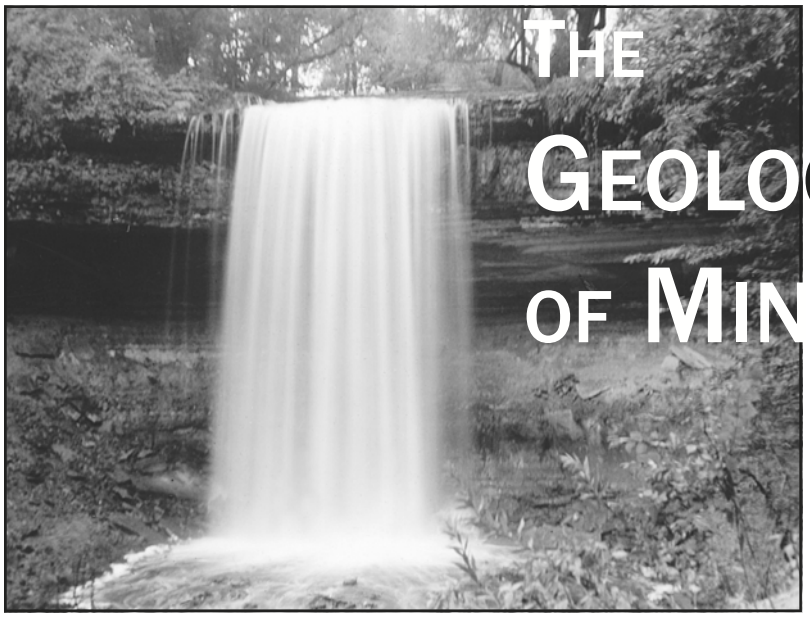
Summer 2012 *Promoting public interest and educational support in the geological sciences* Volume 66, No. 2



The Geological Society of Minnesota News

Volunteer opportunities, field trips, lectures, and public service, since 1938

ALMOST TIME FOR THE GSM STATE FAIR BOOTH!

Anyone who has staffed the GSM State Fair Booth knows how much fun it is to share our enthusiasm for geology with a broad cross-section of society. Many of us were first recruited to be GSM members at that booth, weren't we?!

So, in the next couple of months, the Show and Exhibit Committee will recruit volunteers for the 2012 GSM State Fair booth! We will need 72 people, each to work a 4-hour shift. The Fair starts on Thursday, August 23 and ends on Labor Day, September 3. Each day is divided into three shifts, 9 AM to 1 PM, 1 PM to 5 PM, and 5 PM to 9 PM.

Young and old alike will show interest in our rock display, and we will have new items to draw attention to the booth. Field trips and lectures will spark interest in students and their parents, so we will have our Brochures and fall lecture schedules to hand out. When people ask you a question at the booth, you can invite them to a lecture with talks by experts. There are also books and other material to show them.

Even though it's early in the year, this is a good time to get the shift you want. So, please call **Sandy Steffner at 952-831-5165** to claim your spot. If I don't hear from you before long, you'll be hearing from me!

Sandy Steffner

Upper photograph: GSM field trip to Minnehaha Falls, July 12, 1942

Inside this issue:

from the archives: three geologists examining a basal conglomerate at Taylor Falls, GSM Field Trip, September 1939

GSM News

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The Geological Society of Minnesota is a 501(c)3 nonprofit organization. The purpose of this newsletter is to inform members and friends of activities of interest to the Geological Society of Minnesota.

Send all GSM membership dues, change of address cards, and renewals to:

Joanie Furlong
GSM Membership Chair
P.O. Box 390555
Edina, MN 55439-0555

Membership dues are: $10 Full-time students; $20 Individuals; $30 Families

GSM News is published four times a year: **February 15, May 15, August 15, and November 15**. Deadline for article submission is the first of the month, before the date of publication. Send all material to:
Harvey Thorleifson,
thorleif@umn.edu

New Members!
Mark and Debra Larson, Center City
Paul Bartlett, St Paul
James Sundown, Delano

FROM THE PRESIDENT'S DESK

We just finished up another great lecture season. Next season's topics have just been posted to our web site and look as good or even better. Thank you, Steve Erickson, for putting together another amazing series for us.

This summer there will be at least 2 and possibly 3 field trips that will be happening, so please watch your email, the web site, and our next newsletter. The big event is the State Fair. If you have not already signed up to work in our booth at the fair, please do so. It is really a lot of fun. I'm looking forward to seeing everyone at the Fair or on the field trips. Hope everyone has a safe and wonderful summer.

Roger Benepe, GSM President

E-NEWSLETTERS!

Thanks to everyone who has elected to receive our newsletter electronically. This helps us to cut down on printing and mailing costs, and to produce an even better newsletter – in color! For those who are continuing to receive the newsletter via U.S. mail, please consider switching. The color photos in this newsletter are spectacular! If you haven't done so already, please provide your email address to our membership chair **Joanie Furlong** at jfurlong12345@yahoo.com, and ask to receive your future newsletters, and other mailings electronically.

SAN ANDREAS FAULT GSM FIELD TRIP

APRIL 14—22, 2012
An Outstanding Success!

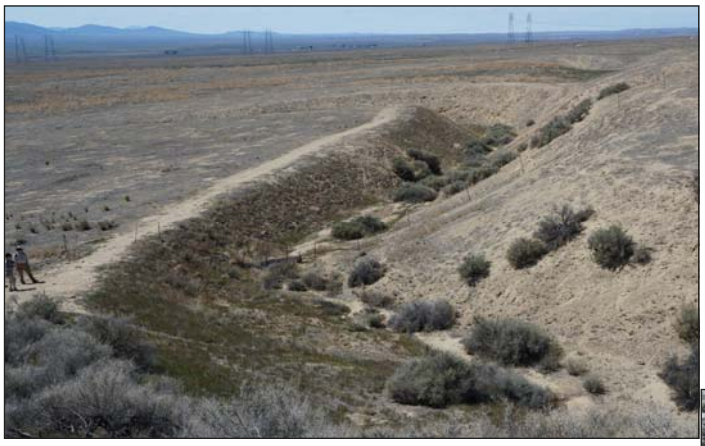
This spring, GSM members had one heck of a trip tracing the San Andreas Fault from as far north as the area around Parkfield, California to 30 miles north of the Mexico border and then back to LA, driving more than 1400 miles during one week!

After arriving in Los Angeles, our group of 19 folks assembled and headed to the Carrizo Plain. This is wide-open, arid country where the fault is easily seen because of the surface rupture it created in the great Tejon Pass quake of 1875. It was a heady experience to be able to stand "with one foot on the Pacific Plate and one foot on the North American Plate" although our leader David K. Lynch continually reminded us that the fault is an entire complex "zone", not merely a trough in the sand.

Crisscrossing an active fault for a few days was quite refreshing--a real departure from normal life. And it was especially satisfying to do it with David Lynch who is so intimately familiar with the fault. Dave is a smart and entertaining guide and the author of **Field Guide to the San Andreas Fault**. He was our guide for the first four days and provided expert navigation, insight, commentary, and humor that rounded out his guidebook's descriptions. Even though the guidebook is excellent, we would have been

far less certain about what we were seeing, and would have found far fewer great locations to see without Dave's help.

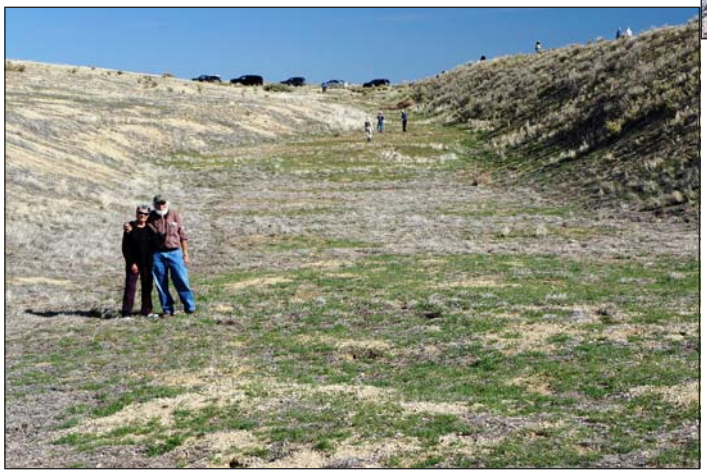
Lynch explained the many geologic features created by the fault, all of which we saw, some in great number:



Offset along Wallace Creek

Offset creeks such as Wallace Creek, are features created when movement of the fault over centuries has offset the creek channel perpendicular to its flow.

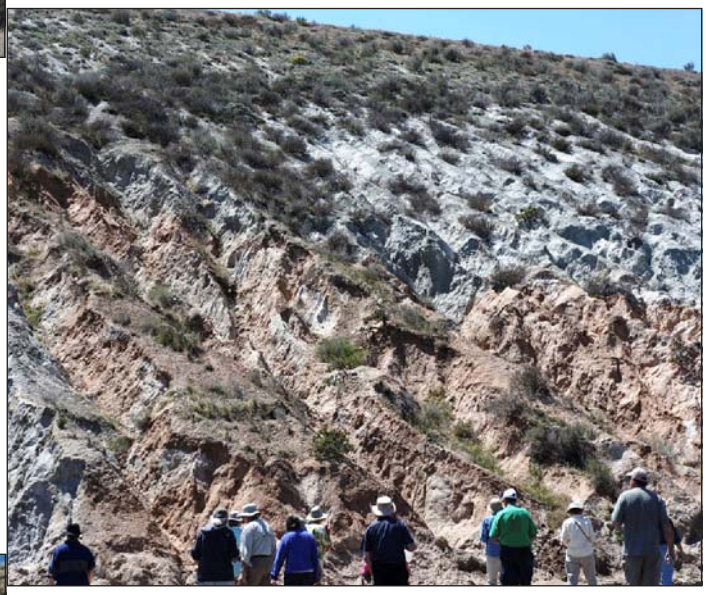
Grabens, are formed by blocks dropping into pull -apart basins when the fault is not exactly parallel to the plate movement, in regions where the Pacific plate pulls away from the North American plate.



GSM members exploring a graben

Sags are pulled apart by fault motion, and this pull apart occurs only when the fault steps sideways or zigzags, specifically in a right hand direction. Since sags are low points, they often fill with water, creating sag ponds. Much of the land we traversed is ranch land and many of these sag ponds are used for watering cattle.

Pressure ridges are raised, linear topographic features that also result when the fault is not exactly parallel to the plate movement, in this case with the Pacific plate pushing into the North American plate, raising the ridge. Since pressure ridges are high points sometimes near sag ponds, we saw frequent examples of expensive homes built atop them; locals are often not aware or don't believe the big one is coming in their time.



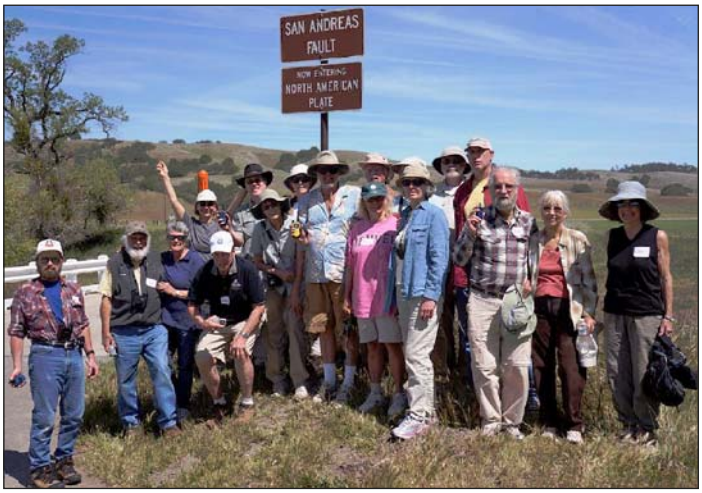
Deeply eroded gouge

Gouge, is pulverized, weak, powdery rock at the fault plane caused by friction between two plates when the fault slides. Since considerable heating of the rock can occur with plate movement, the gouge often has been chemically altered and can appear as very colorful, deeply eroded bands.

Along parts of the fault, the rocks are locked; pressure builds and lets loose in big earthquakes. In other parts, the plates continually creep causing landslides and requiring the roads to be patched

and re-patched. Lynch explained that the "slow" quakes in the Parkfield region are "a swarm of very small quakes of magnitude about 0.5 to 1.0, distributed spatially and in time."

Our group was charmed by Parkfield, the "Earthquake Capital of the World". The tiny town (population 18 as of 2007) is in lush, green, open-range cattle-ranching country. Parkfield's famous offset bridge crosses the fault and signs are posted



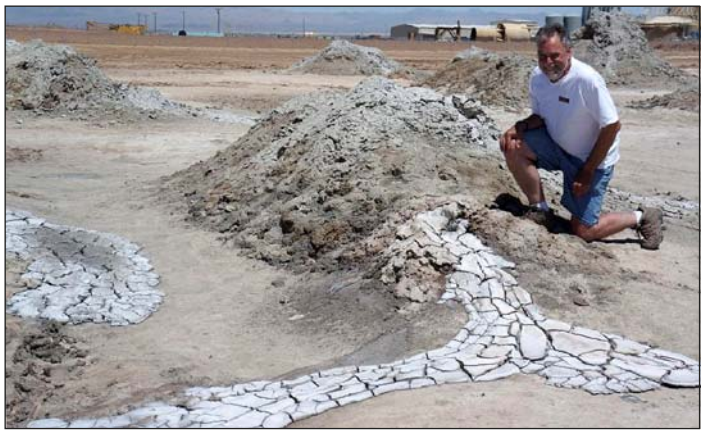
GSM group at the Parkfield offset bridge. The North American Plate in in the background.

telling which tectonic plate is where. While examining a nearby road cut, our group found itself in the midst of a helicopter cattle round up. Parkfield has a sweet little lodge/restaurant and remodeled post office for lodging. That evening we had dinner with the 'copter pilot and the ranch owner; the owner gave us an entertaining history of Parkfield while our food was being prepared.

In Wrightwood we saw the scar of the Heath Canyon Landslide, a barren exposure of Pelona schist that produced the Wrightwood Mudflow. In May of 1941, a sudden warming melted the snowpack, lubricating the already weak schist. The hillside began to slide and formed a massive mudflow. Actinolite, a beautiful green mineral related to asbestos, was a significant component of the mudslide, and Dave Lynch found a great area for us to collect some of that mineral – a huge diversion ditch which hopefully will divert any future mudslides around the town.

From there, GSM member Randy Strobel became the group's guide as we headed to the bizarre Salton Sea area. The sea is a huge lake (15 by 35 miles), 226 feet below sea level, created by accidental breaching of a levee containing Colorado River floodwaters. In the 1950s and 60s, it was a vacation paradise, then abandoned, and is now a haven for people who enjoy life outside the mainstream. At the same time, this "environmental disaster" is a necessary migratory bird layover spot. Arranging for a park ranger from the Sonny Bono Salton Sea National Wildlife Refuge to speak to us was certainly an achievement on Randy's part. The annual evaporation from the Salton Sea is six feet, but is approximately matched by runoff from nearby agricultural irrigation, with salt content now about 25% higher than that of oceans. In the heat of summer, with 90 degree F water temperature, the oxygen content of the Salton Sea is low enough to permit Botulism organisms to thrive, which the Tilapia fish tolerate, but birds consuming the fish are sickened, and will often die without care. With care, about 80% of these fish-eating birds can recover.

South of the Salton Sea, the San Andreas Fault disappears to the east, and a spreading center exists, similar to mid-ocean spreading centers, with hot magma below. The spreading center has formed the Gulf of California, with Baja Peninsula on the west. Geothermal power plants have been



Dave at a mudpot, geothermal plant in background

built over the magma and trace the location of the spreading center. We were greatly entertained by mud pots, bubbling, burping and belching, with popping mud bubbles, making the spreading center even more evident.

Our group visited Obsidian Hill, to see obsidian "in the wild". Obsidian is a remarkable, improbable natural glass--a random mixture of glass-forming materials that has about a 50% chance of being water soluble and just a low chance of cooling fast enough to form glass but not so fast that it will crack and craze.

As a group we took a side trip to Painted Canyon. The canyon slices across the fault, and we got an amazing view of the fault and rocks that it had brought up from depth, and saw how the surrounding rocks have been affected.

Deformation on the wall of Painted Canyon

The day we were back in MN, we learned there had been a 3.9 magnitude quake heard and felt in the Chino area--a place we had left 24 hours earlier!

Maybe next trip!

In the next GSM newsletter, we will include an article to describe scarps and landslides we saw, mention weather we experienced, review a trip to Painted Rocks National Monument, consider the famous Palmdale Road Cut, our lunch at Salvation Mountain, mention our experience at Joshua Tree National Park and tell what we saw at La Brea Tarpits.

This article was a joint effort by: Diane Lentsch, Bill Robbins, and David Wilhelm

Photos by David Wilhelm

FRACK SAND

The Upper US Midwest is one of the few places on Earth where the hydrocarbon industry can obtain silica sand that is just right as one of the ingredients for the extraction of oil and gas from rocks such as shale using the hydraulic fracturing or fracking method. For over a century it has been mined in Minnesota where it is found in the southeastern portion of the state. Even though sand can be found all over the world, sandstones found in the Upper Midwest have several unique physical properties. This industrial silica sand consists of well-rounded sand composed of almost pure quartz grains. Quartz, or silicon dioxide (SiO2), is one of the most common minerals found on the Earth's surface and is found in rocks like granite, gneiss, and sandstone. Industrial silica sand is a higher value product than sand and gravel used in the construction industry, due to it purity as measured by quartz content.

Over the past decade, a rapid expansion of shale oil and gas development has created a sharp increase in demand for industrial silica sand. The hydraulic fracturing extraction method requires approximately 10,000 tons of industrial silica sand per well. Due to increased demand, permits for new industrial silica sand mines and expansion of existing mines are being submitted across the southeastern portion of Minnesota. Three sandstone formations have potential for producing high quality industrial silica sand. The Jordan and Wonewoc sandstones are the most sought after sources followed by the St. Peter sandstone. To date, five counties - Winona, Goodhue, Wabasha,

Houston, and Fillmore – have passed moratoria on new permits for industrial silica sand mining.

In the hydraulic fracturing process, a mixture of industrial silica sand known as frack sand, water, and chemicals is injected under high pressures to maintain fractures in shale. The sand-filled cracks and fissures create conduits for fluids and gas to flow into an oil and gas well. The sand is mined processed in places such as Minnesota and Wisconsin, and it is then transported out of the state by rail or barge to the oil and natural gas producing regions such as North Dakota, Pennsylvania, and Texas.

Tony Runkel, Minnesota Geological Survey Chief Geologist, will speak on Fracking Sands of Minnesota and Wisconsin on November 12, as part of our 2012-2013 Lecture Series. Watch for the complete lecture schedule in the next issue of the newsletter.

Katy Paul

URANIUM, JUST FOR FUN

What comes to mind when you hear the word "uranium"? …visions of huge mushroom clouds, or the giant stacks of nuclear power plants? Geiger counters, fission, atom bombs, or radioactivity? Some people don't think of any of these things. Some people just think of translucent, greasy-looking greenish/yellow glass that glows under ultra violet light, also known as black light. In the 20th century, uranium was used for many things, but not everyone knows that in the 19th century, uranium was used as a coloring agent in the manufacture of glass.

"Uranium glass", also known as "Vaseline glass" due to its dull greasy-yellow luster, was first manufactured in the early 19th century. The first person to use uranium to color glass is not known, but by the 1830's several glass manufacturers were selling green and yellow colored objects made with uranium oxide. Both pressed and blown glass objects in green, amber, and canary yellow were manufactured right up until the Second World War, when uranium became a precious and restricted commodity, for those other reasons, mentioned earlier. Toiletry bottles, glasses, figurines, neon light tubing, ashtrays, knife rests, candle holders, lampshades, and insulators are just some of the products produced in shades of yellow and green with the help of uranium.

Back in the early 1800s the unstable nature of uranium was not known, and in spite of an alternative green coloring agent being available – iron oxide – the use of uranium in glass may have been preferred due to its "glowing" properties. Without interference from light produced from electricity, uranium glass will glow when the last rays of the sun produce more ultra violet rays during twilight. Imagine families sitting in their unlit living rooms as the sun sets, watching their uranium glass figurines or bowls take on an eerie greenish glow.

Very small quantities of uranium were used in the manufacture of glass. Variations from as little as .03% to as much as 1.24% are recorded from analysis of 19th century glass, but this is enough to register on a Geiger counter. Radioactivity was unknown back then, and today, the amount of radioactivity in uranium glass is not thought to pose a health hazard. Many glass collectors prize those pieces of uranium glass they are able to add to their collections.

If you would like to go on a field trip and see some real uranium glass, there is an antique shop on Main Street in Stillwater that has a small closet, filled with examples of Uranium glass/Vaseline glass, lit with a black light. Each object quietly glows with a ghostly greenish hue. If so inclined, you can obtain your own specimens with your "silver pick".

Katy Paul

IS MINING THE DULUTH COMPLEX SAFE FOR THE ENVIRONMENT?

Though discovered more than 50 years ago, Minnesota's vast resources of copper-nickel and platinum group metals associated with the Duluth Complex –perhaps the largest undeveloped base metal resource in the United States – have lain idle largely because the technology to process these ores economically and in an environmentally acceptable manner had not been developed. The introduction of new, cleaner metallurgical processes, plus strong market demand for the products, now makes these developments possible.

PolyMet Mining Corporation is developing a copper-nickel-precious metals project in the established mining district of the Mesabi Iron Range in northeastern Minnesota. PolyMet controls 100% of the NorthMet ore deposit and owns the nearby Erie Plant, a large crushing and milling facility with associated infrastructure. PolyMet is currently in the advanced stages of the environmental review process.

Environmental groups are launching a campaign against plans for copper, nickel and precious metals mining in northeastern Minnesota. Conservation Minnesota, Friends of the Boundary Waters Wilderness and the Minnesota Center for Environmental Advocacy are targeting the proposed PolyMet and Twin Metals mines. The campaign includes the web site MiningTruth.org, a 40-page report, and four billboards along Interstate 35 between Minneapolis and Duluth to reach summer travelers

The groups say that mining copper, nickel, gold and other metals will produce sulfuric acid and other contaminants when exposed to the elements. Frank Ongaro of the industry group MiningMinnesota, however, says the state has strong regulations to protect the environment and companies won't get a permit unless they show they can meet them.

GEOLOGICAL SOCIETY OF MINNESOTA 1938

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