Earth Science Week
Field Trip #2, October 16, 1999
What’s Shakin’ in the Neighborhood?

Road Log

Safety Precautions: Please be careful! We will be visiting places where there may be such hazards as hot geothermal pipes, loose gravel on slopes, broken glass, and loose rocks. Please be mindful of such potential hazards and take care of those around you, especially children. Wear eye protection and gloves if you will be breaking rocks with a hammer and make sure no one else is near enough to be injured by flying rock fragments. Do not harm any plants or animals, including the roots of trees. Dig only in already-disturbed areas. Do not dislodge any rocks on a slope where they could roll down onto someone else.

Our field trip today will explore evidence for ancient and more recent earthquake activity along faults from southwest Reno south past the town of Genoa, within what is termed the Sierra Nevada-Great Basin seismic belt. Along the fault system we will visit a major active geothermal area that produces electrical power and is characterized by unique rocks and minerals.

Mileages are given in miles from the last point followed by cumulative trip mileage (e.g. 0.5/22.5 means 0.5 mile from the last point and 22.5 miles from the beginning of the trip).

0/0 Parking lot at Evans and Record; turn left (west) on Evans, and take first left (still on Evans), then first right onto 7th, right on Center, and right onto the Interstate-80 on-ramp, headed east.

1.4/1.4 Turn right on U.S. Highway 395 South. We are crossing the Truckee Meadows, a valley formed by down-dropping along faults at the base of the mountain ranges to both the east and west. To the east rises the Virginia Range, composed of volcanic rocks that have been altered in many places to colorful, iron-oxide-stained, clay-rich rock by hydrothermal (hot water) activity. Most of the gold and silver deposits of Nevada (the nation’s leading producer of both) formed from such hot waters, including the Comstock Lode in Virginia City just over the crest of the Virginia Range to the southeast. The Carson Range rises to the southwest; it is the westernmost range in the Basin and Range physiographic province. It consists mainly of granitic intrusive igneous rock that crystallized at depth in the earth’s crust about 70 million years ago and has been uplifted along a range-front fault system over the past several million years. The granite is overlain by darker andesitic volcanic rocks. The Huffaker Hills rise from the valley floor on the left (southeast). They are composed of Miocene-aged volcanic flows and domes.

6.4/7.8 Turn right on Exit 61, turn right at end of ramp, heading south on South Virginia Street.

2.7/10.5 Turn right at light onto Arrowcreek Parkway. Continue west on Arrowcreek Parkway for two miles.

2.0/12.5 Park on right shoulder of road at Wolf Run Golf Course. Assemble on sidewalk – Watch out for traffic on Arrowcreek Parkway!

STOP 1. Overlooking Wolf Run Golf Course. We have been climbing west up what is called the Mount Rose Fan, an apron of material eroded from the rising mountains to the west and deposited onto the valley floor to the east over the past few million years. In this area, the main fault zone that uplifts the Carson Range includes many small north-south-trending faults that cut the alluvial fan deposits. Some of these faults have been active as recently as a few hundred years ago. Can you see any evidence of possible faulting at this stop? Examine the geologic maps and aerial photos of this area. Can you identify both wise and unwise land-use decisions evident in this area?

Return to vehicles and continue west on Arrowcreek Parkway to Thomas Creek Road.

0.5/13.0 Turn left on Thomas Creek Road

0.7/13.7 Crossing Whites Creek

0.2/13.9 Turn right (west) on Mount Rose Highway, State Route 431

1.4/15.3 Turn left on Callahan Ranch Road go about 0.2 miles and turn left on remnant of “old Callahan Ranch Road.” Go to end leaving room for others to park behind you.

0.3/15.6 STOP 2. Mount Rose Fan – Callahan Ranch Area

Optional exercise in drawing a topographic profile of a slope (possible activity for a middle or high school class). Using a water bottle as a level, pencil, and graph paper, work in small groups to produce
Earth Science Week
FIELD TRIP 2
Stop 1  Wolf Run Golf Course
Stop 2  Callahan Ranch
Stop 3  Steamboat geothermal area
Stop 4  Davis Creek Park
Stop 5  Genoa gravel quarry

Active fault
a rough “pace and compass” topographic profile from Callahan road west up the Mount Rose fan, graphing your elevation change over the distance you walk in a straight line to the west. (As we do not all have compasses, you may sight on the water tank on the hill to the west of us.) Discuss possible origins of the topographic features encountered along the traverse. Also take note of the rock types encountered in the float in this area. What measures can homeowners and developers in this area take to minimize damage from future seismic events?

Return to vehicles and retrace route back to Mt. Rose Highway

0.2/15.8 Turn right (east) on Mt. Rose Highway, State Route 431.
2.6/18.4 Turn right (south) at light at Wedge Parkway. Proceed through construction area
0.1/18.5 Turn left on gravel road and left through gates of Yankee Caithness Power facility. Follow paved road. (Permission from Yankee Caithness is required.)
0.7/19.3 Park on roadside at road’s first major bend to the right. The site of the future UNR Redfield campus lies immediately to our north.

Due to limited parking at the next stop at the Sulfur Pit area, Yankee Caithness personnel have asked us to regroup here, squeezing into as few vehicles as possible.

STOP 3a. Steamboat geothermal area. Both heat and pressure increase with depth in the Earth’s crust. Geothermal areas often occur where a fault system allows groundwater to penetrate deep enough into the earth to be heated by the Earth’s natural heat or by heat from a cooling magma below the surface. Water percolating down through fractures and faults in the rocks is heated and rises again through the same conduits to form hot springs, geysers, fumaroles and the other features associated with geothermal areas. Wherever you see hot springs, suspect associated fault systems. Can you think of other nearby hot springs that might be associated with faults? (Moana, Bowers Mansion, Walley’s, Grovers) Think about the location of these springs relative to mountain ranges. Before returning to vehicles, look at the rock float on the ground in this area. How is it different from other rock you have seen at earlier stops today? This rock is called sinter and is composed primarily of silica (SiO₂) that was deposited by hot springs as they migrated and changed position on this terrace over the past few million years.

Discuss history of the geothermal area, relationship to fault system, highway construction material, and geothermal power plant.

Return to vehicles, carpooling to take as few vehicles as possible up to the pit area; we will return to this spot shortly.

Drive up the paved road to the south.

0.6/19.9 Turn right on unmarked gravel road up to reinjection well area.
0.3/20.2 Park in area on the right and assemble near vehicles.

STOP 3b Sulfur Pit, Steamboat geothermal area.

Please exercise extreme caution in this area and keep children with you at all times!! The horizontal pipe is a reinjection well for the geothermal power plant. It is very hot (~300° F) and must not be touched or a severe burn may result. Cross pipe only in designated area at west end of pipe past the “TEE”. Keep children away from the pipe.

Look at the rock in the small pit on the hillside behind the metal buildings. How does it differ from the rock seen where vehicles are parked below? What other rock types are found in this area? Copious sampling of the rock in the pit area is discouraged; please leave this unique resource for others to enjoy. On a good day, you may be able to savor the pungent emanations peculiar to geothermal areas! Yankee Caithness utilizes this natural source of geothermal energy to produce 3.5 megawatts of electrical power, and nearby SB Geo Inc. produces about 48 megawatts of electrical power. Refer to handouts on geothermal energy to learn more about how electricity is generated at geothermal sites, and for contacts to call to set up tours of the power-generating facilities.

Return to vehicles and regroup at the spot where the other vehicles are parked below, then retrace route back to intersection of Wedge Parkway and State Route 431 (Mount Rose Highway).

1.6/21.8 Turn right (east) on the Mount Rose Highway.
1.3/23.1 Turn right at U.S. Highway 395, south.
6.0/29.1 The landslide scars on Slide Mountain are clearly visible in front of us to the right (west).
8.9/32.0 Turn right on State Route 429.
0.4/32.4 Turn right into Davis Creek Regional Park (Washoe County Park).
0.2/32.6 Turn left at fork in road to day use area and follow paved drive south to the Lakeview group area at the end of the road; park here.

0.4/33.0 **STOP 4: Davis Creek Park, Ophir Creek Trail and trench area.** The fault that bounds the west side of Washoe Valley goes through Davis Creek Park and generally lies along the base of the hill slope. We will take a short hike to the south along the fault to a small fault scarp in Holocene (<= 10,000 years old) deposit. NMBG geologists trenched the fault at this location and found evidence of two paleo-earthquakes within the last few thousand years.

Retrace route back out to State Route 429

0.6/33.6 Turn right (south) on State Route 429.

0.7/34.3 Note light-colored bouldery sediments along roadsides in this area. This is where a debris flow crossed the road in 1983. An extremely wet winter and rapid spring thaw caused a landslide of rock and soil to slide off Slide Mountain into Upper Price Lake, which then overflowed first into Lower Price Lake. Then the combined mass of water, soil, rocks and vegetation flowed rapidly down Ophir Creek Canyon. The 30-foot-high wall of debris reached the valley below and fanned out, extending all the way across southbound lanes of U.S. Highway 395, forcing its closure. Several people were caught by the fast-moving flow; one person was killed; others were severely injured; and several houses were destroyed. Similar debris flows can also be triggered by seismic events.

0.7/35.0 Bowers Mansion. The swimming pool here is geothermally heated, and hot springs behind the mansion mark the trace of the Sierra Nevada frontal fault in this area.

5.7/40.7 Road rejoins U.S. Highway 395. Continue south on it through Carson City.
4.7/45.4 Pass Highway 50 East on left.
3.4/48.8 Pass Highway 50 West intersection on right.
0.7/49.5 Douglas County Line
0.7/50.2 Turn right on Jacks Valley Road
1.4/51.6 Jacks Valley Elementary School on the left
1.1/52.7 Jacks Valley. The Carson Range rises abruptly to the west along the frontal fault.
2.0/54.7 Note how the river hugs the west side of the valley here.
3.8/58.5 Town of Genoa. Continue south on Route 206.
1.2/59.7 Turn right into wide turnout near gravel pit. Park vehicles.

**STOP 5: The Genoa fault** The actual fault plane surface, up to 40 feet high, is exposed in the quarry and is marked by “slickensides” or grooves in the polished surface resulting from fault movement. Studies of trenches cut through nearby alluvium and bedrock indicate that several seismic events formed this scarp, the youngest between 500 and 600 years ago. Note the marshy area in the Carson Valley below that hugs the west side of the valley, indicating that the valley floor has been tilted down to the west, also a result of earthquake activity on the Genoa fault.

Thank you for helping us celebrate Earth Science Week, which has been officially designated as the second full week of October by Governor Kenny Guinn, and is a nationwide recognition of the importance of geology and the other Earth sciences to society. This field trip is sponsored by volunteers from the Nevada Bureau of Mines and Geology, Department of Geological Sciences, and W.M. Keck Museum at the Mackay School of Mines, University of Nevada, Reno; Desert Research Institute; Nevada Division of Minerals; Geological Society of Nevada; American Institute of Professional Geologists; Association of Engineering Geologists; Nevada Paleontological Association; Nevada Petroleum Society; Society for Mining, Metallurgy, and Exploration; U.S. Geological Survey; U.S. Bureau of Land Management; U.S. Forest Service; and Nevada Mining Association.

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