



The Colorado Professional Geologist



American Institute of Professional Geologists—Colorado Section
Colorado Section email: Colorado-aipg@outlook.com

Geology News, Events, and More

AIPG 2021 Field Trip to Dotsero Crater



**In this
issue
of the
CPG:**

President’s Message	3
Editor’s Remarks.....	4
GeoEvents	5
AIPG Purposes	10
What AIPG Does.....	11
25 years of GeoEvent News Messages	11
Why I Became a Geologist	12
AIPG Field Trip to Dotsero Crater.....	14

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The Board usually meets the second Tuesday of each month at 7:00 AM; all members are invited to attend. Please contact a Board Member to confirm time and location.

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Call for Articles

The Colorado Section of AIPG newsletter welcomes submission of technical or informational articles for publication. Articles may be submitted via e-mail to the editor at:

*summitdatasvcs@msn.com
(Microsoft Word format is preferred.)*

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*Contact James at 303-278-4456
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Change of email:

Change of email notices and other contact information changes for the CPG should be sent directly to:

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(The National Office maintains the address list for all.)

Letters, articles, announcements, ads, etc. must be received by the Editor by the **end of the fourth full week of the month preceding publication**. Letters, articles, ads, announcements, etc. accepted on a space available basis. Submission of articles, etc. via e-mail is the preferred method. Copy can be accepted in most PC formats, but DOC or DOCX are preferred. Call or e-mail James Russell for details on submission of copy or advertising at 303-815-3901, summitdatasvcs@msn.com.

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President's Message

The 2021 year has turned out to be almost as strange as 2020 was. COVID has proven to be a constant hurdle as we attempt to return to some level of normalcy. The Colorado Section Executive Committee made the difficult decision to postpone the Annual Dinner and Student Mentoring Event. We look forward to seeing everyone in person. However, we want to make sure we are also keeping everyone safe as COVID cases are on the rise once again. The new date for the dinner is Friday, January 21, 2022. Please keep an eye out for more details and a call for volunteers as we get closer to that date.

The 2022 Executive Committee needs a handful of volunteers to fill all the positions for next year. If you would like a chance to make a difference and get involved, please reach out to Colorado-aipg@outlook.com. The Section is utilizing Zoom for the monthly meetings, so travel to a certain location is no longer a requirement to attend the meetings.

Dinosaur Ridge is hosting the Girl Scout and Boy Scout days in October. Girl Scouts will be there October 9th, and Boy Scouts on October 10th. Both days run from 9am to 3pm, and we have typically requested volunteers in 2-hour increments. If you would like to volunteer (please bring any rocks, fossils, etc. that you would like to discuss with the Scouts!) please reach out to the Colorado Section email above. The Scout days are so much fun, and it's inspiring to talk about geology and paleontology with the kids and their parents.

I wish you a healthy and safe fall and look forward to seeing you in person soon!

Jessica Davey
2021 AIPG Colorado Section President
MEM-3242

Editor's Remarks

James Russell

Well summer is gone and the trees will start turning color. Where did the summer go? The untimely closures of Interstate 70 created frustration to those of us planning trips to the western slope. This issue is packed with interesting material. Dave Abbott wrote an interesting article about why he became a geologist. Also, Jessica Davey has provided us with the road log used for the fantastic field trip to Dotsero Crater that many of us took this summer. Additionally, there are many meetings listed for this Fall to keep us busy.

Send in Your Articles!



Job Opening

[President & CEO](#) for a Vancouver-based TSX-V listed explorer with a premier package of base and precious metal projects.

This is an exciting opportunity for an emerging leader to advance the Company's vision, by guiding the existing projects towards development, divesting non-core assets, and acquiring additional complementary projects that will add value, either in British Columbia or elsewhere. The ideal candidate will be a market-savvy, natural leader and skilled communicator with experience in the junior exploration sector. The incumbent will have a proven track record of capital raising, deal-making, public company administration, deposit discovery, and building shareholder value.

For more details - view the job here: <https://jobs.miningsearch.com/president-ceo/>

Economics and Metal Market Information

Battery Metals Trends Infographic Available

Cobalt, lithium and nickel prices have increased by 55%, 45% and 7% respectively since the start of this year to August 2021. The changes in metals prices have contributed to 60%-110% increment in battery metals costs across various battery types in the past 12 months. With a high growth forecast for passenger PEVs sales, can the battery metals market keep pace with demand?

Get vital insights into our latest battery metals analysis and price projections:

Growth of global passenger PEV sales

Battery metals costs

Battery metals demand and supply outlook

Battery metals price forecasts

Download the infographic: <https://pages.marketintelligence.spglobal.com/battery-metals-infographic-NUR-0921.html>

Goevents

NOTICE: This information is provided as a service to Colorado Section-AIPG members and others on this e-mail list. No position on a particular topic is taken or implied by the CO-AIPG or its governing Executive Committee unless specifically mentioned.

GJGS September Meeting

Joint meeting with the CMU Geology Students

September 19, 2021; 7:30 PM; In-Person and Zoom

Weldon Lecture Hall (Room 131 in the Wubben-Science Building), CMU Campus, Grand Junction, CO

Dr. Vince Matthews, State Geologist of Colorado (Retired)
“The Wonders of Colorado’s Glacial Landscape”

The manuscript of a new book on the fascinating features and landforms found in Colorado's glacial landscape is the culmination of a 3-1/2 year journey. This talk will include a potpourri of some of the more interesting glacial, periglacial, proglacial, and paraglacial features explored on jaunts around Colorado. Dr. Vince Matthews retired as Director of the Colorado Geological Survey and was the

Geoevents(Continued)

State Geologist of Colorado. He taught geology at six institutions of higher education and held tenure at two. Vince is the author of the multiple award-winning book "Messages in Stone: Colorado's Colorful Geology" and has just completed the manuscript for "Land of Ice: Jaunts into Colorado's Glacial Landscape."

For those who can't or would prefer not to attend in person, the September meeting will also be conducted via Zoom. Please note that the meeting itself starts at 7:30. The Zoom meeting "room" will open at 7:00 to give people time to log in prior to the meeting.

Join Zoom Meeting: <https://coloradomesa.zoom.us/j/94258402037?pwd=eGM1cGoyeGMxbC9qTzVGd210bFZ0UT09>

Meeting ID: 942 5840 2037; Passcode: 188092

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+1 301 715 8592 US (Washington DC)

Meeting ID: 942 5840 2037

Passcode: 188092

Find your local number: <https://coloradomesa.zoom.us/u/aecUVCTxnp>

GeoEvents in the Denver Area

Sept. 10-18, JG&M Expo Denver Show, at the Clarion Hotel, 200 W 48th St., Denver; open to the public, free admission. Jewelry, Gems, Minerals, Crystal, Fossils, Beads.

Sept. 10-19, National Western Complex Denver Mineral, Fossil, Gem & Jewelry Show. 10 a.m. – 6 p.m. daily; no admission charge; on the north side of I-70 at Exit 275-B, Brighton Blvd.

Sept. 16-19, Denver Gem & Mineral Show; 10 a.m. – 5 p.m. daily Thurs.-Sun. at the Colorado Convention Center, held as part of the "Hardrock Summit - Evolution" mineral and gemstone show. See www.denvermineralshow.com. This is the show hosted by the Denver Council of Gem and Mineral Societies, and formerly held at the Denver Merchandise Mart; it is "The original" Denver Gem and Mineral Show, with special exhibits by clubs and museums. By my count this is the 53rd (not quite annual—there was no show in 2020) Denver Show. The featured mineral this year will be Fluorite.

Sept. 16-21, "Hardrock Summit 2021" gem and mineral show, Denver. This will consist of two separate shows; "Evolution", Sept. 16-19, a gem and mineral show open to the public at the Colorado Convention Center (admission and parking fees [consider using public transportation!]), and "Sparkle and Joy", Sept. 18-21, a gem trade show held at the Sheraton Denver Downtown Hotel, Plaza Ballroom. For more information see www.hardrocksummit.com.

GeoEvents in the Denver Area (Continued)

Oct. 1-3, Pikes Peak Gem, Mineral, & Jewelry Show, at the Norris Penrose Event Center, 1045 Lower Gold Camp Road, Colorado Springs. Sponsored by the Colorado Springs Mineralogical Society; see <https://pikespeakgemshow.com>. [This is the gem & mineral show, normally held around June 1.]

ICARD 2021— Meeting Challenge Through Innovation

September 21-23, 2021; Virtual Conference

Join us online in less than a month for the first virtual ICARD! Listen, discuss, and network with industry-leading representatives guiding global best practices regarding acid and metalliferous drainage. This conference will include live-streaming and on-demand content (including keynote lectures, panel discussions, technical presentations, and site tours) to offer multiple options for participation over the three-day event.

Day 1 will kick off with the current learnings from both industry and academia that are driving the future of AMD management, including a virtual site visit from Boliden's Garpenberg operation and a keynote from Dr. Bill Price.

Day 2 continues with a focus on proactive mine planning for closure, with a site visit delivered by Rio Tinto.

Day 3 closes the conference with an emphasis on the future of AMD management strategies. Hear from emerging research regarding the use of machine learning, exploiting microbiology for waste management, and a panel discussion addressing the barriers between the classroom and the mine site.

Not able to attend the event programming live? We are pleased to share that Virtual ICARD content will be made available to registrants within the virtual event platform for 6-months following the event dates.

Visit the event website (<https://www.icard2021.com/program/>) for the schedule of events and a listing of the confirmed speakers including representatives from industry and academia. Registration also is available through this website.

DREGS September Meeting

September 15, 2021; Social hour: 6:00 to 7:00 p.m.; Presentation: 7:00 p.m.
Berthoud Hall Room 241, Colorado School of Mines, Golden, CO

"417 Project, Globe, Gila County, Arizona", by Chris Osterman, PhD.

The 417 Project lies 10 km due north of the copper mining town of Globe, Arizona, and 112 km east of Phoenix, Arizona. The "417" consists of 100 unpatented lode claims covering an area where an extraordinary amount of alluvial native silver was found by metal detectorists over the last two years. Twenty five, large (over 0.5 kg), silver nuggets totalling over 10,700 ounces (330 kg) were spread over a 560 meters length of a dry arroyo locally known as Mexican Mine Canyon. The silver nuggets range in weight from 30 grams to up to 190 kilograms (417 lbs) and notably decrease in size down the gradient of the arroyo. The largest nuggets, 36 kg, 55 kg, and 190 kg, occur 25 meters downslope of a 300 m long, east-west striking, 40 cm wide, quartz-siderite brecciated vein.

GeoEvents in the Denver Area (Continued)

Although one historic 4 m deep prospect pit occurs on the vein, there are no indications of native silver in the pit walls or in dump material. The obvious source of the silver lies in the east-west vein.

Apparently the earliest mineral discovery in the area was by the Apaches who used silver found in a creek to make bullets. There was a rush to the area when prospectors heard of this and the creeks were worked in 1873 and 1874. During 1875-1876, one of the sources for the nuggets was located on the surface at what is now the McMorris mine. The town of Globe was founded in 1875, and in fact was founded as a silver mining center, named after a 9 inch “globe” of solid silver found in the hills. As Ransome, a USGS geologist noted in 1903, the first mines in the Globe area focused on silver.

The last published discovery of native silver was noted by Pederson in a 1962 USGS Professional Paper who stated a 60 lb nugget was found in a wash north of Globe. Nugget Wash just north of Mexican Mine Canyon was cited as producing \$100,000 worth of silver in the early 1900's, which at the then price of a \$1/oz silver would equate to 100,000 oz of silver.

The Globe-Miami Mining District is a prolific copper producer and still has three mines in full production. All copper comes from Laramide age porphyry deposits, located 8 km to the west of the “417” claims. The “417” area is underlain by a Proterozoic diabase with the quartz carbonate vein and presumable source of the native silver occurring near the contact of the diabase and the Proterozoic Apache Group sedimentary rocks which the diabase intrudes. The diabase intruded the Ruin Granite, also Proterozoic in age. Locally the diabase contains a compositionally similar gabbro with a pegmatitic texture. A red, potassic granite appears to intrude the diabase and a more aplitic phase of that potassic granite occurs in a prospect pit alongside the quartz carbonate vein which hosts the native silver.

The silver nuggets range up to 20 cm thick and up to 120 cm long, compositionally the nuggets have skeletal quartz up to 40% by volume (Figure 4), although occasionally the nuggets are pure silver. One XRF (handheld) analysis showed the silver contained 6% tin and 2% mercury, the outer rind of the nuggets are often covered with a 1 mm layer of dark cerargyrite (silver chloride). Petrographic studies showed that the native silver contains 2% mercury as an amalgam, as well as acanthite, chlorargyrite, jalpaite, and mckinstryite. The closest geologic analogue to the “417” project is the Cobalt Silver district in Ontario, Canada where over 445 Moz of silver were produced from thin veins in another Proterozoic diabase. At Cobalt, the veins were from 5 to 25 cm wide and often near the edges of the Proterozoic diabase sills and the Archean sedimentary rock. The unconformity between the Nipissing diabase and the sedimentary rocks at least spatially appears to be a control on native silver mineralization. It seems likely that the “417” silver mineralization is of Proterozoic age as well and not related to the nearby younger porphyry copper ores.

Payne Institute Online Presentation

“Pathways to Resilient Energy Infrastructures for a Net Zero World”

Thursday, September 16, 2021; 9:00am – 10:00am (MT)

Lawrence Jones, Vice President, International Programs, Edison Electric Institute

According to the recent IPCC report, the earth is warming much faster than expected. Also, the frequency, scope and severity of extreme weather events all point to more disasters with dire consequences for societies in both developed and developing countries. Around the world more citizens are realizing and demanding immediate actions to address climate change. Political and business leaders, NGOs, investors, development agencies and representatives from diverse stakeholder groups will gather at COP 26 in Glasgow to reaffirm commitments and actions to reach net zero by 2050.

GeoEvents in the Denver Area (Continued)

Payne Institute Online Presentation

A centerpiece to the climate solution are the energy infrastructures around the world. How to transition current global energy systems to be resilient in a net zero future? What factors shape the pathways to resilience? How to rethink and redesign energy infrastructure? How to evaluate the positive externalities of infrastructure? In this seminar we will hear from award winning global thought leader and practitioner Dr. Lawrence Jones covering these questions. He will also discuss the need for hybrid regulatory, business and analytical frameworks, as well as why long-term thinking is the requisite mindset when infrastructure investment. Dr. Lawrence E. Jones is Vice President, International Programs at the Edison Electric Institute; a Senior Associate (non-Resident) with the Energy and Security Program at the Center for Strategic and International Studies; a Senior Fellow at Boston University Institute of Sustainable Energy; an Honorary Industry Fellow at Monash Energy Institute, Monash University, Australia. He is the Editor of “Renewable Energy Integration – Managing Variability, Uncertainty and Flexibility”.

Free webinar, no registration necessary.

For more info and the Zoom link, go to <https://payneinstitute.mines.edu/event/pathways-to-resilient-energy-infrastructures-for-a-net-zero-world/>

Members in Transition Virtual Talk

September 16, 2021; 11:30 am - 12:30 pm (MDT)

Rocky Mountain Members in Transition (MiT) is a joint effort of members of AAPG, SPE, WOGA, COGA, DWLS, and RMAG in the Rocky Mountain region to help association members in the midst of a career transition.

Webinars are free and open to all.

"Geothermal Greenhouse Partnership"

Sally High

Summary:

Geothermal Greenhouse Partnership (GGP) serves the Pagosa Springs region through demonstration and education of direct-use geothermal energy and sustainable agriculture. GGP manages three geothermal greenhouses, an amphitheater, and two outdoor gardens on the San Juan River Walk. Truly a partnership, GGP is donor- and volunteer-driven. Since 2014, financial support has come from various governmental agencies and private foundations. The Town of Pagosa Springs gives GGP 100 gallons of geothermal fluid per minute, with which we heat our greenhouses and grow vegetables year-round. A small solar array supplies our electricity and an EV-charging station is adjacent to our renewable energy campus.

Before Covid, GGP held in-person classes and workshops for all ages. Each school year, over 600 students learn about renewable energy, agricultural sustainability, and food security. Since March 2020, we've grown vegetables intensively and produce is donated to local food pantries. Our mission is education - "growing food and community with local energy."

To register, go to <https://www.rmag.org/index.php?src=events&srctype=detail&refno=189&category=Members%20in%20Transition>

GeoEvents in the Denver Area (Continued)

Colorado Scientific Society September Meeting

Thursday, September 16, 2021; Program: 7:00 pm
CSS Past Presidents' Dinner.

First face-to-face meeting of the Colorado Scientific Society in 2021. Dinner at Mount Vernon Canyon Club at 6:00 pm., plus live music with Lesli Wood and Dallas Spear; .

Presentation by Professor Lesli J. Wood, Colorado School of Mines, entitled: "A Voyage Through Time: Ancient Landscapes and Seascapes of the Earth and Beyond."

To register or get more information, go to <http://www.coloscisoc.org/>

THE FOSSIL FUTURE – WHERE DOES OLD FOSSIL FIT IN A LOW CARBON FUTURE – VIRTUAL SEMINAR

SEPTEMBER 30; 9:00 AM - 10:00 AM MT

Please join the Mines Global Energy Future Initiative and the Payne Institute for Public Policy at the Colorado School of Mines as we welcome Matt Gallagher, Mines Alumni, Founder, President & Chief Executive Officer, Greenlake Energy Ventures.

Is Fossil Fuel use going to be obsolete by 2050? If not, what are the appropriate uses? Matt looks back on his career and evaluates development themes of the past and shares what he thinks they tell us about the future.

Matt Gallagher is a Mines alumni (BS Petroleum Engineering '05) who played football under Coach Stitt and was a member of the Alpha Tau Omega fraternity. Gallagher went on to work at Pioneer Natural Resources, then later Parsley Energy, where he became Chief Executive Officer and helped steward the Company's IPO and later merger into Pioneer Natural Resources. He is currently the President and CEO of Greenlake Energy Ventures, a Venture Partner at NGP Energy Capital and a board member of Pioneer Natural Resources and Chesapeake Energy. He has 3 kids with his wife Katherine who is also a Mines alumni (BS Metallurgical Engineering '05).

ZOOM VIRTUAL SEMINAR – NO REGISTRATION NECESSARY!

Link to seminar: <https://mines.zoom.us/j/92176698494>

AIPG Purposes

The purposes of the Institute shall include:

- advance the geological sciences and the profession of geology;
- establish qualifications for professional geologists;
- certify the qualifications of specific individual Member geologists to the public;
- promote high standards of ethical conduct among its Members and Adjuncts, and within the profession of geology; and represent, and advocate for, the geological profession before government and the general public.

What AIPG does . . .

- Professional Certification - Certifies geologists based on their Competence, Integrity, and Ethics.
- Categories of Membership - Certified Professional Geologist, Professional, Young Professional, Associate, and Student.

Ombudsman - Intervenes with regulatory boards and agencies on behalf of individual geologists, at the geologist's request. Information also is disseminated in cooperation with the Association of State Boards of Geologists.

25 Years of GeoEvent News Messages Colorado AIPG Executive Board

Nearly everyone receiving this CO-AIPG newsletter also is receiving the e-mail blasts from Doug Peters on an approximately weekly basis that contain various news items on in-person and (mostly more recently) virtual events of interest to our Colorado Section members and various others on the e-mail list. This August we reached the milestone of Doug having sent these messages to CO-AIPG members for 25 years (since mid-August 1996) without interruption!!

Back when the AIPG membership directory was strictly available in paper form, printed once a year and mailed to all AIPG members, Doug went through the 1996 directory and compiled a MS-Word list of ALL Colorado Section members' e-mail addresses who had one. With the CO-AIPG's Executive Committee blessings at the time, Doug was approved to send out e-mails to everyone with messages that contained news items relevant to the Section and interests of members. At the start, approximately 30% of members had e-mail addresses, so the sending of these e-mails basically was information in the newsletters as well as including short-term news items on events that were too quick in timing for the newsletter to include based on publishing deadlines for the, then, paper newsletter that was mailed to all members.

Doug started with about 200 e-mails in the list, including National officers and AIPG staff. Telephone dialup was still the norm for accessing the then early World Wide Web and Internet. He had a 1200 baud modem at the time, which was hot stuff when it first came out (the earliest modems were 400 baud for the most part). Sending to the CO-AIPG e-mail list took as long as 4 hours, even at 11 PM to midnight on the weekends which is when he sent most messages to avoid high-phone line and Internet usage times. Heaven forbid if the phone line was static-y on a given night as that would cause one or more interruptions in the sending process, meaning he had to figure out where in the e-mail list the sending failed and start over at that point in the list. When that happened, sending to the whole list could take much of a whole day.

Sending messages nowadays is dramatically faster, as you might expect. Sending to the full e-mail list now takes about 30 minutes due to sending in small batches of addresses to limit rejections by spam filters. Doug still tries to send most of them in the evening after school and business Internet usage decreases. Occasionally he sends them earlier in the day as time is available to him. The email list is about 600 people now, with nearly all 380 section members having e-mail addresses and a number of interested nonmembers and non-AIPG societies' newsletter editors also receiving the messages.

The thanks we have received from many members for these events messages are appreciated! The pandemic resulted in many events moving to online formats, which means more people can access (cont.)

25 Years of GeoEvent News Messages (Continued)

them, but also means that many newsletters and notices Doug pulls info from tend to be shorter notice than when all were in-person events. We will continue to try and get timely info to everyone as much as possible.

It is unlikely that Doug will be doing this for another 25 years as age catches up with all of us. Maybe a younger compiler will take up the mantle someday. However, we hope that there are many years of useful news still coming.

Why I Became a Geologist and How my Career Evolved

David M. Abbott, Jr., CPG-4570
Consulting Mining Geologist & Geoscience Ethics Columnist
Denver, Colorado

I grew up in Colorado and family vacations were usually car trips around the west. By the time I graduated from high school, I'd visited Rocky Mountain, Mesa Verde, Grand Canyon, Hawaiian Volcanoes, Teton, and Yellowstone National Parks. I'd traveled on the Yampa and Green Rivers through Dinosaur National Monument and seen the dinosaur quarry museum in Jensen, UT. I had driven past the Spanish Peaks and seen the associated spectacular radiating dikes. I had climbed many of Colorado's 14,000+-foot peaks. So, I'd seen lots of geology without realizing it. Visits to natural history museums and such led me to believe that geology was collecting fossils and minerals, neither of which particularly appealed to me. I'm not a collector.

Following the encouragement of various advisors, I took Physical Geology during the Spring of my freshman year at Dartmouth College. The professor was enthusiastic, and I'd visited about half the places pictured in my textbook. I realized that I knew a bunch of technical terms because I'd seen them in the field. During my first lab session, one assignment required drawing the location of a dike whose strike and thickness were given along with one contact. I looked at the contours on the map on which I was to draw the dike and there was no topographic relief for a dike. I asked the lab instructor about this and was told that I wasn't expected to know about differential erosion at that point in my education. Drawing two parallel lines of the appropriate distance apart and on the specified azimuth was all that was required. I learned that geology was about a lot more than mineral and fossil collecting. The geomorphology course I took sophomore year was a real pleasure. Working with topo maps and air photos and studying landforms as expressions of the underlying geology, the rock types, and structures was great fun. During my sophomore summer I took a geology of Colorado course at the University of Colorado Boulder that was taught by driving around the Colorado Front Range on Tuesday and Thursday afternoons along with a weekend field trip to western Colorado.

That fall I took a job as a field tech for a mining consulting firm in Golden, CO. I learned about staking claims, drafting, collecting soil and rock samples, sample prep, and collecting and processing data with a magnetometer and electromagnetic detectors. I worked on projects looking for molybdenum, gold and silver, uranium, and alunite, among others. I logged a lot of pace and compass miles through the mountains. I generally learned about mineral exploration in the field including jeep repair in mud holes with bailing wire and such things that aren't taught in field camp. After two years of practical training, I returned to Dartmouth, completed my BA, and went on to the Colorado School of Mines for my MS.

Why I Became a Geologist and How my Career Evolved (Continued)

Mineral exploration is cyclical and the type of deposit of most interest at the moment changes every 2 to 5 years or so. When I was finishing my MS, uranium exploration was where the jobs were. But I wasn't all that excited about uranium. I was a hard rock guy. At the time I was a Boy Scout leader and my co-leader was a fellow Dartmouth alum and an attorney with the US Securities and Exchange Commission in Denver. He told me that the SEC was looking for a mining geologist and so I went for an interview, was intrigued, and became a geologist for the SEC. Working for the SEC is very unusual geologic career path. This was my real introduction to disclosures about mineral properties both honest and fraudulent and to the SEC's definitions of and requirements for disclosures about probable and proven ore reserves. As I gained experience in these areas, I began writing papers and given talks about the SEC's mining rules. I became experienced in investigating alleged frauds and being an expert witness. I also became active in the Colorado Section of the American Institute of Professional Geologists before becoming a Certified Professional Geologist in 1979. In 1990 I began writing and talking about geoscience professional ethics and professional practices. My first PE&P column for AIPG's *The Professional Geologist* appeared in November 1995. By the end of 2021, 179 PE&P columns will have been published.

I worked for the SEC for 21 years. By 1996, it had become clear that natural resource frauds were no longer a current priority for the SEC, and it was time to leave. Because of my work on the SME's Resources and Reserves Committee since 1988 and the drafting of the various editions of the *SME Guide for Disclosure of Exploration Information, Mineral Resources, and Mineral Reserves*, I'd become a recognized expert in this area and was invited to become a Senior Associate of Behre Dolbear & Company and also began an independent consulting practice. Since 1999 I've been associated with Ammonite Resources. I work on natural resource disclosure matters, resource and reserve classification systems, and their application to specific deposits. I've also been involved with litigation support cases.

In summary, I became a geologist because of my basic physical geology course that taught me that I knew more geology than I realized. Mineral exploration became my focus early on. My career at the SEC occurred because I was open to different things and was in the right place at the right time. My SEC work gave me the unique specialization that provided the pathway into a consulting career. My willingness to work on the SME's Resources and Reserves Committee and on AIPG's Ethics Committee and giving talks and publishing papers for AIPG and other professional societies have provided professional recognition and standing. These activities have resulted in my being the recipient of a number of national awards. It has been, and continues to be, a satisfying career.

Dotsero Volcano Field Trip Overview by Jessica Davey September 2021



Saturday, July 17th, a group of AIPG members (plus a couple of engineers who tagged along) met at Dotsero Volcano for the summer field trip. This volcano is the by far the youngest volcano in Colorado. Just think what the Native Americans in the region thought as the eruption was occurring!



See if you can spot the geologist and engineer who braved the hike into the base of the crater!



Photo credit: Jessica Davey

[The Dotsero Volcano is] a small maar and scoria cone complex at Dotsero, near the junction of the Colorado and Eagle Rivers west of the Gore Range, is the only Holocene volcano in Colorado. Although Interstate highway 70 cuts across a lava flow from Dotsero, this volcanic center is one of the least known in the western United States. The most prominent feature of the Dotsero complex is a 700 m wide and 400 m deep maar that was erupted about 4150 radiocarbon years ago along a ridge consisting of evaporites and reddish oxidized sandstones of Pennsylvanian age. Small scoria cones were constructed along a NNE-SSW line on either side of the maar. Small lahars preceded eruption of a basaltic lava flow that traveled 3 km down two narrow V-shaped valleys and spread out onto the floodplain of the Eagle River, diverting the river to the south side of the valley. Older Pleistocene basaltic lava flows occur nearby at Willow Peak, McCoy, and Triangle Peak (Smithsonian Institution, 2013).

The Dotsero Volcano is the only “active” volcano on the State of Colorado, with its most recent eruption occurring roughly 4,000 years ago. The USGS has the Dotsero Volcano ranked 82nd on their watch list and has assigned it a “moderate” threat level (gihikes.com, 2021).

Dotsero Crater, near the Dotsero railroad junction in central Colorado, is one of several volcanic features resulting from basaltic eruptions between 3,800 and 5,500 years ago (4,150 +/- 300 years B.P. radiocarbon age) (USGS, 2021).

View of Eagle Valley from the road to the crater.

Photo credit: Jessica Davey



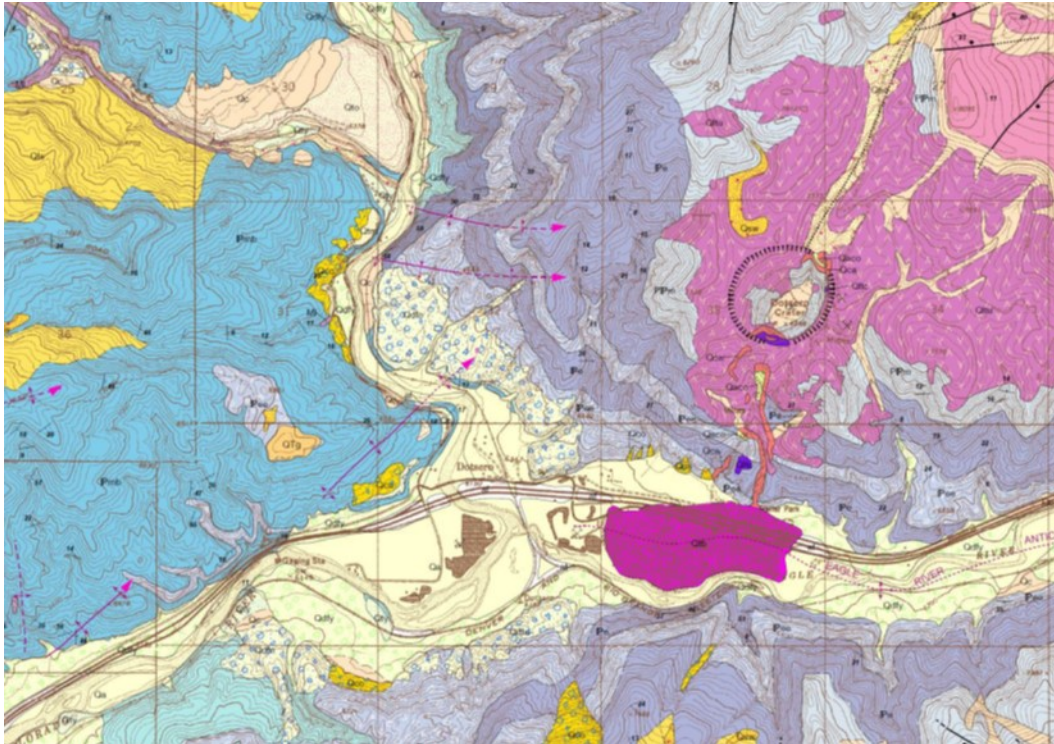
The earliest eruptions occurred along a north-northeast trend and built scoria cones that ascend the north canyon wall of the Eagle River near where it joins the Colorado River. An ‘a‘ā lava flow issued southward from a gulch and buried about 0.7 km² (168 acres) of the adjacent floodplain. Today, U.S. Interstate Highway 70 cuts this lava flow. Dotsero Crater formed when magma encountered water and explosively blasted a crater through the country rock, destroying part of the scoria-cone chain and showering tephra across the landscape. This tephra fallout includes a substantial amount of red sandstone bedrock fragments. Although 20 m (65 ft) or thicker around the vent, much of the tephra was blown eastward from the crater by prevailing winds. The crater today has a diameter of about 750 m (2,460 ft) and a depth of 76 m (250 ft) at low rim points. When first formed, the crater was possibly as deep as 400 m (about 1,300 ft), but has since been partly filled (USGS, 2021).

The most recent lava flow in Colorado occurred in Eagle County. This was approximately 4,000 years ago (think Stonehenge) as determined by radiocarbon dating of a tree found in the ash in 1962. Local historians weren’t available for documentation purposes, however, according to an article written by Allen Best in 1990 [Vail Trail Dec. 7, 1990], there would have been a native American local population to witness the event. If you drive by the Dotsero exit on I-70, look at the hillside above the trailer court. This is one side of the cone that produced the lava. According to the late Ogden Tweto of the U.S. Geological Survey, Colorado has a volcanic rock similar to that found in Hawaii, so the eruption probably produced a flow of lava through a vent rather than a wild explosion. Looking at the area south of the Interstate, the remnants of that flow are clearly visible. Ogden Tweto, by the way, revised the state geologic map during the late sixties, early seventies. It was published in 1979 and “has been acclaimed the best map of its kind to appear anywhere and sets a high standard for other states to follow.” – L. A. Warner, in his “Memorial of Ogden L. Tweto 1912-1983,” in *American Mineralogist*, v. 72, p. 1271-1272, 1987 (It's Not Dead, It's Just Resting (Sorry, Monty), 2021).



Dotsero lava flow circa 1900, image from <https://www.evld.org/blogs/local-history/its-not-dead-its-just-resting-sorry-monty>

Scoriaceous lapilli tuff (Qltu) mined from thick, unconsolidated deposits in the vicinity of Dotsero Crater is mixed with other lightweight fillers and cement to produce cinder blocks by the Mayne Block Company in Dotsero. This scoriaceous material is also marketed as landscaping aggregate, road cinders, and as other lightweight construction products (Colorado Geological Survey, 2021).



Dotsero “diamonds,” little pieces of quartz that were picked up by the lava as it moved across the landscape. The heat of the basalt affected the outside rim of these quartz crystals, so they have a little rind on them. Most are very tiny, but there are some that can be quarter size, or half dollar size (9News KUSA, 2018).

If you would like to venture to check out the Dotsero Volcano on your own, here are directions and suggestions from the field trip guide:

What you need to prepare for: Bring your own water and lunch/snacks. Be prepared to hike, ensuring you have comfortable footwear and proper attire for the weather.

A 4-wheel drive vehicle is preferable due to loose gravel on the road up to the crater, but not required; clearance should not be an issue. The star marks the location of the parking lot for the meeting location.

To get there take the Dotsero Exit 133 on Interstate 70. At the traffic circle on the north side of the interstate take the first exit onto US Highway 6 heading east. After another 6 tenths of a mile turn left onto a road that has a 'No Outlet' sign. After another half mile the road reaches a mobile home park. Go around the mobile home park on the left side and follow the road the begins climbing up the gulch. Some maps label the road with the number 8460. A 4wd vehicle would probably be desirable due to places where the road has thick loose layers of gravelly volcanic rock. If you park at the bottom and begin hiking the round-trip distance will be just under 2 miles. For turn-by-turn directions enter Dotsero Crater into your driving app. (<https://www.gjhikes.com/2020/11/dotsero-volcano.html>)



Drive up from I-70

The field trip will begin during your drive up from I-70. The website GJHikes (<https://www.gjhikes.com/2020/11/dotsero-volcano.html>) provides a good overview of what to keep a look-out for as you make your way up the road:

1. As you head up the road you might notice thick light-colored layers of volcanic ash. About halfway up the mountain the road passes a vent, or blow out, that is interesting to investigate .



2. As the road reaches the Dotsero Crater there is a kiosk with a map that is labeled 'Castle Peak' .



Additional Exciting Geology in the Area

Extend the field trip by visiting some of these amazing sites (disclaimer, this is only a small selection, there is a ton to see in this area!):

- Glenwood Canyon
- Hanging Lake (reservation required)
- Hot Springs (Glenwood Springs, Yampah Vapor Caves, Iron Mountain Hot Springs)
- Rifle Gap
- Rifle Falls
- Glenwood Caverns
- Cardiff Coke Ovens

Recommended Reading

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