U.S. Geological Survey

The Geologic Division Retirees Newsletter

Volleyball Champions, circa 1982

Number 84 **Spring-Summer 2023**

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:

Terrors of Reston volleyball: Rob Wesson, Jack Fischer, Doyle Frederick, Carolyn Harrison, and John Houghton. About 1982. Photographer probably Dave Usher.

From the President

Hello All,

2023 has been a year of lots of changes and new adventures. Rob and I are busy with two grandsons (Russell age 3 and Sammy age 1) most afternoons. Russell is a budding scientist, who loves planets and volcanoes. He is proud of his pumice sample from Mount St. Helens and his piece of Hawaiian basalt and likes to tell you about the difference in their weights.

Rob and I fulfilled one of my bucket list adventures—a two-week cruise on the Rhine, Main, and Danube Rivers from Amsterdam to Budapest with my youngest brother Mark and his wife Jill. Yes, the trip was as wonderful as the Viking ads one sees on PBS. You only had to ask, which meant Rob was able to have low sodium and low protein meals to fit his diet. I needed help finding an English-speaking driver to take 8 of us to a farm village in Slovakia (our daughter, son-in-law, and 2 grandsons joined us for 10 additional days traveling by train from Budapest to Bratislava and to Prague). The Viking concierge found us a large van and a wonderful driver.

We did not see as much geology as you might think from the longship as passage was often at night. We did see lots of variation in building stones and street cobbles as well as remnants of Roman roads and town gates. Marksburg Castle (in Braubach, Germany) was built into the bedrock composed of heavily folded slates. It made for some tricky walking, which was the design to protect the castle from invaders.

In recent months, I spent several hours a week at the USGS National Center, working on the Talent Within annual art show, which showcases employee, retiree, and family members creations. I hung out in the Natural Hazards Mission Area space to register art work as it was dropped off. Lots of quiet time as few people were around working and drop offs were sporadic (none on Mondays or Fridays).

In the upcoming months, I will be active as a Scientist Emeritus with the Northeast Region. The project focuses upon building community outreach with the Reston Association and local schools to reach underserved communities.

What have you been doing? We'd love to share your news. Send me an email at r2susan53@gmail.com or drop a note to John Keith at jkeith@usgs.gov.

Cheers,
Susan Russell-Robinson

Treasurer's Report and Membership

Treasurer's Report (abbreviated):

Our expenditures for the two most recent Newsletters were $2,849, and our bank balance as of October 31, 2023, was $6,160. Dues notices will be forthcoming in the next month or so; please see the boxed item below regarding a change in dues.

> The Board of Directors has voted to raise our association dues from $6 to $10 per year. This is our first increase in about 25 years.

Membership Statistics:

Our most recent count of members is 256, including the 11 new members listed in this News.

New Members

Blaine Cecil
Mike Diggles
Wright Horton
Marti Miller
Bruce Molnia
Pauline and Charles Morgan
Bill Orem
Dave Smith
Dave Sutphin
Peter Ward

Essays, Anecdotes, and History

Nuclear Testing

James G. Moore

It was while I was assigned to the Hawaiian Volcano Observatory in 1962 that I experienced a nuclear blast, an atmospheric hydrogen bomb. The tests occurred at Johnston Atoll, 900 miles west-southwest of the Island of Hawaii, and we observed one from the rim of Kilauea Caldera on the south side of the island. Before the tests, Johnston Island was simply a U.S. Coast Guard facility for the operation and maintenance of a loran navigation station. But the testing program changed all that. Operation Dominic was a series of 36 atmospheric nuclear detonations (29 dropped from aircraft, one a ballistic missile launched from a Polaris submarine, another an antisubmarine rocket launched from a surface ship, one launched atop a Nike Hercules rocket, and eight more carried aloft by Thor rockets). All the detonations were in the vicinity of either Christmas Island or Johnston Island.

The schedule for the tests was broadcast by radio. When the date and time were announced in the summer of 1962, we would stay up late and go to a good lookout point on the Kilauea Caldera rim next to the Volcano Observatory. We were ready for the launch of a Thor missile with a hydrogen bomb warhead that was scheduled late at night, June 20, 1962. The rocket was fired, but the Thor engine cut out only 59 seconds after launch, and the warhead was destroyed with no nuclear yield or fallout. Having seen nothing, we went home, but planned to try again when the repeat test was scheduled.

A few weeks later a test was announced for July 9 at 0900 Greenwich time, which was 11:00 p.m. Hawaiian time. A group of us, including my wife Flossie, Don Richter, and others, patiently waited at the Kilauea lookout point, and this time we were not disappointed. We first saw a spectacular white flash that grew in size until, as reported in the newspaper headlines, "It Was High Noon at 11:00 p.m. Today." The blast triggered an artificial aurora that produced impressive light displays lasting up to seven minutes. From our vantage point, the white light faded into several colors and then into a long-lasting red resembling tomato soup. As timed by my watch, one could read fine print for five minutes after the blast, which slowly faded thereafter.

We later heard that the electromagnetic pulse from the test sent power-line surges throughout Oahu (200 miles from us) knocking out street lighting, blowing fuses and circuit breakers, and triggering burglar alarms. This hydrogen fusion blast was dubbed Dominic Starfish Prime and occurred 900 miles away from us at an altitude of 250 miles with a yield of 1.4-megaton. Marion Richter saw the blast from their home (the old Jagger House) on the crater rim near the Volcano House Hotel. She described first a white mushroom cloud that turned yellow, green, and on to other colors. It reminded her of the neon advertising sign for Sherwin-Williams Paint, where multicolored paint is poured over, and progressively covers, the globe.

More Work with UNESCO

Bob Schuster

Photograph by John Keith.

From 1981 to 1983, I was a member of the ten-man (five Russians; five "westerners") UNESCO International Scientific Council on Protection of the

Lithosphere, which was established to advise Soviet scientists and engineers on a UNESCO project on landslide studies in the USSR and to publish a book (in Russian and English) on landslide hazards. The purpose of our "Scientific Council" was to advise the Russian scientists on project efforts and to monitor the project so that UNESCO would get its money's worth. The latter was not an easy chore, partially because the Soviet Union and the West were at that time still very much involved in the "Cold War." We spent a lot of frustrating time arguing with the Russian scientists, mostly through interpreters. The Scientific Council met four times: in Moscow, Prague, Paris, and Tokyo.

The first Scientific Council meeting was in Moscow in October 1981. It took place immediately after a Soviet-Union-sponsored UNESCO *International Symposium on Water-Related Exogenous Geological Processes and the Prevention of Their Negative Impact on the Environment* (a typical Soviet title) held in Alma-Ata, Kazakhstan (now called Almaty). This was the first of my several visits to Alma-Ata, and I enjoyed it very much. After the Alma-Ata meetings we flew back to Moscow for the first meeting of the Scientific Council. With me was my old USGS friend Dave Varnes. We stayed at the Hotel Sport, a new hotel that the Russians had built for the 1980 Olympic Games.

That evening, Dave and I were invited by a few close Russian friends to join them for a drink at the hotel's bar. Well, it turned out that "a drink" was really six large glasses of vodka, etc., placed in front of each of us (a typical Russian sociable drinking practice). To be sociable, I managed to get through my six glasses O.K., but poor Dave, who was still suffering from stomach problems he had acquired in Alma-Ata the evening before, couldn't finish his.

Our first Scientific Council meetings began the next day. They were a fairly dreary affair. We spent much of our time arguing with the Russian team, not about political differences (we kept away from that topic), but about technical issues. The high point of our visit was an evening party at the Geological Department, Moscow State University (the 26-story skyscraper in central Moscow). Anticipating an opportunity for levity at the party, I had brought from Colorado a car bumper sticker that stated "Reunite Gondwanaland." (Gondwanaland is the geologic nickname for the earth's single continent in early geologic time that by tectonic movement ["continental drift"] broke into today's several continents.) Professor George S. Zolotarev, Head of the Geological Department and a noted Soviet scientist (and no friend of the United States), was at the party, and I decided to formally present the bumper sticker to him. Because Zolotarev spoke no English, I asked Dr. Shibakova, who got the joke, to make the presentation and translation. Zolotarev also got the joke and retorted with, "Dr. Schuster, this is not the time for political statements!" This got a big laugh from everyone who understood the joke's implications.

The second UNESCO Scientific Council meeting was held in Prague, Czechoslovakia, in May 1982. I chaired the conference. Pat, my wife, accompanied me on the trip. There were supposed to be two or three other foreign wives along, but for various reasons Pat was the only one who showed up. To prepare for the wives, the Czech government had set aside a big, black Skoda sedan with driver and interpreter/tour guide to show the wives around Prague and environs during the entirety of the 5-day meeting. Because Pat was the only wife, she had the car, driver, and guide all to herself for all 5 days (while I was arguing with the Russians). She visited castles, had great lunches, etc. The guide and interpreter, a woman government chemist, also enjoyed the tours; she had the week off from her regular work and had a great opportunity to meet with and practice her English on a friendly and sociable American woman. At the end of the week, a fancy luncheon was set up for Council members (and Pat) at the "Palace of Culture" in Prague, a fancy new

Communist official center. My favorite at the luncheon was the liver dumpling soup—the best I've ever had. For entertainment that week, Pat and I attended the National Opera, and one evening Jaroslav Pasek took us to an "oompah-pah" German-style beer garden; it was great.

In August 1983, in Tokyo and Osaka I participated in the UNESCO Symposium on Landslides, followed by the third meeting of our Scientific Council. One day of the Scientific Council meetings was set aside for presentations, the Russians in the morning, the rest of us in the afternoon. We foreigners sat through the boring Russian presentations, but in the afternoon all of the Russian team headed downtown to "see the sights" (none of them had ever been to a modern, non-Soviet city; they were overwhelmed). Because of their absence that afternoon, our Japanese hosts were not happy with the Soviet team.

After the Russians left for home, our hosts asked if there was anything I would like to visit in Japan. I took them up on their offer. In working with the 1980 Mount St. Helens eruption, I had learned that a very similar eruption had occurred in 1888 at Mount Bandai (Bandai-san) Volcano on Honshu island about 110 miles north of Tokyo. The eruption had caused a huge rock avalanche that dammed streams forming three large mountain lakes. The Japanese agreed that a visit to Bandai would be very worthwhile. So, the next morning I joined about a dozen young Japanese government geologists and engineers to climb the volcano (elevation: 5,968 ft) and reconnoiter the large rock avalanche and dammed lakes (Hibarako Lake, Onogawako Lake, and Akimotoku Lake; all three are beautiful). That night we stayed at the posh Bandai Hot Springs resort near the mountain, and the government men treated me to a "Geisha Party." I was the guest of honor at the party, which lasted from about 6:00 p.m. to midnight. We were entertained by two geishas and two sword dancers. Had a great meal with plenty of sake. I managed to limit my sake intake, but several of the young Japanese had had a bit too much by the end of the party; one of them grabbed the ornate headdress from one of the geishas and plopped it on my head. This was photographed by several of the Japanese. So, I said to the Geisha through an interpreter, "if my wife sees these photos, she'll divorce me." She countered with, "don't worry sir, if your wife divorces you, I will marry you if you take me to America" —a brilliant retort! The boys gave me a few prints just for fun; I took them home to show Pat, and then we destroyed them (too embarrassing). My only geisha party, ever. It was a lot of fun, and nothing serious or immoral happened. The next day, I thanked my Japanese colleagues and headed for Colorado.

The 2-year Scientific Council efforts did result in a two-volume book, *Landslides and Mudflows*, published in 1988 in Russian and English, in which I authored three chapters. I don't think it had a very wide distribution worldwide.

Working with Apollo
George Ulrich

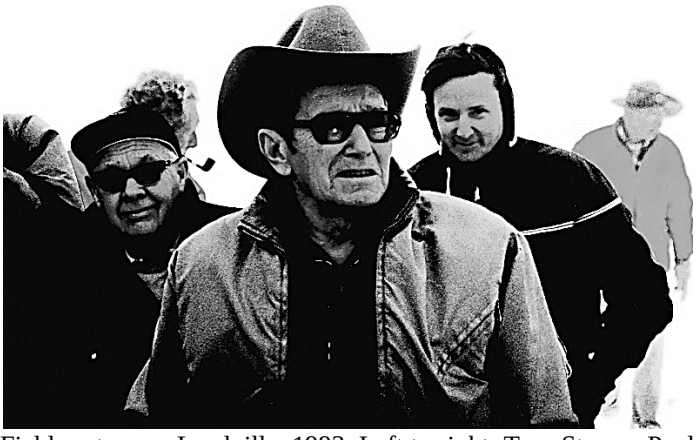
These flags flew over the USGS temporary buildings in the "back 40" of the Lyndon B. Johnson Space Center during the Apollo Lunar Landings in the

early 1970s. The teams of the Apollo Field Geology Experiment (S–059) headquartered in Flagstaff, but including geologists from Menlo Park and Reston, were in residence at the Center from liftoff to return landing plus weeks following Apollos 14 through 17. We supplied crews to the Science Operations Room across the hall from Mission Control both during the EVAs (on the lunar surface) and afterwards to evaluate and plan for the following EVA. When the astronauts returned and photos were processed, our efforts concentrated on preliminary reports of the geology and surface exploration results.

Because of our remote location on campus, NASA paid little attention to our activities, ignoring our comings and goings. Eventually the bureaucrats discovered our waving display and declared it inappropriate for the Space Center. So, the flags were struck and carefully preserved for future glory. They have just been uncovered from the personal holdings of Jody and Gordon Swann and are herewith made public by the few remaining team members: Jody Swann, Ed Wolfe, George Ulrich, Steve Reed, Kay Larson Edwards, and Gerry Schaber.

Remembering Ogden Tweto (1912–1983), with a Dallas Peck Twist

John Keith



Field party near Leadville, 1983. Left to right: Tom Steven, Paul Theobald, Ogden Tweto, Dick Taylor, and Bill Sharp. Photographer unknown.

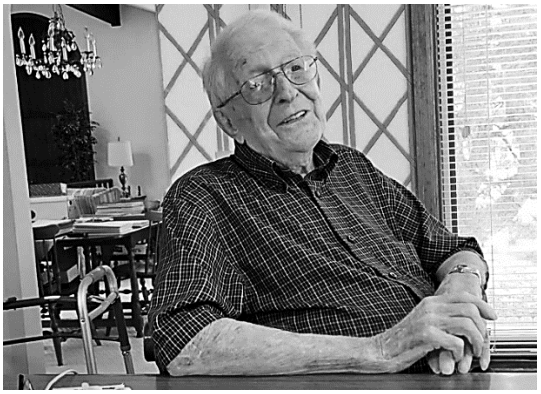
Beginning about 1968, I had an interesting carpool once a month. Ben Leonard and I lived in Golden, and Ogden lived in West Lakewood, so we carpooled to the Colorado Scientific Society meetings at the Petroleum Club in Denver. In later years we were joined by Paul Sims and Jim Elliott. One particular trip comes to mind. In the spring of 1973, Survey employees received a memo saying that we must pay overtime for field assistants. This rule came at a time when it was customary for field parties to work dawn to dusk six days a week—and sometimes seven. It happened that this edict was announced on the day of our monthly Sci Soc meeting. I was driving that evening, and for a treat I took Ogden, Ben, and Paul (Jim was not with us) in my 1941 Cadillac, which had ample room for the three to enjoy stretching out in the back seat. The overtime memo caused a seismic reaction from my passengers. The gist of their fulminations was that it was an absolute privilege for young geologists to work 90 hours a week during the field season because they were rewarded by learning a stupendous amount of science from their elders. These "old guard" complained all the way to the meeting, and they were still grousing about this bureaucratic bombshell as we drove home.

After my move to Reston in 1975, I always went to visit Ogden when I was back in Denver. I got some very good Survey history during those visits. One story that stuck with me was from the summer of 1951, when Dallas Peck was Ogden's field assistant mapping the Holy Cross quad in central Colorado. After an initial day or two of orientation, Ogden assigned Dallas to his own traverse, which went up over a high ridge and made a loop back into camp. Ogden warned Dallas about an apparent short-cut across a snow cornice and told him the snow was too rotten to support him. Also, he instructed him to return to camp by 4:30, as it got dark quite early at their camp. So 4:30 came, 5:30, 6:30, still no Dallas. When it was getting quite dark, he dragged into camp in terrible condition, a bit bloody,

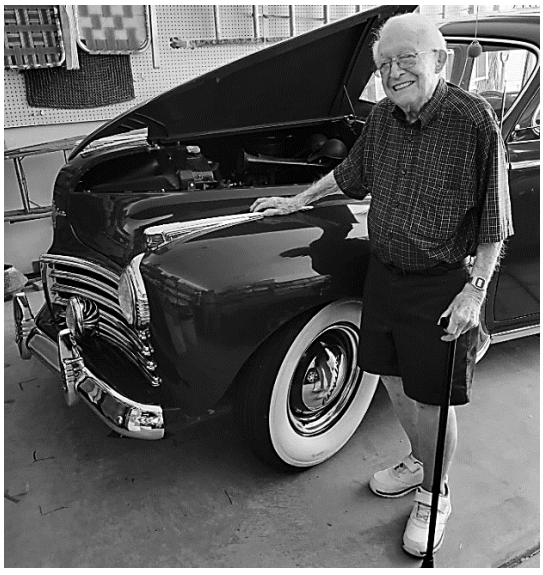
with mud all over him, torn clothes, and a bent pack frame. Ogden said, “You took the short-cut, didn’t you?!,” to which Dallas only groaned and headed for the fire to ease his aching muscles and bones.

Visiting Bob Davis
John Keith

In August 2023, I had the pleasure of spending several hours with Bob Davis at his home in Westminster, Colorado. Bob turned 99 on Oct. 30. His memory is excellent, and we had a lot of fun recalling Survey stories and characters we have known. His humor still has that sharp edge that I have been enjoying since 1961. Bob joined the Survey in 1951, and he retired in 1990. The second photo is of Bob with his son’s 1941 Chrysler.



Photographs by John Keith.



My Alaska Years
Bill Silberman

In early 1974, I was asked by Ed Mackevett, a senior member of the Branch of Alaskan Geology, to join his field party in the summer at McCarthy, Alaska. Ed was completing the McCarthy quadrangle AMRAP study that included mapping and sampling the Kennecott massive sulfide copper deposits. These deposits, hosted in limestone, were mined in the early 1900s and were very high grade and of controversial origin. George Lynn, a student at New Mexico Tech, was doing a Ph.D. geochemical study of the deposits. Gus Armstrong of the USGS, an expert on carbonate rocks, Gary Winkler, Ed’s assistant, Ed, George Lynn, and I mapped and sampled the mines, which at the time were accessible to over 1,200 feet depth. I applied K-Ar geochronology, stable isotope analyses, and petrographic analysis to samples from the mines and to the basaltic rocks that underlie the deposits. The basalts were generally considered the source rocks for the copper found in the deposits. My K-Ar geochronology and stable isotope analyses showed that the basaltic source rocks underwent low-grade metamorphism coincident with the accretion of the Wrangel terrane to southern Alaska at the same time that granitic intrusions were emplaced. I published a report on this in a symposium volume in 1980. Ed and his crew completed the McCarthy AMRAP study, and Gus wrote several papers on the limestone host rock and its relation to the formation of the copper deposits. A final report on the Kennecott deposits was completed in 1999, and it was published in a special Alaska issue of *Economic Geology*. In that report, Ed Mackevett developed a model for formation of the deposits based on all of our work, including my interpretation of the stable isotope data and the composition of the basaltic source rocks. We suggested that the deposits formed during the accretion process of the Wrangel terrane.

During the McCarthy summer field work, I was given a short assignment to work with Dennis Cox on

porphyry copper and molybdenum deposits in the adjacent Nabesna quadrangle, which was another AMRAP project led by Don Richter. Dennis was a porphyry copper expert and went on to be a leader in the USGS development of ore deposit models, along with Don Singer. I was asked to provide isotopic and geochemical data for the porphyry study in Nabesna. Dennis was one of the nicest people you could meet, and I liked him a lot, but strange things seemed to happen every time we worked together. The first instance was at the Orange Hill prospect where we worked out of a mining company camp. Dennis and I started working our way into the zone of mineralization when suddenly Dennis saw in the distance a grizzly bear with two cubs. Dennis decided he needed a picture of the bears and started walking toward a hill that the bears were climbing. I tried to stop him because messing with a bear with cubs is not a bright thing to do. However, he was persistent. He started climbing the hill from the other side, and I could see both Dennis and the bears approaching the top of the hill from opposite sides. I don't remember how far they were, but I sat down with my rifle, an 8 mm Lebel cavalry carbine, and aimed at the top of the hill. Finally, either Dennis stopped and came back, or the bears turned around and left. I don't remember which. I was really angry, because I did not want to shoot a bear, but it was all OK in the end.

The next Dennis episode occurred in 1977. I was assigned that year to work on another AMRAP quadrangle on the Alaskan Peninsula. I think it was the Chignik quadrangle, under the direction of Bob Detterman. I was there to work with Ric Wilson, a recent hire who was starting to do K-Ar studies of Alaska mineral deposits. Ric has been a friend and colleague for decades and is also one of the brightest people in the organization. His fields of expertise are many, and always in depth. Dennis was also going to the field to work on the many porphyry prospects in the region. We were to travel together from Anchorage to Chignik Lagoon on the north side of the Alaskan Peninsula to join the field party based at a fisherman's outfitter camp. We left Anchorage for Sand Point early in the morning on Reeve Aleutian Airlines. However, we ran into really bad weather and could not get near Chignik. Instead, we landed at an airport on the south side of the Peninsula and were told we would have to fly back to Anchorage and wait until the weather cleared and try again the following day.

We decided not to do that, got off at the airport stop, and collected our luggage. I checked around the airport to see if we could charter a flight on a small plane to get us up to Chignik. The weather had cleared, but the wind was very strong. We found a plane and a pilot who was willing to take us north. This was a high wing, single engine small plane and the wing struts were wrapped in duct tape. Most of the instruments in the dashboard were gone, leaving empty spaces. It was the only plane available, so we got in with our luggage and took off. It was a very choppy flight. We got up to Chignik Lagoon and looked for a place to land, but the wind was so strong we could not get down to the airport near the cannery. When we tried to descend, we actually were increasing in height 500 ft per minute. We finally were able to descend but ran the length of the runway on one wheel with the other off the ground. We finally deplaned, but we still had to get to the camp, which was around a headland that projected out into the ocean. The only way to do that was by boat. We asked around and found an Aleut with a small boat, an aluminum, outboard skiff, who was willing to take us there. Dennis and I put our stuff in the boat, and the Aleut and his wife got in, and we started. As soon as we got out towards the open ocean, we shipped some water, and everything got wet. We got around the headland and turned into the bay where the cannery was, after which the engine stopped. It was out of gas. Luckily there were oars, so I rowed the boat to the shore. Evidently someone at the camp saw the boat land and came to pick us up. I paid the Aleut, and

Dennis and I went off to the camp to dry everything out. Ric Wilson was there, and we spent a couple of weeks looking at prospects and camping out in the bush. Other than almost slipping down a snow field for hundreds of feet, the rest of the trip was uneventful.

I eventually joined the Alaska Branch and worked summers in Alaska for about 10 years and was fortunate to work in many parts of Alaska. I provided isotopic analyses, K-Ar and Rb-Sr geochronology, and mapped mines and prospects for resource assessment in many AMRAP projects, and geochronological and geochemical studies in several regions of Alaska. Again, as in the Lower 48, I got to collaborate with many of the senior Alaskan geologists of the branch, as well as several mining company exploration groups. I worked with: Bela Csejtey on geochronologic and geochemical studies of the Talkeetna and Talkeetna Mts. quadrangles; Art Grantz on the geologic and tectonic history of the Matanuska Valley; Dave Hopkins on dating the young volcanic rocks and the older granitic intrusions on the Pribilof Islands; Don Grybeck on the Survey Pass quadrangle in the Brooks Range; Bob Chapman and Bruce Reed on determining ages of igneous and metamorphic rocks of the Ruby Geanticline region; Bill Patton for 2 years on the Medfra quadrangle AMRAP project; Gary Winkler on the Valdez and Cordova AMRAP projects; and Steve Nelson, Marti Miller, Julie Dumoulin, and Alison Till on a mineral resource study of Prince William Sound. The years in Alaska were productive and exciting, with many adventures, too numerous to describe. In early 1982, I resigned from the USGS, joined the Anaconda Minerals Company, and started a whole new career.

Alaska Vignettes

Anyone who has worked in Alaska as long as I did had various kinds of adventures. Generally, these have to do with bears, helicopters, being marooned in the bush, and problems on the water. I have had all of them.

Bears

In 1979, I was at Medfra, Alaska, working on the AMRAP project and mapping the Mystery Mountains tin-porphyry system. My field assistant Joanne Bentz and I had just landed on a ridge and the clouds moved in. When the clouds cleared, I noticed a large black bear sitting down just off the ridge looking at us. Joanne had a shotgun, and I pulled it out of her pack and pumped a shell into the chamber, but I had my finger in the trigger guard and as soon as the shell went into the chamber, the gun went off right by my ear. Luckily, no damage, but the bear looked at us, and slowly got up and walked away. I suspect he thought, "damn fools, liable to hurt themselves." Later, as we ate lunch about 50 yards or so away, a large grizzly was looking right at us. I noticed as we walked away, after dropping our lunch, that the bear did not go for the food but started following us. I decided we should walk up the nearest hill, because if the bear charged us, it would be better to shoot him as he came up hill. He pretty well kept the same distance from us, as we went up a hill. Finally, he stopped, then walked away in another direction. We may have smelled pretty bad as showers were not an easy option at that field camp.

On the Water

When working on the Survey Pass quadrangle AMRAP project in the southern Brooks Range, I was collecting samples of igneous rocks for K-Ar and Rb-Sr isotopic dating. We usually left and returned by helicopter from the field camp. The area was beautiful, on the shore of Walker Lake, a quite large body of water. One day we decided that we could take our collapsible outboard boat down to the lake to do some sampling, and we could fish on the way back. My field assistant got in the boat and motored south down the lake for perhaps a few miles or so, and then drove the boat into the shore and got out to do our sampling. The boat was made of canvas, with a wood framework that folded when not in use. We got our samples and started back to camp in the boat. We got a few yards from the

shore and the boat started sinking. Evidently, when we drove it up on shore, we ripped part of the canvas on the bottom, and it let in the water. We quickly turned back to shore and landed. I radioed back to camp and told them what happened. However, the radio could not reach the camp because the distance was too great. I had told the group where we were going, so if we did not make it back they would come for us. We took our wet clothing off and sat in the sun to dry out.

A few hours later, the camp float plane came to find us and take us back. We disassembled the boat and put it and the motor in the plane, then got in and flew back. We landed and came close to shore. As we unloaded the plane, my really good reflex 35 mm camera fell in the water. I jumped in the lake to retrieve the camera, but lost my glasses in the water. I had a spare pair of glasses, but not as good as the ones I lost. The following morning, I tried diving in the lake to find them, but all I got was hypothermia from the extremely cold lake water.

Helicopters

The bad helicopter:

It was in 1978, I think, that I was working on the Valdez quadrangle AMRAP project for Gary Winkler. I had two field assistants—Bill Pickthorn and Leda Beth Gray. While working above the Valdez Glacier, the weather started to close in on us, and visibility dropped to nothing. I called the field camp and told them it was not safe to fly the helicopter to us. I was overruled and they came up and found us when there was a break in the clouds. As we flew back to camp, we found that this particular helicopter had a problem. It would be flying, and all of a sudden it would lose power and have to land. After a while, it would recover power, and we could take off again. We headed back to camp but after a few minutes the helicopter lost power, and we had to land on a ridge above the Valdez Glacier. The helicopter regained power, so we took off again, and started to descend, but flew into a total whiteout below the ridge. After what seemed hours, but was probably seconds, we broke out under clouds and over the glacier and flew back to camp. The pilot, Bill, and I went to the bar at the roadhouse and we sat there drinking until about 2 a.m., after which we had to help a local resident home because that person had way too much to drink. Needless to say, there was no field work the next day.

The best pilot:

I was assigned in 1980 and 1981 to work on the Mineral Resource Assessment of the Prince William Sound region. I was mapping and sampling mines and prospects in the Hope-Sunrise district, Northern Kenai Peninsula, and the Girdwood district. The mines were in very steep terrain; the only way to get to them was by helicopter. Landing on mine dumps on the sides of steep hills is not an easy thing to do. Ralph Yetka was an ex-Coast Guard pilot who had flown off ice breakers and cutters. He was the steadiest pilot with whom I'd ever flown. He could drop me off and pick me up from places that I could not even stand on. One procedure we used a lot was for me to call him in by radio to some really nasty spot. He would come in to the landing area and put a skid on whatever stuck out or up, like the end of a dump or an outcrop of rock, and I would grab hold of a skid; as he took off, I would reach up, open the helicopter door, and climb into the cabin. That, with a pack full of rocks and a board with maps! Ralph was by far the best pilot of all the ones I met. At one point, Barney Berger, the chief of the geochemistry unit that analyzed all our samples, wanted a tour of some of the mines we were working on. When we were flying the area, I picked a mine to land on, tapped Ralph on the shoulder, and pointed at the dump. He started descending toward it, and Barney said, "You want to land there?" I had total confidence in Ralph, and never did he refuse an LZ, no matter how ridiculous it was. But, not wanting to freak Barney out, we moved somewhere else. Sadly, a couple of years later Ralph's helicopter with geophysicist Frank Frischknecht aboard was hit by an airplane as they were coming in to Ketchikan, Alaska. There were no survivors.

On the Water, Again

In 1981, part of my work on Prince William Sound was done from the RV *Don J. Miller*. We had a helicopter on board, and also used 14-ft aluminum skiffs with outboard motors for shoreline mapping and sampling. Marti Miller was my field assistant. She is now chief of the geology office of the USGS Alaska Science Center. We were due to work along the shore on the southern Kenai Peninsula. The weather was windy with rain squalls. We put on survival suits, got into the boat, and started off. The suits are very hot and uncomfortable, so after a while we took them off, as we were getting as wet inside them as we would have without them. Marti was piloting when we decided to stop on the shore of an island in Seward Bay. Marti said, "I can land this, and I have a lot of experience." "Go ahead," said I. She landed on shore, and immediately a wave came and swamped the back of the boat. To get the water out, I backed the boat off the shore, went out a ways, pulled the drain plug in the back, and drove it forward. That drained out the water, so then you put the plug back in. We then proceeded out into the bay to get to the next island and were immediately surrounded by a pod of killer whales. The male of the pack was huge and must have had a 10-ft dorsal fin. There is nothing cute about being in the middle of a pack of killer whales in a boat half the size of a small one. Well, eventually they swam off, and we were left alone. I did not have my camera, but would probably have been too frightened to take a picture anyway.

My Alaska years were a tremendous learning experience, and I was lucky to meet and work with a lot of great USGS people.

Memorials

Duane E. Champion, 1949–2023

Duane E. Champion, long-time paleomagnetic guru at the USGS California Volcano Observatory (Volcano Science Center) in Menlo Park, passed away suddenly of natural causes on January 11, 2023. Duane was born in 1949 in Greene, New York. He earned his B.A. and M.A. degrees in geology at SUNY Buffalo and in 1970 had a NAGT (National Association of Geoscience Teachers) internship at the USGS in Flagstaff. In 1980, he earned a Ph.D. in geology at CalTech under the guidance of Gene Shoemaker. While still a graduate student, Duane joined the USGS in Menlo Park where he remained until his passing.

Duane was most noted for his enthusiastic collaboration with geologists throughout the western United States and Hawaii, applying the principles of paleomagnetic secular variation to the discrimination of volcanic units and thus to the elucidation of volcanic history. Notable areas where his investigations provided essential constraints on the interpreted volcanic history include the Cascades Volcanic Arc in northern California (the Lassen Volcanic Center, Medicine Lake Volcano, Mount Shasta and the arc between Lassen and Shasta/Medicine Lake), in Oregon (Crater Lake and central Oregon including Newberry Volcano), and in Washington (Mount St. Helens and

Mount Baker). Duane also supplied critical data for studies of Kilauea, Hualalai, and Mauna Loa Volcanoes in Hawaii, as well as for many other volcanic regions throughout the western United States. He carried out a decades-long cooperation with the DOE Idaho National Laboratory, supplying paleomagnetic data that elucidated the stratigraphy and hydrology of the basalts of the Snake River Plain. In Nevada, his paleomagnetic conclusions were critical to evaluating volcanic hazards to the proposed nuclear repository at Yucca Mountain. Duane's huge paleomagnetic data set acquired over decades of field work allowed him to make major contributions to the record of Holocene paleosecular variation, summarized in a 2002 *Journal of Geophysical Research* review paper coauthored with Jon Hagstrum.

My personal memories of Duane are not just his scientific accomplishments and his support of USGS and DOE activities. I so recall his booming voice echoing down the hall in Building 2, as well as his entry to my office with the pronouncement, "Patrick, we need to talk." I remember how happy he was explaining his results and how undaunted he was by the challenge of drilling paleomagnetic cores in the field regardless of getting his shirt and pants covered with mud that spewed backward as the drilling progressed. And how much he enjoyed his huge breakfasts at the Kopper Kettle Café in Chester, California.

Duane was a vibrant and stimulating presence for decades at the USGS in Menlo Park. We miss him greatly.

—Patrick Muffler

H. Edward Clifton, 1934–2023

Eminent sedimentologist and long-time Survey colleague H. Edward (Ed) Clifton died early this year in Monterey, California. He had studied under F.J. Pettijohn at John Hopkins and then in 1963 joined the U.S. Geological Survey in Menlo Park. Assigned to evaluate the old gold placers along the Oregon coast, Ed parlayed that into a long-term project to study nearshore marine sedimentary deposits and environments, and soon added scuba to his kit of tools.

In 1969 he was selected to serve as one of four aquanauts in the Tektite I experiment and then as a crew chief in 1970 on Tektite II, in which together he spent nearly 3 months living and working on the shallow seafloor in the Virgin Islands studying the interaction of marine organisms with physically produced sedimentary structures. His roles in these pioneering experiments served as a major springboard in his career-long focus on the sedimentology of nearshore modern and ancient sediments, much of it along the northern California, Oregon, and Washington coasts.

Ed served as chief of the Branch of Pacific Marine Geology (1978–81) while continuing his research and by 1982 was beginning to write summary discussions of nearshore environments and their sedimentologic characteristics. He taught a popular seminar in sedimentology at Stanford (1983–91) and served as president of SEPM in 1986–87, presiding over the difficult separation of SEPM from AAPG and its emergence as a vigorous, independent scientific society. In 1991 he left the Survey to work for Conoco, where he stayed until his retirement in 1999.

Throughout his career and into retirement, Ed retained his passion for the meticulous study of the details of sedimentary rocks, in which he was an acute and creative observer. Although he mostly focused on nearshore environments, his interests were extensive and included a career-long study of the well-exposed Paleocene rocks at Point Lobos, south of Monterey, which he brought to international attention as an example of deep-water turbidites filling a submarine canyon.

Ed's pioneering work in sedimentology emphasized coordinated study of modern and ancient sediment and defined the facies and detailed

characteristics of open-coast, nearshore sediments and their depositional environments. He earned an international reputation, received numerous awards including the Survey's Distinguished Service Award (1969), and through his generous leadership and enthusiastic teaching in the classroom and on the outcrop stimulated the careers and work of many others.

—Carl Wentworth

Donald A. Coates, 1938–2023

Donald Allen Coates was born in Sonoma, California, in 1938. His mother, Juanita (Baird) Coates, and his father, Stanley Ketchel Coates, raised Don and his older sister in Santa Rosa, California. He married twice: in 1968, to Mary-Margaret Hepp of Bartlesville, Oklahoma, with whom he had three children; that marriage ended in divorce. In 1996, he married Kathryn Addison Norman of San Francisco, who died in 2021. He died in Wheat Ridge, Colorado, in July 2023.

Although Don spent only one year at Santa Rosa Junior College, it was an important year; an instructor there introduced him to his career path—geology. He then "went east" to the University of Colorado Boulder, where in 1961 he earned a B.A. (cum laude) and in 1964 an M.S. in geology. Back in California, he began at UCLA in 1965 under John Crowell, who sent him off to southern Argentina to examine the stratigraphy of an area possibly influenced by plate tectonics, at a time when continental drift was still an unsettling idea to some. His Ph.D. was awarded in 1969 "with distinction," the first such diploma granted by UCLA's Geology Department.

He joined a U.S. Geological Survey expedition to the Antarctic in 1964 (and for that work, a hill on the Freyberg Mountains, Victoria Land [Coates Rocks] now bears his name). Immediately afterwards he spent several months in New Guinea working as an exploration geologist (and thawing out?). He joined a second expedition in 1967 while he was at UCLA, paying special attention to tillites, and a third in 1969 with Ohio State University's Institute of Polar Studies and a similar interest in tillites. That year, another team including Edwin Colbert (of the American Museum of Natural History) discovered a fossil of *Lystrosaurus*, a non-swimming relative of early mammals found also in other Southern Hemisphere regions. This exciting discovery strongly implied that present-day continents once had been joined. In 1970 he went on his final expedition, again mapping with a focus on tillites.

Beginning in the 1970s, more time was spent closer to his Denver home now that he was in the USGS Coal Branch. He spent several summers mapping in the southern Powder River Basin of Wyoming as new coal mines were opened. And, because during his field season the family lived on a ranch in northeastern Wyoming, he taught his children another life skill: check for rattlesnakes before jumping out of the trailer-house door! Eventually he became interested in clinker, a rock baked or otherwise changed by the high temperatures of adjacent, natural coal-seam fires. His 30-year collaboration with Ed Heffern (Bureau of Land Management, Wyoming) produced a trip to China in 2005 to speak at a coal fires conference, and in 2007 their final publication (with Charles Naeser, USGS, and Peter Reiners, University

of Arizona) on the geochronology of clinker and its effect on landscape evolution in the Powder River Basin.

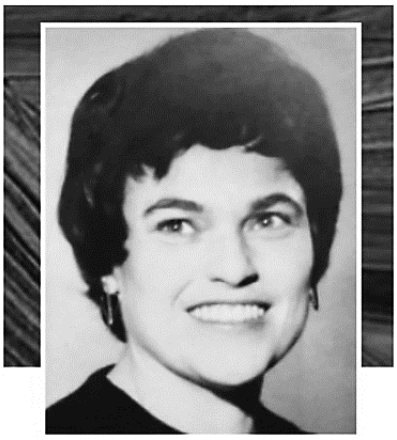
The early 1980s brought further trips abroad, as USAID and USGS helped Costa Rican geologists determine whether certain coal deposits were rich enough to warrant mining. Don so enjoyed the complex geology and the people he worked with in 1983 and 1984 that he packed up his family to go with him in 1985 (children 8, 6, and almost 2 years). He spent 10 days in the field and 4 days in San Jose with family every 2 weeks. The only serious family problem was that one child contracted scarlet fever, but Don—the family's only fluent Spanish speaker—was in town and got the child to a hospital.

In 1988 and 1989, Don spent two fall field seasons mapping neotectonic activity in the floodplain of the Brahmaputra River in lower Bangladesh. He was again doing his favorite things: solving geological problems by making careful observations at just the right places and helping his Bangladeshi counterparts do the same.

Once Don's employment with USGS ended in 1995, he headed back to his old stomping grounds. There, from about 2002 to 2012, he worked for the State of California North Coast Regional Water Quality Control Board, helping to ensure that wildfire or other debris did not get into public water supplies. He later consulted on environmental hazards and water quality issues throughout northern California.

In retirement, he and his wife traveled extensively. They trekked in Norwegian mountains, spent time in Paris, went on safari in Tanzania, travelled through the Middle East with stops in Jordan and Qatar, and feasted in India on a boat trip down the Ganges, the palaces of Jaipur, and the bazaars of Delhi. Surviving family members include his sister, cousin, children (son and two daughters), granddaughter, and Kathryn Norman's daughters, Hillary and Heather Norton.

Nancy P. Dutro, 1927–2022



Nancy Pence Dutro passed peacefully at home with family by her side on August 28, 2022. She is predeceased by her husband of 62 years, Tom Dutro. She leaves behind three children, Sarah Cormier, Christopher Dutro, and Susan Dutro, and their families.

Born May 17, 1927, Nancy had a full and adventurous life. As a child growing up in the Depression, she learned how to "use it up, wear it out, make it do, or do without" and be generous to persons not as fortunate as herself. Her father was an avid gardener, growing all the vegetables and fruits a family needed to thrive, not just survive the Depression. Her mother was a superb cook and baker who passed on her skill to Nancy. Nancy was also a master gardener. She practiced organic methods for decades before they were popular, and her compost pile was legendary. Growing far more than she could consume, she shared with family, friends, and neighbors.

Nancy attended Oberlin College where she met and married Tom. After college, they lived in New Haven, Connecticut, for the next 2 years and then moved to the Washington, D.C. area where Tom began his career with the U.S. Geological Survey. Nancy and the family, including pets, went with him to the field many summers. Nancy established quarters in a variety of challenging places, where she cooked gourmet meals over coals and campfires.

Nancy was an excellent writer and began a career in publications after her last child started school in the late sixties. In the Publications Department of the American Geological Institute, she worked on a wide variety of manuscripts including translations of Russian scientific journals. Her career began in the era of hot lead type and ended with computer publishing. She retired as AGI Director of Publications in 1980.

During the eighties and nineties, Nancy served as a free-lance editor, mainly for the Smithsonian Institution Press, producing some 15 books on many subjects, including systematics and evolution of grasses, turtles, human paleopathology, Chilean mummies, and whales and porpoises. She was a writer, editor, and a highly respected book and publications designer. She was an avid reader and had a deep respect for a well-crafted sentence.

Nancy often traveled with Tom to attend scientific conferences and field expeditions in geologically significant areas, such as China, Russia, and Australia.

Nancy was involved in the PTA and helped establish the first library at Key School. She was involved in community theater as an actress, set designer, and director. She enjoyed attending weekly yoga and strength and balance classes for the friendships as well as the exercise.

Nancy Dutro was an independent, capable, and strong woman. She was an awesome, bright, kind, caring, welcoming, and generous wife, mother, grandmother, great-grandmother, and friend to many. She will be missed.

—Excerpted from the memorial by the Dutro family

Gordon P. Eaton, 1929–2022

Gordon (Gordie) Pryor Eaton, the 12th director of the USGS, passed away in July 2022. His life's work embraced two different professional careers. One in academia, where he rose from college instructor to president of Iowa State University, and the other with the Federal government, where he rose from hydrologic field aide to director of the USGS.

Gordie graduated from Wesleyan University in Middletown, Connecticut, in 1951, and from the California Institute of Technology in Pasadena, California, where he earned a master's degree and a Ph.D. in geology and geophysics in 1957. From 1967 to 1981, he held several different positions in the USGS, including those of scientist-in-charge of the Hawaiian Volcano Observatory and as associate chief geologist in Reston, Virginia.

From 1981 to 1986, Gordie served as dean of the College of Geosciences, then as university provost and vice president for academic affairs at Texas A&M University. From 1986 to 1990, he was President of Iowa State University in Ames, Iowa. From 1990 to 1994, he served as director of the Lamont-Doherty Earth Observatory of Columbia University in New

York. From there he received the presidential appointment to serve as the 12th director of the USGS.

Gordie served on the Earth Sciences and Resources Board, the Ocean Studies Board, and the Geophysics Study Committee of the National Research Council, as well as on the Science and Technology Committee of the Gore-Chernomyrdin Commission. He was a member, then chair, of the Advisory Committee of the U.S. Army Command and General Staff College, and a member of the Council of Advisors for the World Food Prize in Des Moines, Iowa.

He received the American Geological Institute's Ian Campbell Medal, the California Institute of Technology's Distinguished Alumnus Award, an honorary doctorate in engineering from the Colorado School of Mines, and an honorary doctorate from Wesleyan University. The Texas A&M geosciences department awarded Gordie with the Michel T. Halbouty Geosciences Medal, and lowa State University named a new campus building in his honor. He is listed in Who's Who in America, Who's Who in the World, Who's Who in Science and Engineering, and in American Men and Women of Science.

Following retirement, Gordie and his wife, Virginia, took up residence in Coupeville, Washington, but later moved to College Station, Texas, in 2003, after having moved there for the first time in 1981. He moved to the adjoining city of Bryan, Texas, in 2013.

He travelled extensively throughout his adult life, frequently on business, but many times with Virginia for education and (or) pleasure, visiting a total of 27 countries. He took up painting in retirement and produced more than 80 pictures, many of which are on file at Arbor Oaks at Crestview in Bryan. Gordie was preceded in death by his parents, Colman and Dorothy Eaton, and by his wife, Virginia. He is survived by his adult children, daughter, Gretchen Maria Eaton Rodriguez and her husband, Juan M. Rodriguez of Bryan, Texas; son, Dr. Greg M. Eaton and his wife Shari of Sissoville, West Virginia; and two close nephews, Dr. Tony Brown of Reading, Massachusetts, and Adam Brown and his wife, Grace Vee of Mt. Kisko, New York.

— A more extensive memorial is on the Iowa State University website.

Robert O. Fournier, 1932–2023

Bob Fournier (left) and Don White at the Y3 drilling site at Pocket Basin adjacent to Ojo Caliente, Lower Geyser Basin, Yellowstone National Park in 1967. USGS photo.

USGS geologist and geochemist Robert O. Fournier passed away in January 2023 in Portola Valley, California. Bob received an A.B. degree from Harvard in 1954 and a Ph.D. in geology and geochemistry from the University of California at Berkeley in 1958 with a dissertation on the porphyry-copper deposit at Ely, Nevada. He then joined the USGS in Washington, D.C., where he worked with George Morey studying the solubility of silica in water as a function of temperature, a theme that would persist throughout his long and productive career.

Bob is best known for his leadership in developing various methods for determining subsurface reservoir temperatures from the chemical analysis of hot-spring waters, based on both laboratory and field investigations, primarily in Yellowstone National

Park. His work in the park began in 1962 when he served as a geothermal consultant to the National Park Service during bridge construction and road relocation at Beryl Hot Spring. After moving in 1962 to the USGS office in Menlo Park, California, he joined a group led by Donald E. White to carry out research drilling in hot-spring areas of Yellowstone National Park. These unique and seminal investigations provided ground truth for the subsurface temperature and pressure conditions beneath Yellowstone hot springs, with bottom-hole temperatures reaching 240 °C (464 °F). Bob developed equipment and procedures to measure pressures and to sample water and gas from these wells, he maintained and ultimately decommissioned the wells, and he continued to explore the geochemistry and dynamics of the Yellowstone hot-spring systems. His Yellowstone investigations, which continued throughout his career, provided the basis for his achievements as a world-renown geothermal expert. In Bob's words, Yellowstone was his "cornerstone of reality."

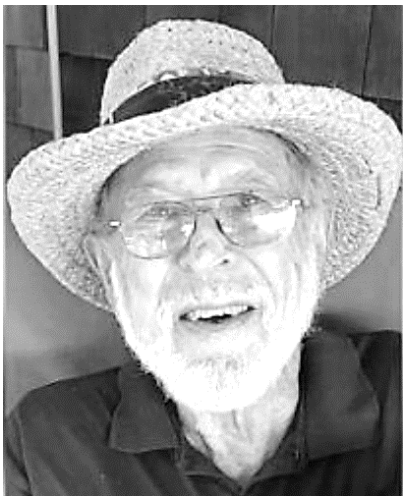
Bob's field work at Yellowstone was closely integrated with his ground-breaking research into chemical techniques to estimate geothermal reservoir temperatures and other characteristics. Notable were his development of the Na-K and Na-K-Ca geothermomenters, which used the chemical composition of hydrothermal water measured at the surface to estimate the temperature of the reservoir of hydrothermal fluids beneath the ground. These tools, along with his silica geothermometer, have been adopted around the world to better understand hydrothermal systems. Bob also pioneered the understanding of models to estimate the temperature of the hot-water component in mixed waters and to predict underground conditions in hot-spring systems—for example, whether a reservoir was steam or hot water. He also developed a better understanding of the processes related to movement of fluid from plastic into brittle rock in the transition zone between magma at depth and the overlying hydrothermal systems.

Bob was a leader in major international geothermal efforts. He chaired the U.S. Organizing Committee for the 2nd United Nations Symposium on Geothermal Resources in 1975, a two-week meeting that drew some 1,100 participants from around the world. He also led advisory panels of international experts overseeing development of the Miravalles geothermal field in Costa Rica and several geothermal fields in El Salvador. He served on many committees overseeing continental scientific drilling activities within the United States and elsewhere—efforts that led to a better understanding of the subsurface conditions in active volcanic areas. Bob's accomplishments were recognized by election as a Senior Fellow of the Society of Economic Geologists, an honor limited to 1 percent of SEG Fellows.

For more insight about Bob's career and perspective check out the excellent interview filmed a few years ago at https://www.usgs.gov/media/videos/inside-usgs-no-3-robert-fournier-yellowstone.

—Patrick Muffler

John Hathaway, 1927–2023



John Cummins "Jack" Hathaway, 95, a resident of Falmouth for the past 61 years, died peacefully in his

sleep at home on September 8, 2023.

Jack was born on November 23, 1927, in Hudson, N.Y., to Thomas H.M. Hathaway and Harriet Cummins Hathaway. He attended MIT from 1945 to 1947 in the Marine Engineering Department, and Colgate University from 1947 to 1950, where he earned an A.B. degree Magna cum Laude, with high honors in geology, and was a member of Phi Beta Kappa. He received his M.S. in geology in 1952 at the University of Illinois at Champaign.

During undergraduate and graduate school, he was involved in many extracurricular activities including ROTC, Glee Club, Crew team, Outing Club, Glider and Flying Clubs, Ski team (co-captain), the National Ski Patrol, and he played the tuba in the football marching band. He earned his private pilot rating and license for single engine planes and gliders. During the summers of 1948–51, he worked as a field assistant for the U.S. Department of the Interior, Bureau of Land Management in Alaska, and for the U.S. Geological Survey (USGS) in South Dakota, Wyoming, and Montana.

Jack joined the USGS in 1952 as a geologist specializing in clay mineralogy and electron microscopy and was the Chief of Sedimentary and Petrology Laboratories in Maryland and Colorado. In 1962, he was one of the founding members of the USGS Coastal Marine Geology Science Center in Woods Hole, Massachusetts. His career in marine geology included several scientific cruises along the Atlantic Continental Shelf. He also participated in dives—up to 1 mile deep—in the Research Submersible D.S.R.V. *Alvin*. His oceanographic research included cruises for the Deep Sea Drilling Program on the U.S. continental shelf and the Red Sea with visits to Ethiopia, Saudi Arabia, and Djibouti. Jack was the Chief Scientist for the Atlantic Margin Coring Project of 1976 on the vessel *Glomar Conception* and a delegate to the 1980 NATO conference in Portugal on seafloor slumping. In 1983, he was also an advisor to the Geological Survey of Bangladesh. From 1986 to 1989, Jack was the Chief Consultant for the USGS-Asia Development Bank contract in Bandung, Indonesia, to assist the Indonesian Government in establishing their Marine Geological Institute. After returning to the States, he retired in 1994 after 42 years of service and maintained Scientist Emeritus status until recently.

During his USGS career, he traveled as a guest lecturer and consultant in clay mineralogy to England, Scotland, Germany, Switzerland, Portugal, and Bangladesh. He published 80 scientific papers and abstracts and held professional memberships and offices in many national and international mineralogical societies.

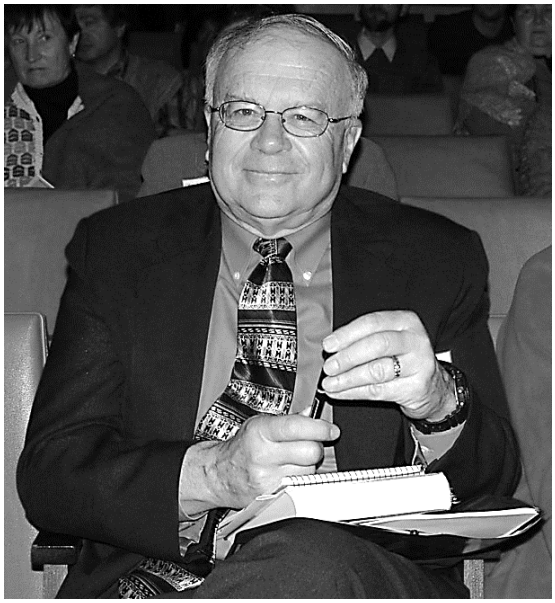
Jack married Ilene E. Everhart of Gypsum, Kansas, R.N. and Director of Nursing, in 1951 in Champaign, Illinois, and together raised four children. They were married for 64 years until her passing in 2015. After moving to Falmouth in 1962 from Denver, they were active members of the First Congregational Church in Falmouth where Jack served as choir member, deacon, trustee, treasurer, and chairman of the pipe organ committee. He was responsible for the acquisition of the magnificent Austin pipe organ that is still in use today.

Starting at age 3, summers were spent visiting his grandmother at her Highlands cottage in Oak Bluffs, Martha’s Vineyard. He first learned to sail with his friends in Vineyard Sound, which deepened his lifelong love of the ocean and sailing. His family also shared his love of the Vineyard, sailing, and the cottage for the past 71 years.

Jack loved to travel personally with his wife and family and professionally. He visited more than 39 countries, all continents except Antarctica, and made four round-the-world trips. He was also an avid downhill skier until the age of 87.

—Deb Foster

Thomas P. Miller, 1936–2022



Tom Miller at workshop dedicated to the 50th Anniversary of the 1956 Eruption of Bezymianny Volcano in Kamchatka. March 2006. Photo by A. Sokorenko (IVS).

Our friend and colleague, Tom Miller, died September 3, 2022, at the age of 86. Tom retired from the USGS in 2002 following a distinguished 41-year career; he remained Emeritus until 2018 when he moved with his wife, Shirla, to Arizona; Shirla passed away in 2021. Tom grew up in the northern Minnesota city of Duluth. He earned a B.Sc. degree in geology and mining engineering from the University of Minnesota at Duluth in 1958 and an M.Sc. degree from the University of Minnesota at Minneapolis in 1961; those years included a field season in Antarctica. In 1960, Tom passed the USGS national qualifications test and was offered a job either on the Kentucky Mapping Project or the Nevada Test Site; Tom chose Kentucky. After 2 years working in Kentucky, he transferred to the Branch of Alaska Geology (BAG) in Menlo Park, California. From 1963 to 1967, Tom served as geologist on the Hughes-Shungnak project, with an emphasis on igneous rock petrology. From 1967 to 1972 he served as Chief of the Hogatza Heavy Metals project, studying mineralization on the west coast of Alaska.

While working full-time, Tom entered Stanford University, earning a Ph.D. in 1971; his specialty was plutonic rocks. However, he soon grew more interested in magma that breached the surface and was funded by the Geothermal Research Program to inventory and study hot springs, which led him into the Volcanic Hazards Program. For 6 years he partnered with Robert L. Smith and learned the basics of volcanology, specifically explosive processes that produced pyroclastic flows. In 1972, Tom moved to the BAG Anchorage office, and in 1975 he was put in charge of the office. Tom began working on late Quaternary volcanoes on the Alaska Peninsula and in the Aleutian Islands in 1973, studying petrogenetic and emplacement processes at more than nine Aleutian caldera centers. At that time, very little work had been done on most of these volcanoes. Important results of his work were the dating of the major catastrophic caldera-forming eruptions, the identification of all major volcanic centers, and the increase by over 50 percent of the known Holocene volcanoes that erupted more than 5 km^3 of material in individual events. The refined chronology and volume became invaluable in the response to volcanic eruptions.

Tom also carried out studies on thermal springs in non-volcanic areas of Alaska and devised a still-accepted model for non-volcanic thermal springs in Alaska. As part of a regional mapping program in west-central Alaska, Tom identified a major belt of ultrapotassic alkaline intrusive complexes that extends more than 1,300 km across western Alaska and into Russia.

In 1980, the USGS decided that BAG should be headquartered in Anchorage, rather than in Menlo Park, and that Tom would be BAG Branch Chief. Some younger members of BAG chose to transfer up to Alaska, and Tom began hiring a dozen new geologists. Tom led the Alaska Mineral Resource Appraisal Program (AMRAP) and played a seminal role in expanding USGS geoscience and mineral-resource expertise in Alaska. Tom's recruitment

efforts included a cohort of excellent women scientists, a bold step forward for gender diversity in the USGS. As BAG Branch Chief from 1980 to 1985, Tom oversaw and led geologic mapping projects throughout Alaska. He also led the move of BAG from three offices to a single one on the campus of Alaska Pacific University. While overseeing BAG mineral-resource appraisal work, Tom continued his studies of Alaska volcanoes. In March 1986, Augustine Volcano erupted and ash began wafting over upper Cook Inlet and the Kenai Peninsula, disrupting air traffic and commerce. At the time, there was no USGS volcano observatory in Alaska, and Tom was instructed to "act" like an observatory, wherein he was to be the federal representative for the response. Thus, he and colleagues mounted a month-long aerial surveillance of the activity and distributed information to Federal, State, and local government as well as to media.

Following the Augustine eruption, Tom met with the University of Alaska Fairbanks and the Alaska Division of Geological and Geophysical Surveys to address the volcanic hazard to south-central Alaska, resulting in the formation of the Alaska Volcano Observatory (AVO) in 1988, with Tom as the Scientist-in-Charge. During the next 6 years, Tom became a leader in global efforts to reduce the risk of volcanic ash to aviation in the wake of the 1989–90 Redoubt Volcano eruption—which produced an ash cloud that nearly brought down a Boeing 747-400 airliner due to ingestion of ash into the engines. This vital work took him to the Far East of Russia in the 1990s where he co-founded the Kamchatka Volcano Eruption Response Team (KVERT). To this day, KVERT works closely with AVO to mitigate the risk of volcanic ash to aircraft in the North Pacific air route corridor. Tom's work with Russian colleagues to establish KVERT was acknowledged in 2002 when he was awarded the Alaska-Siberia Lend-Lease Award.

Tom played a major role in addressing the hazard of volcanic ash to aviation, serving as a USGS consultant to airlines, aviation groups, and government agencies. Tom and Tom Casadevall co-authored a paper on volcanic ash hazards to aviation, considered to be the standard reference on this topic. Over the course of Tom's career, he produced over 139 peer-reviewed publications. One of his most often cited was the 1977 *Geology* article co-authored with Robert L. Smith: *Spectacular mobility of ash flows around Aniakchak and Fisher calderas, Alaska*. Tom's geothermal work was summarized in the 1994 GSA *The Geology of North America*. Tom was the lead editor of the JVGR volume documenting the 1989–90 eruption of Redoubt Volcano, and he had several significant papers in the USGS Bulletin documenting the 1992 eruption of Spurr Volcano. Tom also was instrumental in the creation of the Level of Concern Color Code system of describing volcanic activity, a scheme now utilized worldwide by volcano observatories.

Tom accumulated a rich list of awards and honors over his career, including the Antarctic Service Medal, the USGS Meritorious Service Award, and a Shoemaker Communications Award. Tom's contributions were a major factor to AVO receiving in 1996 the Vice President Gore "Hammer Award" for AVO's response to volcanic hazards to aviation. Finally, Tom received the Distinguished Service Award, the highest award of the U.S. Department of the Interior. After retiring in 2002, Tom continued with AVO as Scientist Emeritus for 16 years. His vast knowledge of Alaska's volcanoes and regional geology and his experience responding to eruptions across decades of technological and organizational change made him a valued resource to the new generations of AVO staff.

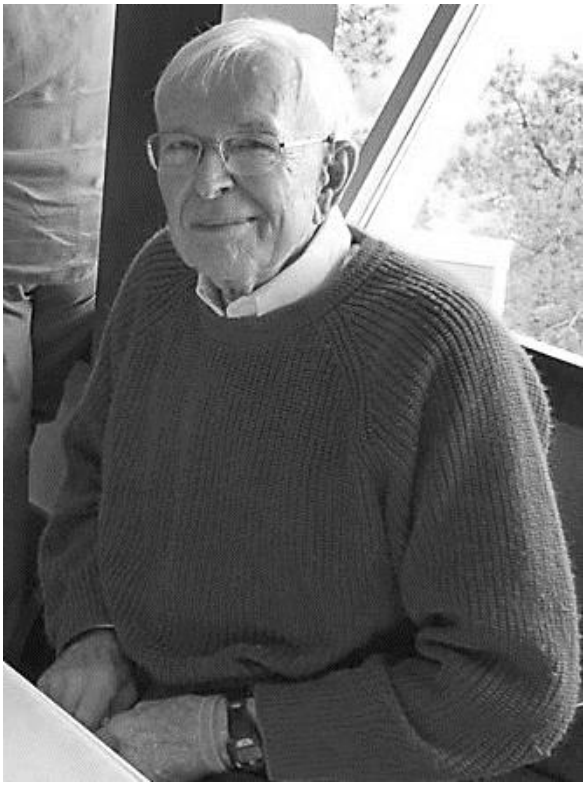
There are endless wonderful Tom Miller stories, from his unexpected overnight stay inside Veniaminof Caldera, to co-creating the aviation color code on a napkin, and scaling the 4,700-m-high Klyuchevskoy Volcano with Russian colleagues. We remember

Tom's commanding presence and decisive leadership. Tom has left a lasting and profound mark on the USGS, Alaska geology, volcano risk mitigation, and many careers. We note his passing with affection and fond memories.

Two, 1-hour video interviews of Tom Miller (2015, 2016) are archived at the USGS Office of Communications; Don Becker, USGS Video Archive Manager/Archivist, becker@usgs.gov, (720) 891-8693.

—Game McGimsey, Patrick Muffler, Tina Neal, Marti Miller, Steve Nelson, and Julie Dumoulin

Paul P. Orkild, 1928–2022



Photograph by John Keith.

Paul passed away on August 16, 2022, at the age of 94. He was born Paul Preben Orkild on May 11, 1928, in Evanston, Illinois. He grew up nearby in rural Northbrook, and he was the second eldest of five children. Paul graduated from Northbrook High School in 1946 and attended the University of Illinois at Navy Pier, where he met Barbara in a geology class. After a brief romance, they married on August 21, 1951. The couple then moved to Urbana, Illinois, where Paul finished his B.S. degree in geology at the University of Illinois.

After graduation, Paul and Barb moved to Washington D.C., where Paul joined the U.S. Geological Survey and Barb was employed by Ball and Associated, an oil and gas company. Several years later the couple moved to Grand Junction, Colorado, where Paul worked on the Colorado Plateaus geology project. Paul and Barb's first child, Ted, was born in Grand Junction. In 1958 the family relocated to Lakewood, Colorado, where three more children were born, Molly, Martha, and Maggie. Paul was headquartered at the Survey's Denver center for the remainder of his career. Most of that time he was in the Special Projects Branch, and he specialized in the structural geology and tectonics of southern Nevada and the Nevada Test Site in particular.

Paul's interests included auto crossing and concours with his Porsches, running 5K races, flying model airplanes, and traveling. Paul's travels to several countries included trips to Australia to visit his daughter, Martha, and his grandchildren, Jake and Caitlin. He also did extended travel to Europe for work on USGS international projects. On another USGS project, he also spent considerable time in Kazakhstan where he befriended all the camp dogs and went through multiple KGB agents due to his daily runs on the Kazak plains. He always had a passion for his pets, especially his dogs, Cody and Daisy, who never left his side. He is survived by his son, Ted; his daughters, Molly, Martha, and Maggie; and his grandchildren, Caitlin, Hannah, Jake, Paris, and Rae Ann.

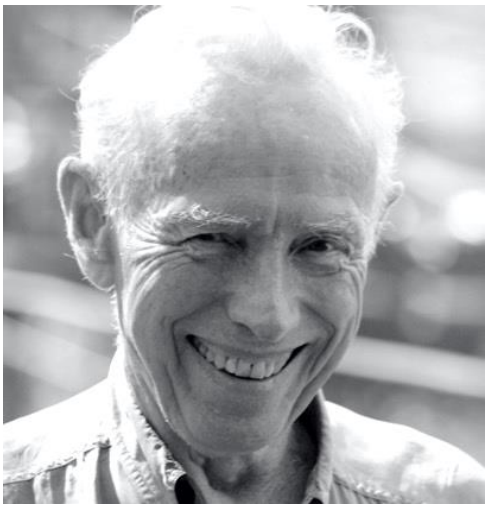
—The Orkild Family
(Paul's granddaughter, Rae Ann Orkild-Norton, is a geologist with the USGS minerals group at the Federal Center in Denver.)

Forest G. (Barney) Poole, 1929–2023

Photograph by John Keith.

Barney joined the Survey in 1954, where he spent 41 years as a geologist, then 24 years as Emeritus. He authored about 250 publications, mostly on stratigraphy of the southwest U.S. He is survived by his wife Pat, and sons David and Gary and their families. We expect to have a more extensive career history in the future.

Howard G. Wilshire, 1926–2023



Howard Gordon Wilshire's death on September 7, 2023, at age 97 closed a remarkable and impactful life. He was well known for incisive contributions to mantle petrology, lunar geology, diverse other geologic contributions, and extensive and highly effective scientific attention to environmental issues. His book *The American West at Risk: Science, Myths, and Politics of Land Abuse and Recovery* (Oxford University Press, 1998), written in retirement with Jane Nielson and Richard Hazlett, earned reviews such as " . . . one of those rare works written by people of science who—like Theo Colburn, Rachel Carson, and too few others—are impelled to be citizens as well as scientists."

Howard was born and raised in Oklahoma. His Army service near the close of World War II included paratroop training followed by duty in the Philippines. Support from the GI Bill led him to Tulsa University, Kansas University, and then the University of Oklahoma. There inspirational instructor Warren Hamilton mentored him and became a lifelong friend. He married Esther Morales while on his way to a Ph.D. at U.C. Berkeley. With this new diploma Howard joined the faculty at the University of Sydney and became a Research Fellow at Australian National University, studying diatremes and peridotite xenoliths in basalt in New South Wales. His subsequent USGS career stationed him first in Paducah for Kentucky mapping, then at Denver in the Branch of Astrogeology, and finally Menlo Park from 1967 to 1998. He and Esther had three children, Ruth, David, and Paul. He remarried in 1984 to USGS petrologist Jane Nielson. They revered their blended family of children and grandchildren.

Howard's authoritative petrologic studies of ultramafic xenoliths led the community to recognize and highly value the xenoliths as characterizing the upper mantle, and to realize the importance of veining, metasomatism, and fracturing in the mantle. Other notable research included documenting unimagined extreme eolian processes: that biscuit-sized pebbles could saltate nearly 2 meters high and build giant eolian ripples of gravel. He found that igneous flow sorting would explain some layering in granite. A Wilshire-led study of the Sierra Madera structure established the structural style of central-peak impact

craters, and he documented impact-produced carbonate breccias (Texas) and pseudotachylite veins (South Africa). He trained Apollo Astronauts on sampling strategies, and with Dale Jackson and others he documented the petrologic details of returned lunar anorthosite, norite, and impactite breccia and glass. Perceptive work on desert surficial geology shines through his papers and geologic maps.

His detailing of the geologic damage to desert soils by human activities opened major policy debates about land use. Pondering the million years or so it could take for an astronaut's lunar footprint to be erased led him to realize that scars on disturbed desert landscapes might take decades or even centuries to recover. His resulting research on desert disturbance led to many research papers and public attention on effects of recreational off-road vehicles (ORVs). He made thousands of measurements of damage done to ecosystems in the annual Barstow to Las Vegas motorcycle race while walking its 125-mile length. Harry Reasoner ran a 60 Minutes piece about ORVs in the desert. John Nakata and Howard produced a popular musical slide show about ORVs. Howard's research compelled Dan Sheridan to author Off-Road Vehicles on the Public Lands, for the Council of Environmental Quality, a division of the Executive Office of the President. Howard's message of landscape damage, in the face of heavy opposition from the American Motorcycle Association and others, elevated him to heroic status among desert naturalists. His activities raised hackles; once, he walked back to his field vehicle in the desert to find all four tires slashed. When Howard received the Meritorious Service Award in 1988 from Director Dallas Peck, he jokingly asked if this would keep him out of jail, to which Dallas replied, "I doubt it."

The following year strong governmental pushback came after Howard's private-citizen observations about ORV effects in a U.S. Forest. A threat to suspend him without pay triggered a Congressional hearing on First Amendment rights for federal workers. Howard received an apology on behalf of Congress, and ultimately became a leader of Public Employees for Environmental Responsibility. But Reston's negative perception of Wilshire haunted the rest of his Survey career, notably in the 1990s Ward Valley nuclear waste-dump affair. A Wilshire-led 3-page memo to the U.S. Department of the Interior on earth-science concerns about this desert site triggered complaints from self-interested parties, dueling Letters to the Editor in the New York Times by the USGS Acting Director and a U.S. Senator, and a lengthy National Academy of Sciences review of the concerns listed in the 3-page "Wilshire Report." The proposed waste dump eventually was abandoned.

In a USGS Bulletin, *Geologic Processes at the Land Surface*, Howard pushed the USGS to better understand and explain sensitive natural processes affected by land use. After retiring, he continued to devote his life to scholarly documentation of what he termed land abuse, and to educate the public. Until recently, he served on the Board of Directors of Earth Images Foundation, a documentary company creating educational films for national public television. Operating on the strength of excellent science, love of and curiosity about the natural world, intricate knowledge of environmental laws and policies, and the will to lead, Howard Wilshire truly made a difference in the world.

—Keith Howard, John Nakata, and Douglas Prose

Other Deaths

Neely Bostick
Rosemary Buden
Mary Margaret Coates
Sally Fouch
Glenn and Gretchen Izett
Dick McCammon
Mitch Reynolds
Betty Skipp
Will White

RETIREE PUBLICATIONS
2019 – 2023

Note: The references below are compiled from information available as of 27 November 2023. These references are "new" since the Fall 2022 Newsletter (Number 83). 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: volkno.rit@gmail.com or rtilling@usgs.gov), with cc to Jim McNeal (e-mail: jmcneal@usgs.gov) as back-up, for listing in the next Newsletter and for updating the Master List.

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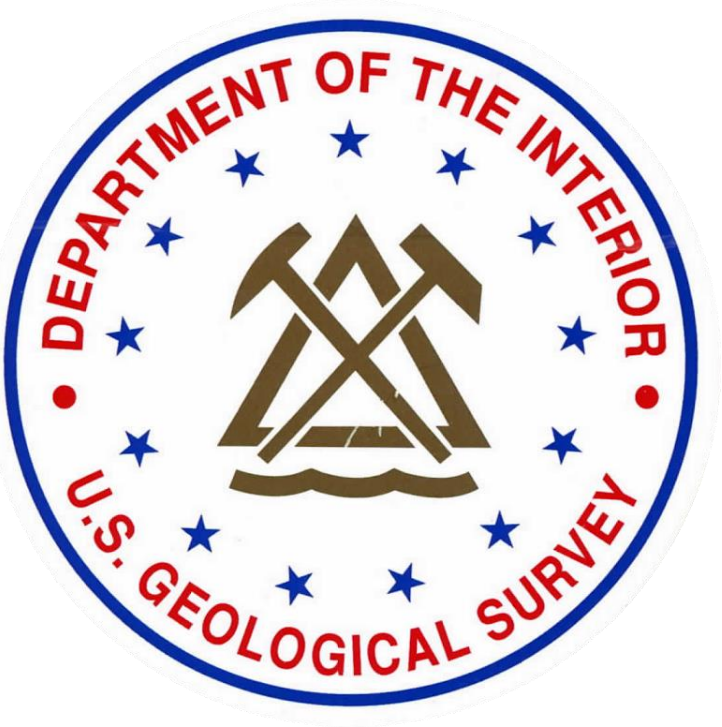
1985 Reston Pick and Hammer Spring Tableau. The theme derives from a famous address by George Otis Smith, "Plain Geology," presented to the Society of Economic Geologists December 21, 1921, in which he argued for effective communication of our science to the public. Smith was the Director from 1907 to 1930. Members of the tableau, left to right: Gene Robertson, Jack Epstein, Elliott Spiker, Susan Russell-Robinson, Kathleen Gohn, John Keith, Bruce Lipin, Liz Koozmin, Sheila Martin, and John Jones.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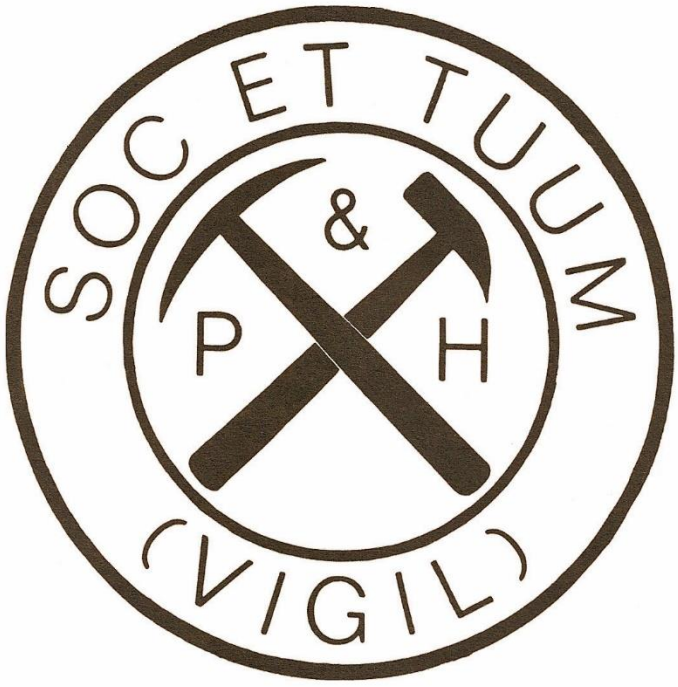
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