Geosciences Program

NEWSLETTER

For alumni and friends of the geosciences program Spring 2019



DEPARTMENT OF PHYSICAL AND **ENVIRONMENTAL SCIENCES**



THE EARLY DAYS OF URANIUM WITH DR. VERNER JOHNSON

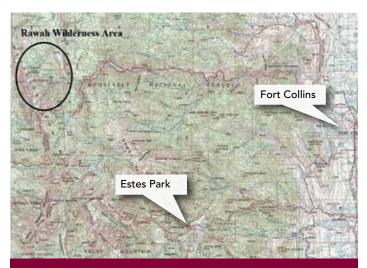
he Department of Energy (DOE) Grand Junction Office is celebrating the 75th anniversary of its role in the Manhattan Project and other uranium programs that began in 1943. The DOE held a photo exhibit of major local events related to uranium in the exhibit hall on the second floor of the CMU Tomlinson Library. These pictures are historically significant because Western Colorado and Eastern Utah had rich deposits of uranium ore, and Grand Junction became a center for processing the uranium ore. At that time, uranium was used mainly for defense, but later become important for nuclear power.

The exhibit hall has a pastoral picture of me as a "cowboy" sitting on the ground next to my horse. People ask, "What's the story behind that picture?" Actually, from 1977 to 1983, I

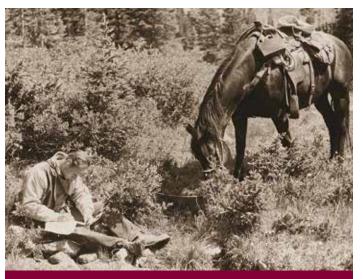
My responsibility was to go over areas that seemed favorable for uranium...my field assistant and I went from place to place to check for radiometric anomalies and geology.

worked as field geologist for the National Uranium Resource Evaluation (NURE) program for Bendix Field Engineering Corporation, a former contractor for DOE. That picture was taken in July of 1977 when I was the Principal Investigator (PI) of the Greeley 10 X 20 Quadrangle topographic map.

My responsibility was to go over areas that seemed favorable for uranium using information from old preliminary



The Rawah Wilderness Area, where Dr. Johnson used horses for field work, is west of Fort Collins and just north of Rocky Mountain National Park.



A seemingly pastoral scene of a man with his horse is really geologist, Verner C. Johnson, in 1977 recording data for the National Uranium Resource Evaluation (NURE) Hydrogeochemical and Stream Sediment Reconnaissance (HSSR) program in the Rawah Wilderness in Colorado. The NURE program was a 10-year massive data-gathering effort. PHOTO CREDIT: Department of Energy Office of Legacy Management

reconnaissance reports, airborne radiometric surveys, water and sediment samples, and geologic field investigation. Weather-wise, my one-year plan was to cover the Front Range in the summer and the Great Plains in the fall. For most of the project, my field assistant and I went from place to place to check for radiometric anomalies and geology. He did most of the driving while I held the scintillometer up to the window on the passenger side of the vehicle. Any time counts went up to 4X background, we stopped and checked around. I took note of the counts per unit time and described the geology of the area in the field notebooks. We stopped and checked old mines and mine dumps for radioactivity. We even hired a helicopter to take us to some of the highest peaks where old mines and adits were located. We camped for few days and took note of the geology. We were not actually looking for uranium; rather, we were evaluating areas as part of the NURE program policy.

> The Rawah Wilderness Area was inaccessible to cars...my field assistant saw the dude ranch near the Rawah and suggested we use horses.

Now, about the picture of me and the horse. The Rawah Wilderness Area was inaccessible to cars, and we were not allowed to use a helicopter, but we still needed to get data. We thought about hiking along the trails. However, when my field assistant saw the dude ranch near the Rawah, he suggested we use horses. I looked at him with astonishment and wondered where he got that idea. Then I accepted his suggestion, and we

went to the ranch headquarters. We explained to the manager about our plans to go through the wilderness and would like to hire horses for field work. He liked our idea and suggested that we take along a few people. That way, we would save money by not having to hire a guide. We checked with the DOE authorities, and they approved our plan of hiring horses and taking tourists along. My head was spinning because I couldn't believe in all that, but was glad everything worked out well.

Then one day, we were on the horses with six tourists ranging in ages from 6 to 45, a guide, and my field assistant. The tourists were fascinated with what I was doing. I carried a scintillometer to check for radiometric counts and then

We were on and off horses for almost eight hours! If you wonder, yes, afterward, I was sore and had a hard time walking for a few days.

stopped to look at rocks, collect samples for geochemical analysis, and take notes in my field notebook. They even asked questions about uranium and geology. We were on and off horses for almost eight hours! If you wonder, yes, afterward, I was sore and had a hard time walking for a few days. The picture was taken by my field assistant. I didn't know he took the picture until I saw it in the NURE 1977 Annual Activity Report a year later (Page 19 in GJBX-11(78)R).

Overall, I am impressed and happy that the picture of me and the horse is historically significant enough for the 75th anniversary celebration of the uranium history. I like the picture and have fond memories of working in the summer of 1977.

~ Dr. Verner Johnson, vjohnson@coloradomesa.edu



Dr. Verner Johnson, CMU faculty, standing next to a photo recently displayed in the Department of Energy's 75th Anniversary exhibit on the second floor of the CMU Tomlinson Library. The photo shows Johnson doing field work by horseback in the Rawah Wilderness Area in 1977.



CLUB ACTIVITIES

The American Association of Petroleum Geologists (AAPG) Student Chapter at Colorado Mesa University by Jordan Walker

Colorado Mesa University AAPG Student Chapter had a busy 2018 fall semester. Jordan Walker (President), Jon Huston (Vice President), Jordan Drake (Treasurer), Nicole Mejia-Mendoza (CAB Representative), and Brandi Maher (Secretary) organized and implemented nine meetings and two outings. Seven speakers gave talks about geosciences. Topics ranged from the geology of Mars to the basics of hydraulic fracturing. A resume workshop provided by CMU was also offered to members. In October, Dr. Andres Aslan accompanied us to Sunnyside, Utah. He explained the complexities of a local abandoned tar sands mine. In December, Dr. Cassandra Fenton, Dr. Larry Jones, David Berry, and nine AAPG members toured the Henderson Mine and mill (see photo on cover). Samples of molybdenum were given to those on the outing.

The CMU AAPG began the spring 2019 semester with a new Treasurer (Alejandro Caro-Jaquez) and has plans for several activities. The West Elk Coal Mine, the Natural Soda production plant, a celestite mine, fossil hunting, and an oil rig tour are possibilities. New merchandise has been ordered and will be available by the end of the semester.

The CMU AAPG is interested in hosting speakers. Geoscience related topics are most desirable, but we would also welcome talks about experiences in graduate school or in the workplace. We would like to hear from anyone who wants to lead a local field trip. If you are interested please contact the CMU AAPG student chapter president Jordan Walker - jtwalker@mavs. coloradomesa.edu. •

COORDINATOR'S CORNER

IN MEMORIAM. Tragically, geology alumnus **Adam Trumbo, '15**, was killed in a car accident in New Mexico as he was driving home from a job site. Adam's enthusiasm and energy for all things geologic, his willingness and eagerness to help those around him, and his genuine passion for rock hounding will be truly missed. He was the only student in field camp to ever find fossils while doing a river gravel pebble count!

2019 ADAM TRUMBO GEOSCIENCES FIELD TRIP, SATURDAY, APRIL 6. The program has decided to name the annual spring field trip in Adam's honor, and April 6 will be the first Adam Trumbo Geosciences Program Field Trip. See details elsewhere in this issue.

PROGRAM AND FACULTY NEWS. The 2018 Western Slope Field Conference in Ouray was attended by ~35 CMU geology faculty and students. The conference was a big success and enjoyed by all (including the bear at the KOA campground!). Geosciences is also close to the end of the hiring process of two new tenure-track faculty in geochemistry and hydrology, and we look forward to working with new colleagues in the fall. Eric Eckberg and Joe Buckovic have joined as part-time adjunct faculty teaching GEOL 105 and GEOL 100, respectively, and are doing a great job by all accounts. Thanks Erick and Joe! Dr. Julia McHugh, the Curator of Paleontology at the Museum of Western Colorado, and a dual-appointment faculty member in Geosciences at CMU, brought Miriam Kane, Anja Riedel and Brandi Maher to the 2018 Society of Vertebrate Paleontology meeting this past fall. The students presented their ongoing research at the meeting, and we hope to see more of such activity in the future.

2019 CMU GEOLOGY STUDENT PRESENTATIONS AT THE APRIL GRAND JUNCTION GEOLOGICAL SOCIETY (GJGS) MEETING. Each spring, the April GJGS meeting is set aside to showcase CMU student research. Presentations are a



Geology Program coordinator Dr. Andres Aslan with AAPG students on a field trip to the tar sands at Sunnyside, Utah, October, 2018.

combination of short talks and posters, and the meeting this year is scheduled for Wednesday, April 24. Posters will be on display by about 6:00 pm and oral presentations will begin at 7:30 pm. This is a great way to see what current students are working on at CMU. If you can't make the Trumbo Field Trip on April 6, this might be a great way to re-connect with the Geosciences program.

SCHOLARSHIPS. Last fall, an anonymous donor gave ~\$600K to the Geosciences program in support of student activities, and we intend to use these funds, in part, to give out two new endowed Geology scholarships to deserving students in the coming year. These endowed scholarships are in addition to the current **Richard D. Dayvault, Geosciences Tuition**, and **Mark Garman** scholarships. Thank you to everyone for your continued interest and support of the CMU Geosciences program. We hope everyone is well and that we see you soon! •

~ Andres Aslan, Geology Program Coordinator

The annual Spring Geology Program field trip for alumni and students will be held Saturday, April 6, 2019, and is dedicated to the late Adam Trumbo. Don Rasmussen has generously offered to lead the all-day trip to view the **Onion Creek diapir** and discuss the geology of Professor Valley in Utah. Please mark your calendars. We hope that both students and alumni will join us on this exciting trip. Alumni – if you do want to go, please email or call Andres Aslan (aaslan@coloradomesa.edu, 970-248-1614) so we can arrange a meeting place and time. •



OBITUARIES

Dr. Jack Roadifer

August 23, 1928 - October 14, 2018

We are saddened to learn that Dr. Jack E. Roadifer passed away on October 14, 2018. He was Professor of Geology from 1966 until his retirement in 1997. Many changes occurred, and a lot of growth took place while Dr. Roadifer was at Mesa. He came when CMU was Mesa College, a junior college. In 1974, when Mesa changed from junior college to four-year college, he and the other faculty added more courses and developed the curriculum for the BS degree in geology. Field camp was added and initially ran for eight weeks, then a few years later changed to six weeks. Jack earned the nickname "No Slack Jack", a compliment that he enjoyed for many years. When



Dr. Jack Roadifer

the Geology Department was created in 1978, he became chair until 1993 when the department was merged with Environment Science, Physics, and Chemistry to become Physical and Environmental Sciences. He stepped down as a chair and continued to teach until retirement in 1997. He taught structural geology, mineralogy, optical mineralogy, and field camp.

An interview with Jack was published in the Spring, 2015, Alumni Newsletter: coloradomesa.edu/geosciences/documents/Geosciences_NewsletterMarch2015.pdf

Adam Trumbo

July 11, 1978 - October 26, 2018

on page 4 in this issue.

We are very sorry to inform readers that CMU alumnus Adam Levi Trumbo passed away on October 26, 2018 in a truck accident near Cuba, New Mexico. He was father, husband, friend, a devoted Christian, geologist, chemist, scientist, philosopher and great Uncompangre geoscientist. As a student at CMU, he was highly motivated, dedicated, enthusiastic, energetic, sincere, hard-working, and intelligent. He received two degrees: Geology (2015) and Chemistry (2016). He was initiated in Zeta Nu Chapter of Sigma Gamma Epsilon in 2014 and received two honor awards from the Geosciences Program: The Verner Johnson GIS-Geology Award (2015) for using GIS software for making maps and Adam Trumbo and his friend,

William Hood Geoscience Award (2016) for geochemistry research in the Uncompangre Plateau. After graduation, he worked for Field Geo Services (2017-2018). The Annual Spring Geoscience Field Trip on April 6, 2019, will be dedicated to

Adam Trumbo. All are welcome to attend the field trip. See announcement



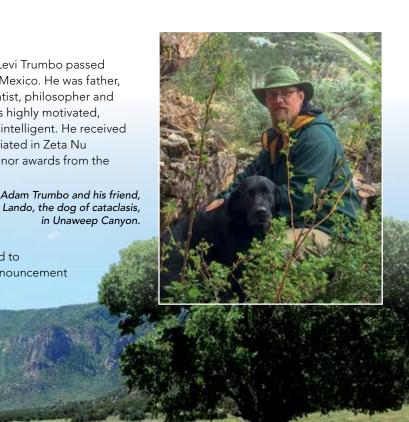


Dr. Russ Walker

Dr. Russ Walker

November 23, 1955 - February 18, 2010

Dr. Russ Walker, Head of Physical and Environmental Sciences (including geology) succumbed recently after a brief illness. Russ was a professor of environmental sciences at CMU for 26 years. He was devoted to his students and environmental causes in western Colorado. Russ served on the Colorado West Land Trust board of directors since 2013. He chaired the lands committee. which oversaw the conservation of thousands of acres of Western Colorado's finest lands. Russ was PES Head from about 2004 until his death.



MAVERICK GEOLOGISTS (ALUMNI NEWS)

Ben Haveman, '13, is Assistant Lab Manager/Rock Mechanics Technician for Agapito Associated, Inc. in Grand Junction. He reports:

"My time is divided between preparing and testing rock core in our lab, and assisting with geology/geotechnical projects in the field.

The rock properties tests conducted in the lab include Uniaxial Compressive Strength, Triaxial Compression, UCS and/or Triaxial with Elastic Properties, Brazilian Tensile Strength, Slake Durability, Moisture Content and Point Load Tests.

Uniaxial compressive strength involves simply squeezing a cylindrical specimen in our large hydraulic press until it fails. That point of failure can be quite explosive sometimes; it is really something to witness.

The triaxial compression test is basically the same process, but it's conducted inside a sealed fluid-filled chamber which is held at a set pressure throughout the test. By providing a triaxial confining pressure, or along all three axis, this test most closely mimics the conditions the rock would experience deep underground. These are typically conducted in groups of three tests, each at increasing pressure, and then used to construct a Mohr's circle. I have six of these tests to do today; two at 500 psi, two at 1500 psi, and two at 2500 psi. It's core we drilled back in September at the underground Eagle Mine (nickel) in northern Michigan.

When 'with elastic properties' is added to the UCS or Triax tests, it involves installing two extensometers on each sample prior to compression; one measures axial deformation and the other measures radial deformation. I know you're familiar with what comes next... We use the amount of deformation, stress over strain, to

calculate Young's Modulus and Poisson's ratio.

The other tests are less complex and fairly self-explanatory. The overwhelming majority of time in the lab is spent on sample preparation rather than testing. Each sample must be cut and surfaced to the ASTM standard dimensions. It's always nice to get out and help on field projects. This year, I'll have spent about 30% of my working time in the field. Occasionally, I'm sent to assist with drilling operations and perhaps log the core. Most often however, I'm in the field to conduct in situ stress measurements using one of our three methods. We refer to this simply as 'overcoring' because a probe with six to 12 strain gauges is installed downhole inside a 1.5 inch diameter pilot hole. We then core drill over the gauge with a larger diameter coring bit (usually six inches). The diameter of that small pilot hole actually changes very very slightly as the bit passes over and this change is recorded by the strain gauges. The magnitude and direction of change, or 'relief', is used to calculate the principal and secondary stresses in the surrounding rock mass (or concrete, for civil projects).

The three methods vary in pros and cons. The Hollow-Inclusion Cell has a 12 strain gauge array and produces a 3-D plot of the in situ stresses but must be epoxied into the pilot hole and left to cure overnight. It is at the end of a cable, so depth is limited to <95 ft, and it can only be used once. The Borehole Deformation Gauge (BDG) was developed by the Bureau of Mines in the 1970's and is very durable, as well as waterproof. However, it records the stress in a single plane (2-D) perpendicular to the drill hole and is attached to an even heavier cable, limiting the depth to <60 ft. The Sigra In situ Stress Tool (IST) has a self-contained battery and data storage system, so it's wireless. This allows the Sigra tool to be lowered via wireline into holes thousands

of feet deep. It produces a detailed 2-D stress ellipse and is relatively quick and easy to use. The only downside to the Sigra is that lowering a \$30,000 tool into a thousand foot hole as it dangles from the placement device and then turning on the drill (and hoping it's seated properly) can be pretty stressful. Agapito is the only company licensed to do Sigra testing in North America.

This three minute Youtube video is a great look at how Sigra works: https://youtu.be/0a50jHxrQIY"

Jesse Houghton, '08, writes:

"How is the CMU Geoscience program these days? Do you still have all the faculty that I had (e.g. Gigi, Rex, Larry, Verner, Rick)? Any of you attend AGU? I'd love to stop by sometime to say hi. I'm sure that CMU has grown so much I would hardly recognize it now!

I've been at UTIG since early 2017, after I resigned from an eight year tenure as an environmental consultant. Here at UTIG I work for Peter Flemings, who is an expert in methane hydrates and geofluids. I manage a research agreement between DOE-NETL and UTIG to study methane hydrates in the deepwater Gulf of Mexico (off the continental shelf). We developed a pressure coring tool that we tested in the Gulf of Mexico last spring, when we collected what I think are some of the first marine hydrate-bearing cores taken from the US continental shelf. We built a pressure core lab in the basement of the Jackson School where we store the hydrate-bearing cores under insitu pressure and can do neat stuff like sub-sample under pressure, quantitative degassing experiments, 3D X-ray CT scanning, P-wave sensing, etc. We are currently developing an operational plan to return to the Gulf in 2021 for a larger scale expedition, where we will pressure core coarse-grained reservoirs, do geophysical logging, and some in-situ testing. Cool stuff!

Here is some more info if you are interested:

- https://ig.utexas.edu/energy/genesisof-methane-hydrate-in-coarsegrained-systems/
- https://www.netl.doe.gov/node/2121
- https://www.youtube.com/ watch?v=z1dFc-fdah4

Now that I think about it, it has probably been a year or two since I remember seeing the CMU Geoscience Newsletter! Thank you for thinking of me – I love keeping up to date with what is going on with the MSC Geoscience folks!"

William Walsh, '11, helped take the AAPG Student Chapter on a field trip to the Henderson Mine in December of 2018 (see AAPG Student Chapter news. and Willy's picture with students in the mine on the cover of this issue). Willy patiently waited for the job he wanted. In his words: "After college I went to work for Boston Market in the "restaurant technology department", as I was unable to find work in the mining industry. I volunteered at Dinosaur Ridge to stay up to date with geology and met some very interesting people who had worked in the mining and petroleum fields. After several years, I was fortunate enough to find an entry-level production position at the mine, where I have wanted to work since we first toured it in field camp in 2011. Since I started working there I have learned so much about mining and the local geology. I hope to continue



"Scout".

learning mining and geology, and stay in this field as long as I am able."

Tim Gerken, '16, reports:

"I am working as a Project Geologist for Telesto Solutions Inc. We are a small (20 employees) environmental engineering and consulting firm. Telesto is based in Fort Collins, Colorado and maintains small offices in Grand Junction, Colorado and Silver City, New Mexico. Our services are wide-ranging and technical, but we specialize in three general categories: Civil Infrastructure, Natural Resources, and Water Resources. We consult on many varieties of projects ranging from characterizing deep aguifers for ranchers to environmental issues for large copper mines in New Mexico. We work with government agencies and regulatory agencies such as the EPA, NRC, or Division of Mining & Reclamation on behalf of our clients. Our clients include large mining companies like Freeport McMoran and Rio Tinto to concrete companies and water ditch associations in northern Colorado

Being the only geologist on staff with a small company has given me a chance to work on many different projects around the western U.S. The jobs includes lots of fieldwork, data analysis, as well as maps, figures and reports. A few of the major geology projects include:

- Served as a project geologist for a drilling investigation to declare the upper Laramie Formation a nontributary aquifer with the Colorado State Engineers Office. This included establishing drilling targets, drilling oversight, mud-logging/sampling to depths of 1500 ft, geophysical logging interpretation, and aquifer and water quality characterizations.
- Project geologist during a multiple phase groundwater contamination investigation for an old uranium mining facility in Wyoming. Duties included oversight of a drilling program, managed rock logging

Thanks for the generous donations!

The Geosciences Program and students greatly appreciate the strong financial support provided by the following alumni and friends of the program.

THE GEOSCIENCES TUITION SCHOLARSHIP

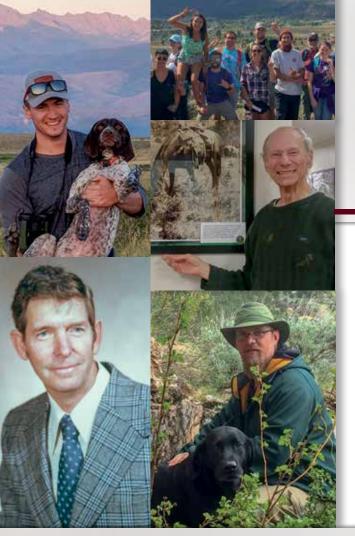
Richard and Cathy Barkley Dr. Verner Johnson

and groundwater testing. Project responsibilities also included analysis of groundwater quality data.

 Estimated a granite quarry resource potential near Laramie, Wyoming for a concrete company in northern Colorado.

I have had to advance many of my geology skills quickly with this job, but I have felt prepared in my geology fundamentals thanks to the professors at CMU. Mesa gave me the necessary technical background to research solutions and apply techniques in the field. I have had to put to my skills to the test, but have felt confident, whether it has been field mapping and rock identification (Rick and Aslan), GIS and geophysics (Verner), subsurface (Rex and Larry), or groundwater (Gigi). The longer I work in the industry, the more I appreciate my education on the western slope. I am still surprised at what they put me in charge of with just B.S. degree, but hey it is just looking at rocks, right?"

We always like to hear from our former students. If you can, please drop by or send an email and let us know what you are doing! •





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Geosciences Program Newsletter

For alumni and friends of the Geosciences Program Spring 2019

- The early days of uranium with Dr. Verner Jonson
- **Club Activities**
- Coordinator's Corner; Adam Trumbo Memorial Spring Field Trip
- **Obituaries**
- Maverick Geologists (Alumni News)
- Thanks for the generous donations!



DEPARTMENT OF PHYSICAL AND **ENVIRONMENTAL SCIENCES**

FROM THE EDITOR

I would like sincerely to thank all of the alumni and friends of the program who have contributed to the various scholarships over the last several years. In particular, I would like personally to thank the anonymous donor of the very large contribution we recently received! We now have multiple endowed scholarships that will provide major support for students at a time when the cost of an education continues to rise. Again, thanks!

At the risk of sounding like a broken record, "Alumni - please let me know what you're up to!" We and your fellow alumni are interested. I would especially like photographs! Current pics, or from the past, but please send me some images related to your time here or your career. I don't care if you graduated 30 years ago, or last year, please send an update. Please be sure to include your name and year of graduation. You can contact me directly at lajones@coloradomesa.edu, and a big thanks to all of you who have kept us up-to-date on your activities! •

> ~Larry Jones, Newsletter Editor, Instructor of Geology lajones@coloradomesa.edu