment he was given. Over the last several years, he has stepped up to work with the Smithsonian on inventorying, compacting, and evaluating over 120 years of USGS paleontological collections at NMNH. In doing so, he has worked with many student interns sharing his knowledge and mentoring them. As Chief Paleontologist and the last chief of the USGS Branch of Paleontology and Stratigraphy, he was the man for the job.

Bruce received his B.S. in Geology from the University of California-Riverside in 1969 and his Ph.D. from Case Western Reserve University in 1975 with his dissertation on *The biostratigraphy and paleoecology of the Gerster Formation (Upper Permian) in Nevada and Utah*. Bruce started his career with the USGS as a post-doctoral fellow in 1975 and became a full-time research geologist in 1976. Over his 40-year career, he contributed to USGS science in stratigraphy, carbonate petrology, upper Paleozoic and Triassic conodont and brachiopod biostratigraphy and paleoecology, thermal maturation, coal geology, and nuclear bomb test craters. Although much of his research was in the western U.S., he reached out internationally in the Middle East, Pakistan, the Pacific atoll of Enewetak, and South China. More recently, Bruce was an integral part of a proposal to map the geology of Qatar for his expertise in carbonate petrology and paleontology. Also, Bruce was a prolific writer with well over 200 publications on his broad knowledge of geology. His legacy will include editorship of volumes of *Micropaleontology and Stratigraphy*, which will be published in 2016.

Randy Orndorff

Charles Dawson Zeigler died November 22, 2015, at his assisted living residence in Manassas, VA. He was born on March 28, 1926. After serving with the 4th Marine Corps Division at Iwo Jima, Charles came home and through the GI Bill obtained a degree in forestry from Penn State. Then he started work as a cartographer for the USGS. He retired in 1981 as Chief of the Eastern Mapping Region.

Excerpted from *The Washington Post*

Other Recent Deaths

John W. Cady
Wilfred J. Carr
John DeNoyer
Pauline Drohan
Shirley Elston
Val L. Freeman
Wallace Hansen
Lois A. Like (wife of Ed)
Robert Moench
Robert O'Sullivan
Peter Popenoe
Robert L. Smith
Charles W. Spencer

RETIREE PUBLICATIONS MOSTLY 2013 – 2015 BUT MANY OLDER

Note:
The references below are compiled from information available as of mid-April 2016. These references are "new" since the Spring 2015 Newsletter (Number 70); no publications were listed in the Fall 2015 Newsletter (Number 71). An effort is made to compile **ALL** known publications (whatever year) by Geologic Division Retirees (GDR) for inclusion in the Master List of GDR Publications (now being maintained and updated by Bob Tilling). Please send complete references for any new publications (**but not those still "in press"**) to Bob (e-mail: rtilling@usgs.gov or volkno.rit@gmail.com), with cc to Odette James (e-mail: o.b.james@verizon.net) as back-up, for listing in the next Newsletter and for updating the Master List.

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